# CLIMATE ACTION PLAN Update 2013

Town of Apple Valley

Terra Nova Planning & Research, Inc.®
42635 Melanie Place, Suite 101
Palm Desert, CA 92211

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# I. EXECUTIVE SUMMARY

This Climate Action Plan includes general information about greenhouse gases and climate change, assumptions and data used to determine the 2005 inventory and baseline, the 2020 forecast under business as usual conditions, and the proposed reduction measures that will enable to Town to achieve the targeted reduction level, thereby doing its part to limit greenhouse gas emissions statewide that contribute to climate change. As described below the Climate Action Plan is divided into community-wide emissions and municipal specific emissions.

The 2005 CAP was designed to be revised every 3 years to respond to advances in technology, emerging policy reforms, and to build on the successes of Apple Valley's efforts to reduce greenhouse gas emissions. The 2013 CAP update seeks to ensure the reduction measures proposed and implemented in the 2005 CAP support the Town's greenhouse gas emissions reduction target of 15% below 2005 levels by 2020. This update identifies the next steps for Apple Valley's reduction plan based on the progress of the past 3 years. The Town has identified which actions should continue, which should be dropped, as well as proposing new actions to be added.

The 2013 updates to the Climate Action Plan are boxed in green throughout this document.

## Community-Wide

The Climate Action Plan for the Town of Apple Valley was prepared using the year 2005 as the baseline and with a greenhouse gas emissions reduction target of 15% below 2005 levels by 2020. The Chart below shows Apple Valley's community-wide GHG trend under business as usual conditions, the 2005 baseline level, and the 15% reduction target. Apple Valley must reduce greenhouse gas emissions by a minimum of 373,317 tons of $CO_2e$ in 2020 in order to meet the reduction target of 15% below 2005 levels.

Apple Valley has made great strides in reducing community-wide GHG emissions since the implementation of the 2010 CAP. Based on 2013 community-wide emissions, Apple Valley must reduce greenhouse gas emissions by a minimum of 176,245 tons of $CO_2e$ in 2020 in order to meet the reduction target of 15% below 2005 levels. This translates to a 197,072 ton reduction in $CO_2e$ from 2005 to 2013 in order to reach 2020 targets.

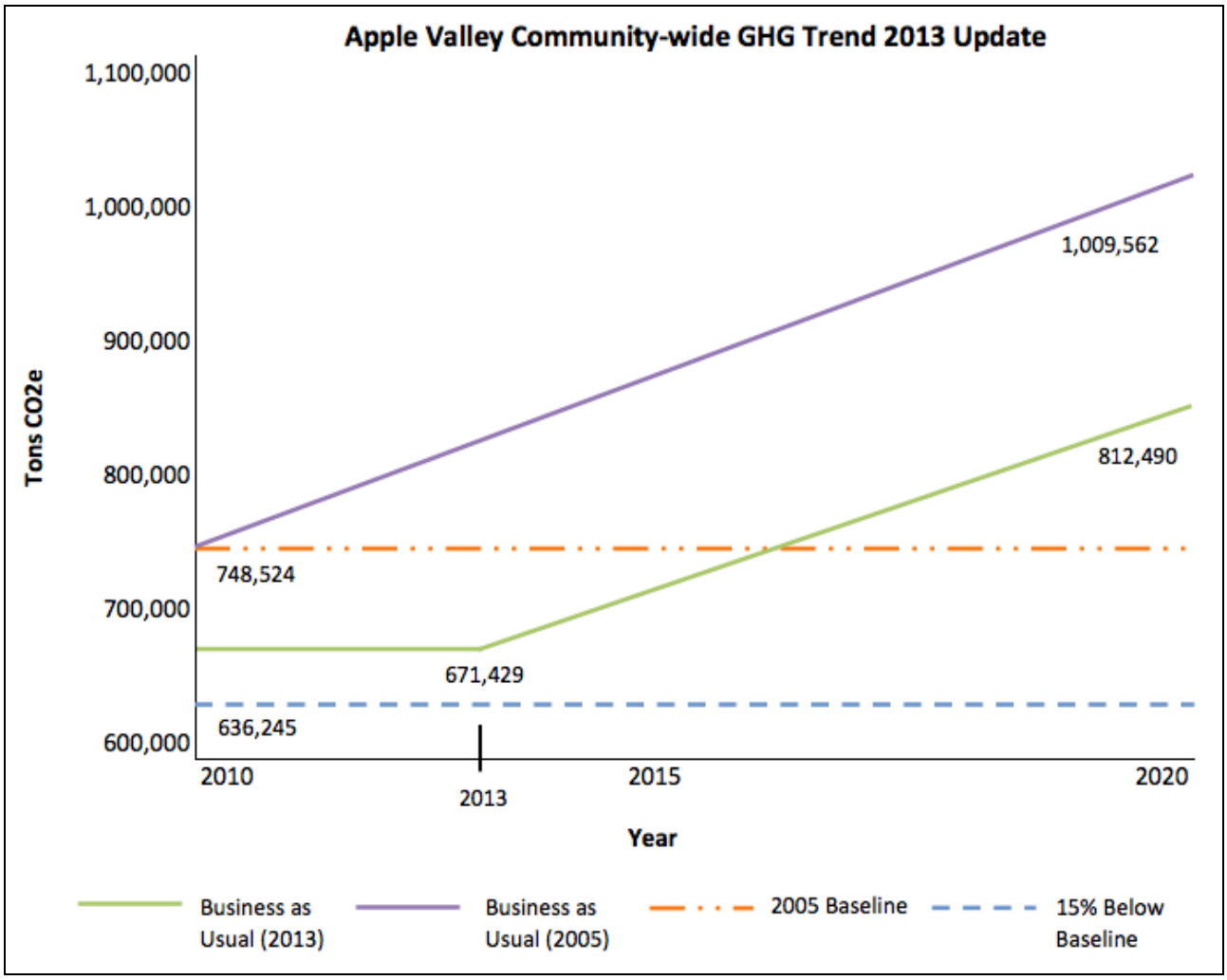


**Chart 1: Community-Wide GHG Trend 2013 Update**

## Municipal-Specific

As with the community-wide analysis, the municipal-specific inventory was prepared using the year 2005 as the baseline and with a greenhouse gas emissions reduction target of 15% below 2005 levels by 2020. Chart 2, below shows Apple Valley's municipal-specific GHG trend under business as usual conditions, the 2005 baseline level, and the 15% reduction target. Apple Valley's municipal operations must reduce greenhouse gas emissions by 1,315 tons of $CO_2e$ in 2020 in order to meet the reduction target of 15% below 2005 levels.

Based on 2013 municipal emissions, Apple Valley must reduce greenhouse gas emissions by a minimum of 1,702 tons of $CO_2e$ in 2020 in order to meet the reduction target of 15% below 2005 levels. This translates to a 387 tons increase in $CO_{2e}$ from 2005 to 2013.

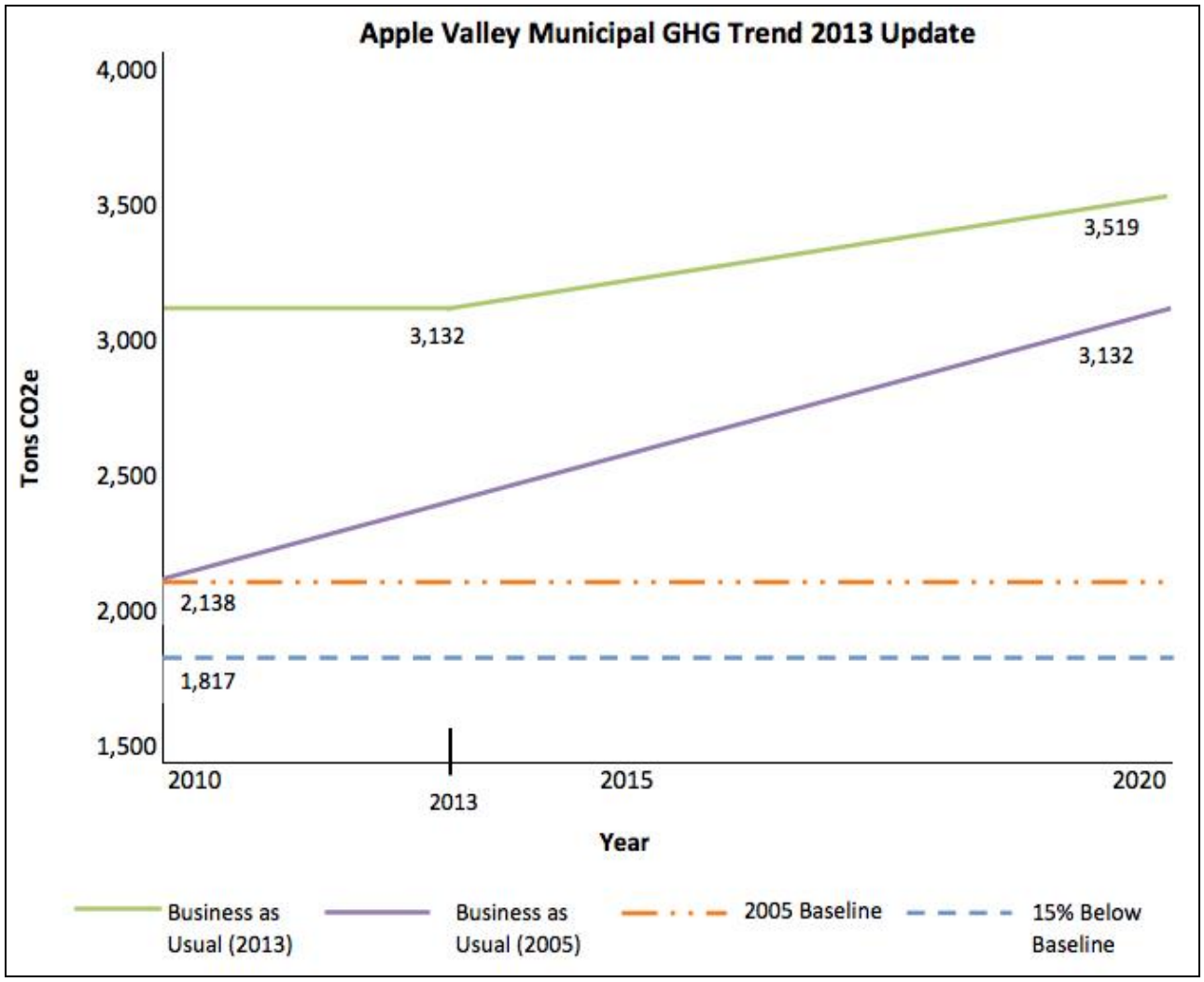


**Chart 2: Municipal-Specific GHG Trend 2013 Update**

# II. INTRODUCTION

Greenhouse gases have, throughout earth's history, had a beneficial purpose – they keep the sun's heat in earth's atmosphere, help to keep temperatures stable at an average of 60 degrees Fahrenheit, and influence climate across the globe. As fossil fuel use and industrial processes increased in the last two centuries, however, the production of greenhouse gases also increased beyond the natural order. As greenhouse gas concentrations rise in the atmosphere, they result in increases in temperature – this increase has become known as climate change. Greenhouse gases include several chemicals: carbon dioxide ($CO_2$), methane ($CH_4$), nitrous oxide ($NO_2$), ozone ($0_3$) and hydrofluorocarbons. Carbon dioxide and methane are the most common greenhouse gases.

## A. The Impact of Climate Change

Climate change can increase hazards associated with wildfires, rising sea levels, and groundwater supply. Public health can suffer due to greater temperature extremes and more frequent extreme weather events, increases in transmission of infectious disease, and increases in air pollution. Agricultural production can be altered by changes in temperature and rainfall patterns.

Rises in temperature have the potential, for example, to cause a shift in the hydrological cycle. While predicted patterns vary with latitude and global location, roughly 75% of analyzed climate change models agree that within the western United States there will be a 10% to 40% decrease in stream flows by 2050[1]. This may be due to a decrease in precipitation levels, which has been evident in the drought conditions suffered by the southwest in recent years, as well as an increase in evaporation, which is temperature dependent and increases as temperatures climb. It has been predicted that a change in the global average surface temperature of 2°C would be at the low end of the possible range[2]. According to the Institute for the Study of Planet Earth at the University of Arizona, it is estimated that a 2°C increase in temperature corresponds to a 9% to 21% decrease in stream flow on the Colorado River[3].

The coast of California is likely to see a rise in sea level that could threaten shorelines, cause increased erosion, and loss of life and property. Sea level rise and storm surges could lead to flooding of low-lying property, loss of coastal wetlands, erosion of cliffs and beaches, saltwater contamination of drinking water, and damage to roads, causeways, and bridges.

1 "Global Pattern of Trends in Stream Flow and Water Availability in a Changing Climate," by P.C.D. Milly et al., Nature Letter 2005.

2 "Working Group III contribution to the Intergovernmental Panel on Climate Change Fourth Assessment Report," Climate Change 2007: Mitigation of Climate Change.

3 "Climate Change in the Colorado River Basin and CAP: a model study," prepared by the Institute for the Study of Planet Earth at The University of Arizona July 18, 2000.

Between the beginning of the industrialized era and 2005, the atmospheric concentration of $CO_2$ in the atmosphere had increased by 35%, methane by 151%, and nitrous oxide by 18%.

It is estimated that in 2004, total GHG emissions were 20,135 teragrams of carbon dioxide equivalents (Tg $CO_2e$), excluding emissions/removals from land use, land use change, and forestry. The U. S. Environmental Protection Agency in 2004 estimated that the U.S. contributed 35% of global GHG emissions, with a total of 7074.4 Tg $CO_2e$, an increase of 15.8% over 1990 emissions.

California is the second largest greenhouse gas contributor in the U.S. and the sixteenth largest in the world. From 1990 to 2003, California's GHG emissions increased 12%. In 2004, California produced 492 Tg $CO_2e$, which is approximately 7% of all U.S. emissions. Transportation is responsible for 41 percent of the state's total GHG emissions; while electricity generation represents 22% of the state's GHG emissions. Conversely, emissions from residential and commercial fuel use in California decreased 9.7% from 1990 to 2004. This decrease may be due to increases in the effectiveness of energy conservation in buildings (Title 24 requirements) and more efficient appliances.

According the California Air Resources Board*, the state's gross emissions of greenhouse gas over the period of 2000 to 2012 have decreased 1.6% from 466.3 million metric tons of $CO_2e$ in 2000 to 458.7 million tons in 2012, with a maximum of 492.7 million tons in 2004. During that same time period, California's population grew by 11% from 34 to 37.8 million, indicating the state's per capita GHG emissions have generally decreased from 13.7 in 2000 to 12.1 tons of $CO_2e$ per person in 2012.

Implementation of California's Cap-and-Trade program in 2013 will ensure GHG emissions continue to decline alongside economic growth in the state.

* "California Greenhouse Gas Emission Inventory: 2000-2012," California Environmental Protection Agency Air Resources Board. May 13, 2014.

**Greenhouse Gases**

The term greenhouse gases refers to a broad group of chemicals and substances which all have one thing in common: they have been found to cause changes in the atmosphere which have been shown to, or are suspected of changing climatic conditions on earth. In most cases, these chemicals and substances have a very long life in the atmosphere, and therefore continue to affect climate over a long period of time. The primary greenhouse gases include:

Carbon Dioxide

Carbon dioxide is the primary greenhouse gas that has raised the alarm of atmospheric scientists due to current and projected levels and the highly correlated temperature regression curve that has been observed, predicting a future path of rising carbon dioxide levels and associated increases in temperature. Carbon dioxide is a naturally occurring, odorless and colorless gas. It has natural sources, including bacterial, plant, animal, and fungal respiration; the evaporation of oceans; the decomposition of organic matter; and volcanic out gassing. Man-made sources

include the burning of coal, oil, natural gas, and wood. Carbon dioxide is removed from the atmosphere by photosynthesis, is dissolved into lakes and oceans water, and transferred to the soil.

Currently (May 2014), carbon dioxide concentrations in the atmosphere are around 402 parts per million (ppm). Comparatively, prior to the Industrial Revolution, about 250 years ago, $CO_2$ levels were 278 ppm, and over the past 650,000 years carbon dioxide levels have fluctuated between 180 and 300 ppm, making present day atmospheric $CO_2$ levels substantially greater than at any point in the past 650,000 years.[4]. The concentration of carbon dioxide is projected to increase to a minimum of 540 ppm by 2100 as a direct result of man-made activities.

Methane

Methane has both natural and man-made sources. In nature, it is released as part of biological processes such as in swamplands. Man-made sources include the combustion of fossil fuels, and biomass burning. Human activities such as raising cattle, using natural gas, and mining coal have increased the concentration of methane in the atmosphere in recent times. Methane is extremely effective at absorbing atmospheric radiation. Compared to other greenhouse gases, its 10 to 12 year life span is brief.

Nitrous Oxide

Nitrous oxide occurs naturally in soil and water, resulting from microbial processes. It is also produced by fertilizer which contains nitrogen. Man-made sources include nitric acid production, fossil-fuel powered power plants and vehicle emissions. Nitrous oxide is a colorless greenhouse gas which can cause dizziness, euphoria, and sometimes slight hallucinations. Extended use can cause brain damage. It is used as an aerosol propellant, and as a food preservative, as well as a race car fuel.

Chlorofluorocarbons

CFCs were first synthesized in 1928, and do not occur in nature. They were used for aerosol propellants, refrigerants and cleaning solvents. They were found to be a cause of the reduction in stratospheric ozone, and as a result, a global effort was undertaken to stop their production. This effort was extremely successful, and levels of the major CFCs are now remaining stagnant or declining. Their long atmospheric lifetimes mean that some = will remain in the atmosphere for over 100 years. CFCs are nontoxic, nonflammable, insoluble, and chemically unreactive in the air at the earth's surface. CFCs are known to cause cardiac arrhythmia and asphyxiation.

Hydrofluorocarbons

Hydrofluorocarbons are man-made chemicals that are used as a substitute for CFCs. They are used in automobile air conditioners, and as refrigerants. Prior to 1990, the only significant emissions were of HFC-23. HFC-134a emissions are now increasing due to its use as a refrigerant.

[4] "Working Group III Contribution to the Intergovernmental Panel on Climate Change Fourth Assessment Report, Climate Change 2007: Mitigation of Climate Change," prepared by the Intergovernmental Panel on Climate Change, May 2007.

Perfluorocarbons
Perfluorocarbons (PFCs) are produced in the production of aluminum and semiconductors. They do not break down through the chemical processes in the lower atmosphere. Ultraviolet rays about 60 kilometers above earth's surface are able to destroy them. As a result, PFCs have very long lifetimes of between 10,000 and 50,000 years.
Health Effects: None.

Sulfur Hexafluoride
Sulfur hexafluoride is used for insulation in electric power transmission and distribution equipment, in the magnesium industry, in semiconductor manufacturing, and as a tracer gas for leak detection. Sulfur hexafluoride is an odorless, colorless, nontoxic, nonflammable and inorganic gas. In high concentrations in confined areas, it displaces the oxygen needed for breathing, and can cause suffocation.

Aerosols
Aerosols include sulfate aerosols, which are emitted when fuel with sulfur in it is burned, and black carbon (or soot) which is emitted during bio mass burning and the incomplete combustion of fossil fuels. Aerosols can warm the atmosphere by absorbing and emitting heat and can cool the atmosphere by reflecting light. Cloud formation can also be affected by aerosols. Particulate matter regulation has been lowering aerosol concentrations in the United States; however, global concentrations are increasing as a result of fossil-fuel burning around the world.

Water Vapor
Water vapor has a significant influence on global warming, and is the most abundant and variable transporter of greenhouse gases in the atmosphere. Water vapor maintains a climate necessary for life. As the temperature of the atmosphere rises, more water is evaporated in rivers, oceans, reservoirs and soil. When the air is warmer, the relative humidity can be higher, leading to more water vapor in the atmosphere. This higher concentration of water vapor is able to absorb more of the indirect thermal energy radiated from the earth, further warming the atmosphere. The warmer atmosphere can then hold more water vapor, creating a "positive feedback loop." The feedback loop in which water is involved is critically important to projecting future climate change.

## B. California Law

Perhaps the first requirement for energy efficiency, California Code of Regulations Title 24, Part 6, enacted in 1978, established energy efficiency standards for residential and nonresidential buildings. The standards are contained in the Building Codes used in most California jurisdictions, and are updated periodically to allow incorporation of new energy efficiency technologies and methods. The most recent update occurred in early 2013.

The first piece of California legislation directly associated with climate change was passed in 1988, when Assembly Bill (AB) 4420 was approved. This Bill directed the California Energy Commission to study the implications of global warming on California's environment, economy, and water supply, in consultation with the Air Resources Board and other agencies. The Commission was also required to prepare and maintain the state's inventory of greenhouse gas emissions. The ARB was required to adopt regulations to achieve the maximum feasible and

cost-effective reduction of motor vehicle greenhouse gas emissions. ARB proposal to implement these regulations was approved in September, 2004. Its implementation will result in an average reduction of greenhouse gases from new California cars and light trucks of 22% in 2012 and 30% in 2016.

AB 1493 was signed into law in 2002. It required that the ARB develop and adopt regulations that achieve the maximum feasible and cost effective reduction of greenhouse gases emitted by passenger vehicles and light-duty trucks. ARB adopted regulations in 2004 limiting greenhouse gas emissions from new vehicles sold in California beginning in the 2009 model year. New vehicles complying with this regulation will consume 30% less fuel than vehicles built prior to 2009.

The Global Warming Solutions Act (AB 32), signed in 2006, requires the ARB to develop regulations on how the state will combat global warming, and requires the state to cut GHG emission to 1990 levels by the year 2020. Specifically, AB 32 requires the ARB to do the following:

1. By January 1, 2008, establish a statewide greenhouse gas emissions cap for 2020, based on 1990 emissions.
2. By January 1, 2008, adopt mandatory reporting rules for significant sources of greenhouse gases.
3. By January 1, 2009, adopt a plan which describes how emission reductions will be achieved from significant greenhouse gas sources via regulations, market mechanisms and other actions.
4. By January 1, 2011, adopt regulations to achieve the maximum technologically feasible and cost-effective reductions in greenhouse gases, including provisions for using both market mechanisms and alternative compliance mechanisms.
5. Convene an Environmental Justice Advisory Committee and an Economic and Technology Advancement Advisory Committee to advise ARB.
6. Evaluate several factors, including the impacts on California's economy, the environment, and public health; equity between regulated entities; electricity reliability, conformance with other environmental laws, and environmental justice prior to imposing any mandates.
7. Adopt a list of action measures by July 1, 2007 that can be implemented before January 1, 2010.

ARB has determined that absent AB 32 and other California climate change laws, California's projected 2020 greenhouse gas emissions would be 596[5] million metric tones carbon dioxide equivalent (MMTCO2e). On December 6, 2007, ARB approved the statewide greenhouse gas limit for carbon dioxide equivalent in the amount of 427 million metric tons. Accordingly, to satisfy the requirements of AB 32, California needs to reduce its overall 2020 emissions for all sectors by 169 MMTCO2e, or 28.3 percent below the "business as usual" 2020 projection of 596 million metric tons. The ARB also determined:

> *"In recognition of the importance of local governments in the successful implementation of AB 32…(The ARB) recommends a greenhouse gas emissions*

[5] CARB Scoping Plan, *Table 1*, December 2008.

> *reduction target for local government municipal and community-wide emissions of a 15 percent reduction from current levels by 2020 to parallel the State's target.*[6]"

This 15 percent reduction from current levels applies to all sectors within the control of the local government, including, but not limited to, reducing emissions from current existing buildings and reducing emissions from government fleet cars.

**AB 32 Timeline Update**

- **By January 1, 2009** – ARB adopts plan indicating how emission reductions will be achieved from significant sources of GHGs via regulations, market mechanisms and other actions.
- **During 2009** – ARB staff drafts rule language to implement its plan and holds a series of public workshops on each measure (including market mechanisms)
- **By January 1, 2010** – Early action measures take effect.
- **During 2010** – ARB conducts series of rulemakings, after workshops and public hearings, to adopt GHG regulations including rules governing market mechanisms.
- **By January 1, 2011** – ARB completes major rulemakings for reducing GHGs including market mechanisms. ARB may revise the rules and adopt new ones after 1/1/2011 in furtherance of the 2020 cap.
- **By January 1, 2012** – GHG rules and market mechanisms adopted by ARB take effect and are legally enforceable.
- **December 31, 2020** – Deadline for achieving 2020 GHG emissions cap.

Source: CARB website, http://www.arb.ca.gov/cc/ab32/ab32.htm, accessed June 24, 2014.

To date the ARB, Environmental Protection Agency (EPA), and other regulatory agencies have not adopted thresholds to analyze project level impacts on climate change. The South Coast Air Quality Management District has established a Working Group to work on these thresholds, but has only established thresholds for industrial projects over which it has jurisdiction.

**EPA Update**

**GHG Tailoring Rule** – On May 13, 2010, EPA set greenhouse gas emissions thresholds to define when permits under the New Source Review Prevention of Significant Deterioration (PSD) and Title V Operating Permit programs are required for new and existing industrial facilities. This final rule "tailors" the requirements of these Clean Air Act permitting programs to limit covered facilities to the nation's largest greenhouse gas emitters: power plants, refineries, and cement production facilities.

[6] CARB Scoping Plan, *Introduction – Proposed Measures,* December 2008.

# III. CURRENT EMISSIONS AND REDUCTION TARGETS

## A. Introduction

Establishing a greenhouse gas baseline allows for projecting an emissions forecast and reduction target, and achieving quantifiable emission reductions associated with implementing proposed measures.

A greenhouse gas inventory is intended to consider all activities within the jurisdiction that result in the emission of greenhouse gases. For the purposes of this inventory, major sources of GHG emissions where identified and the contribution of the following greenhouse gases where quantified: Carbon Dioxide ($CO_2$), Methane ($CH_4$), and Nitrous Oxide ($N_2O$). GHG emissions are presented in units of Tons of Carbon Dioxide equivalent (CO2e). In order to determine $CO_2e$ for any greenhouse gas the appropriate global warming potential must be applied; $CH_4$ has a global warming potential of 21 and N2O has a global warming potential of 310.

It should be noted that this GHG Inventory is not intended to be exhaustive, rather a good-faith effort has been made to identify major sources of greenhouse gases and establish a baseline that can be further refined as more detailed information becomes available.

The Town of Apple Valley Greenhouse Gas Inventory was conducted by reviewing records from various Town departments such as Finance and Environmental and Regulatory Compliance, gathering and assembling data from local and regional utilities and management agencies, and utilizing modeling software to inventory emissions and establish a baseline. The purpose of the baseline emissions inventory is to determine the levels of greenhouse gas emissions that Apple Valley emitted in its base year, 2005.

In addition to a Town-wide emissions inventory, analysis was also conducted in order to identify Greenhouse Gas Emissions from Municipal sources. These include Town owned and operated facilities such as government buildings, community parks and recreation centers, traffic signals and street lighting, and operation of wastewater conveyance. Identifying Apple Valley's municipal GHG sources allows the government to estimate and track greenhouse gas emissions resulting directly from municipal operations. Although the municipal operations inventory is intended to be subset of the community-scale inventory, there is some overlap due to lack of detailed information. Where there is overlap it is further explained below.

There are two main reasons for completing separate emissions inventories for community and municipal operations. First, government has a higher degree of control and a greater opportunity to achieve GHG reductions in its own municipal emissions than those created by the community at large. Second, by proactively reducing emissions generated by its own activities, the Town of Apple Valley government takes a visible leadership role in the effort to address climate change, which is important for inspiring local action within Town limits, as well as surrounding communities.

## B. Methodology

The format and methodology used in this Climate Action Plan (CAP) update are modeled after those presented in the 2010 Apple Valley Climate Action Plan. Wherever possible, the same data sources were contacted so that accurate and meaningful comparisons could be made between 2005 (baseline year analyzed in the 2010 CAP) and 2013 data. Where data was unavailable and assumptions were made in the 2010 CAP, attempts were made to acquire actual data for 2013 to reflect current conditions and set the stage for more precise comparisons in future CAP updates. Where 2013 data was unavailable, the same assumptions as those made in the 2010 CAP were used. The 2010 CAP methodology is provided in Appendix A for reference.

Electricity data was provided by Southern California Edison (SCE), and natural gas data was provided by Southwest Gas Corporation. Electricity and natural gas records for individual municipal buildings were provided by the Town's Finance Department. Public transit data was provided by Victor Valley Transit Agency (VVTA), and bus route maps and schedules were viewed on its website. Solid waste data was provided by the Town and Burrtec Waste Industries. Town staff played a key role in providing information about municipal vehicle fleets, staffing, new development, growth rates, and other details about the community. Demographic data was acquired from the California Department of Finance.

Data was collected for calendar year 2013. Where 2013 data was unavailable, it was obtained for the closest year possible. Specifically, the most recent solid waste data was from 2012, and Town electricity and natural gas records for individual municipal facilities were from Fiscal Year 2012/13.

ICLEI's Emissions Analysis Software

To facilitate local government efforts to identify and reduce greenhouse gas emissions, the International Council for Local Environmental Initiatives (ICLEI) developed the Clean Air and Climate Protection (CACP) software package in 2005. This software estimates emissions derived from energy consumption and waste generation within a community. The CACP software determines emissions using specific factors (or coefficients) according to the type of fuel used. The CACP 2009 Version 2.2.1 software (February 2010) has been updated to incorporate the methods and principles of the Local Government Operations Protocol (LGOP), which is designed to provide a standardized set of guidelines to assist local governments in quantifying and reporting GHG emissions associated with their government operations. This software was used to estimate greenhouse gas emissions for 2013.

Emissions are aggregated and reported in terms of carbon dioxide equivalent units, or $CO_2e$. Converting all emissions to carbon dioxide equivalent units allows for the consideration of different greenhouse gases in comparable terms. As mentioned above, methane is twenty-one times more powerful than carbon dioxide in its capacity to trap heat, so the model converts one ton of methane emissions to 21 tons of $CO_2e$.

The methodology employed by the software is consistent with national and international inventory standards established by the Intergovernmental Panel on Climate Change (1996 Revised IPCC Guidelines for the Preparation of National GHG Emissions Inventories), the U.S. Voluntary Greenhouse Gas Reporting Guidelines (EIA form1605), and, for emissions generated from solid waste, the U.S. EPA's Waste Reduction Model (WARM). Emission coefficients have been updated to reflect the latest Southern California Edison and U.S. EPA eGrid data, as well as recent demographic trends of Apple Valley.

As was true when the 2010 CAP was prepared, calculating GHG emissions with precision is difficult. The CACP model provides a useful framework with which to monitor and analyze trends and guide future policies, but it is important to note that specific numbers provided by the model are approximations, not exact values.

Comparisons of 2005 and 2013 data are provided throughout this document to identify community-wide and municipal trends and help shape future policies aimed at reducing greenhouse gas emissions, energy consumption, and solid waste generation in Apple Valley.

### C. 2013 Community-Wide Emissions

Emissions Summary

The table below provides a comparison of 2005 GHG emissions, as estimated in the 2010 Apple Valley Climate Action Plan, and 2013 emissions. As shown, community-wide emissions in Apple Valley were estimated at 748,524 tons of carbon dioxide equivalent ($CO_2e$) in 2005 and 671,429 tons in 2013. This represents a $CO_2e$ decrease of 77,095 tons over the 8-year period. The inventory includes emissions generated within the entire Town of Apple Valley from electricity, natural gas, propane, vehicles, transit buses, pumping, streetlights, traffic signals, and decomposition of solid waste. The data and methodology used to estimate these emissions are described below.

**Table 1**
**Community-Wide GHG Emissions Summary**
**2005 and 2013 Comparison**

| Sector | 2005 Tons $CO_2e$ | 2013 Tons $CO_2e$ |
|---|---|---|
| Residential | 141,417 | 144,325 |
| Commercial | 38,039 | 50,145 |
| Industrial | 7,118 | 1,368 |
| Transportation | 510,676 | 461,357 |
| Solid Waste | 43,932 | 8,500 |
| Pumping Facilities | 5,956 | 4,081 |
| Streetlights and Signals | 1,386 | 1,653 |
| **Total** | **748,524** | **671,429** |

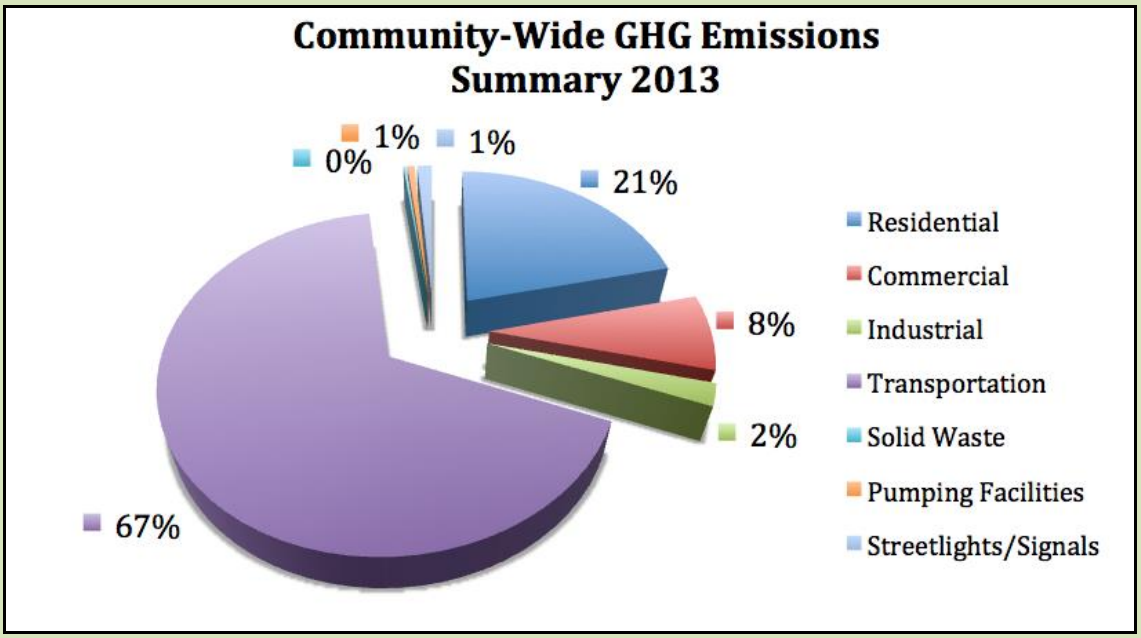


**Chart 3: Community-Wide GHG Emissions Summary 2013**

Electricity

Southern California Edison (SCE) provided 2005 community-wide electricity usage data for the 2010 Climate Action Plan. The same methodology was used for this Climate Action Plan update. SCE prepared an electricity usage report for all accounts in the Town for 2013 (see Appendix C). The table below compares 2005 and 2013 electricity usage. Annual electricity usage is described by sector and in terms of kilowatt-hours.

**Table 2**
**Community-Wide Electricity Usage**
**2005 and 2013 Comparison**

| | 2005 | | | 2013 | | |
|---|---|---|---|---|---|---|
| **Sector** | **Annual kwh Consumed** | **No. of Accounts** | **kwh per Account** | **Annual kwh Consumed** | **No. of Accounts** | **kwh per Account** |
| Residential | 195,613,488 | 23,316 | 8,390 | 215,490,704 | 25,882 | 8,325 |
| Commercial | 79,780,787 | 301 | 265,052 | 116,611,263 | 1,902 | 61,309 |
| Industrial | 13,799,465 | 1,848 | 7,467 | 4,077,631 | 557 | 7,320 |
| **Subtotal:** | **93,580,252** | **2,149** | **43,545** | **120,688,894** | **2,459** | **49,080** |
| Streetlight | 3,905,754 | 160 | 24,411 | 5,210,015 | 200 | 26,050 |
| Water Pumping | 16,783,859 | 96 | 174,832 | 12,625,027 | 92 | 137,228 |
| **Total:** | **309,883,353** | **25,721** | | **354,014,640** | **28,663** | |

Source: Southern California Edison. 2005 data is taken from Appendix B of 2010 Apple Valley Climate Action Plan. 2013 data is from "Electricity Use Report for Town of Apple Valley, Year 2013," SCE (see Appendix C).

Between 2005 and 2013, the number of SCE accounts in Apple Valley increased by 2,942 or approximately 11%. Total annual electricity consumption increased by 44,131,287 kwh or approximately 14%. This reflects typical growth in the Town during the 8-year period. Per account usage increased by approximately 13% in the commercial/industrial sector, and 7% in the streetlight sector. It decreased by 0.8% in the residential sector and 22% in the pumping sector.

The data suggest that the number of accounts and kilowatt-hours used by the commercial and industrial sectors reversed, within these two categories, from 2005 and 2013. However, during this time period, SCE changed the way it groups and categorizes commercial and industrial accounts. For the purposes of this analysis, commercial and industrial data were combined to clarify the comparison.

To determine the GHG emissions generated by Town-wide electricity consumption in 2013, kwh values for each sector were entered into the CACP model. Electricity emissions factors for year 2013 are based on a the LGOP Average Electricity Emission Factors Table G.7 and the latest U.S. EPA eGRID 2010 Summary Tables created February 2014. The latest EPA eGRID shows the CAMX/WECC California subregion to have an average electricity emission factor of 610.82 lb/MWh for the year 2010. The LGOP shows SCE to have an electricity emission factor of 630.89 lb/MWh for the year 2007. Because 2013 data is not yet available, the higher and more conservative emission factor of 630.89 lb/MWh was used for this analysis. Community-wide GHG emissions from electricity consumption are shown in the chart below.

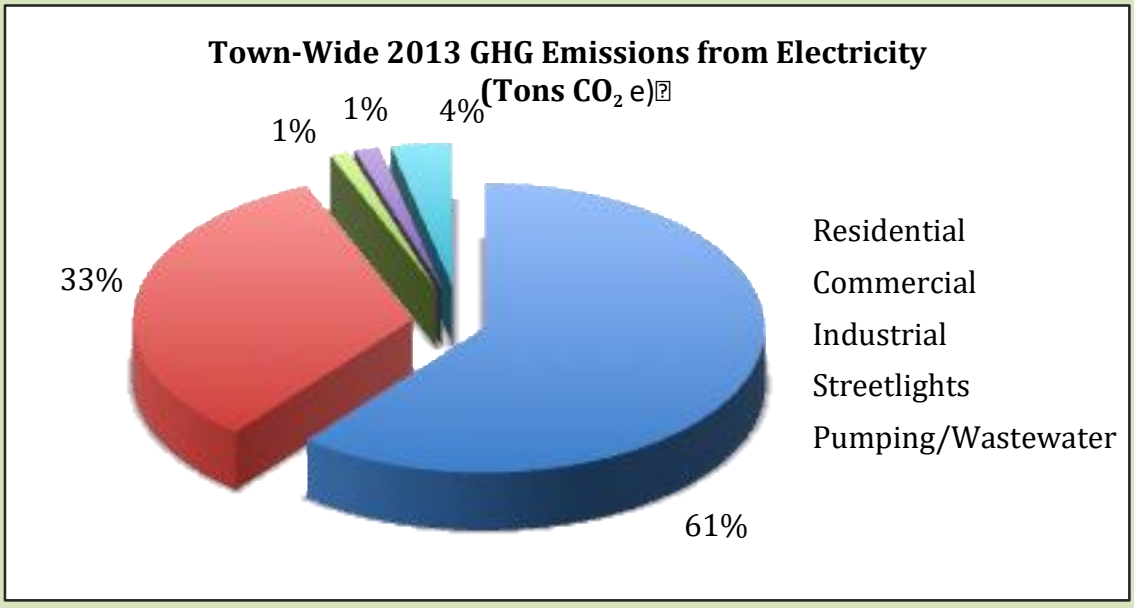


**Chart 4: Town-Wide 2013 GHG Emissions from Electricity (Tons $CO_2e$)**

Natural Gas

Southwest Gas Corporation provided natural gas usage data for all accounts in Apple Valley for the 2010 CAP, and provided the same for 2013 (see Appendix C). Data was categorized by customer class and provided in terms of therms, a standard unit for measuring heat energy. A comparison of 2005 and 2013 natural gas usage is shown in the table below.

**Table 3**
**Community-Wide Natural Gas Usage**
**2005 and 2013 Comparison**

| | 2005 | | | 2013 | | |
|---|---|---|---|---|---|---|
| **Sector** | **Annual therms Consumed** | **No. of Accounts** | **therms per Account** | **Annual therms Consumed** | **No. of Accounts** | **therms per Account** |
| Residential | 11,576,524 | 22,526 | 513 | 12,184,053 | 25,552 | 476 |
| Commercial | 1,574,978 | 991 | 1,589 | 2,241,636 | 1,200 | 1,868 |
| Industrial | 359,547 | 4 | 89,886 | 12,736 | 3 | 4,245 |
| Water Pumping | * | * | * | 2,177 | 3 | 725 |
| **Total:** | **13,511,049** | **23,521** | | **14,440,602** | **26,758** | |

* "water pumping" category was not provided by Southwest Gas for 2005.
Source: Southwest Gas Corporation. 2005 data is taken from Appendix B of 2010 Apple Valley Climate Action Plan. 2013 data is from "Southwest Gas Corporation, Southern California Division, Town of Apple Valley, 2013 Total Usage and Year-End Customers" (see Appendix C)

As shown, the number of natural gas accounts in Apple Valley increased by 3,237 (14%) between 2005 and 2013. Annual natural gas consumption increased by 929,553 therms (7%). Per account usage decreased by approximately 7% in the residential sector, but increased by 18% in the commercial sector. The "water pumping" category was not provided by Southwest Gas for 2005, but its contribution to total natural gas consumption is limited and only accounts for 0.02% of all therms consumed in 2013.

Per account usage decreased significantly (95%) in the industrial sector. Between 2005 and 2013, the 2 million square-foot Walmart distribution center installed 10 acres of solar panels that generate enough energy to power half of the facility's needs. This solar power conversion could be a significant contributor to reductions in industrial natural gas consumption.

As shown in the table above, total community-wide natural gas usage was approximately 14,440,602 therms in 2013. According to the CACP 2009 Software, a total of 84,741 tons of $CO_2e$ were emitted in 2013 from community-wide natural gas.

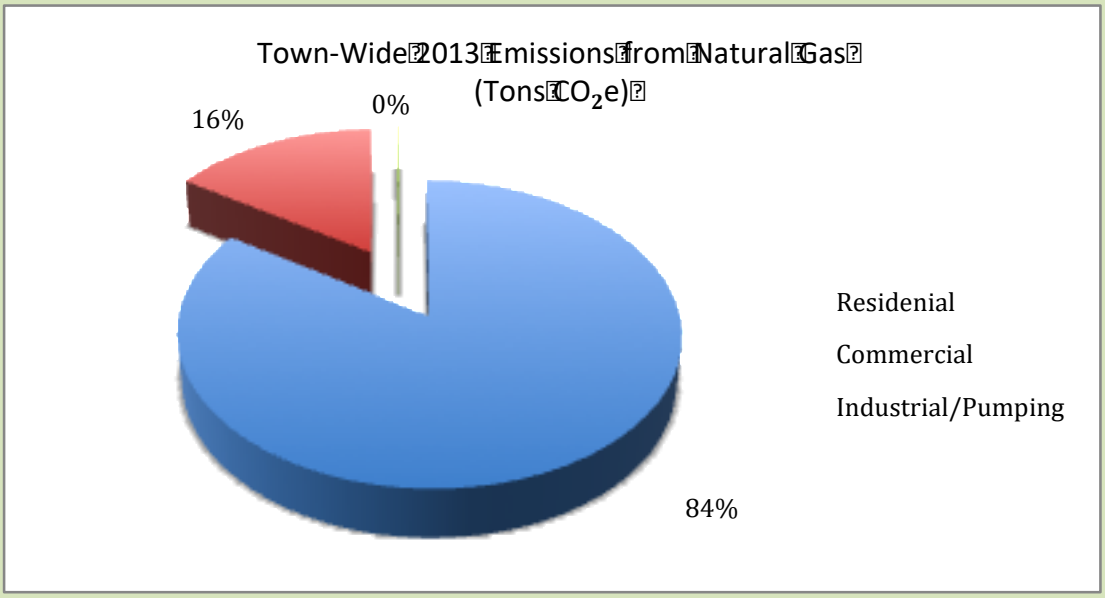


**Chart 5: Town-Wide 2013 Emissions from Natural Gas (Tons $CO_2e$)**

Propane

The 2010 CAP assumed that all Apple Valley housing units not using natural gas relied on propane instead. The same assumptions and methodology were used to estimate 2013 community-wide propane usage. The California Department of Finance estimated there were 26,259 housing units in Apple Valley in 2013. Southwest Gas indicated there were 25,552 residential accounts. This suggests that 707 homes did not use natural gas, and it was assumed they used propane as an alternative fuel.

As was done in the 2010 CAP, it was assumed that the average home consumes 1,000 gallons of propane annually. Based on this assumption, an estimated 707,000 gallons of propane were consumed in Apple Valley in 2013, which is more than 9 times the amount consumed in 2005. It is unclear why potential propane use increased substantially. Town building permits do not track the type of fuel used in new homes and, therefore, documenting propane use is difficult. It is possible that the assumptions described above overstate reliance on propane, but the methodology used to compare 2005 and 2013 usage is the same.

The community-wide consumption of propane resulted in the emission of 4,504 tons of $CO_2e$ in 2013.

Transportation

The combustion of fuel during vehicle operation generates GHG emissions. Community-wide emissions are generated by two sources: 1) vehicle used by residents, workers, and others traveling through Apple Valley, and 2) public transportation.

*Residents, Workers, Through Trips*

The majority of GHG emissions from the transportation sector are from vehicle miles generated by people living, working, and traveling in Apple Valley. The 2010 CAP used data from the Town's General Plan Circulation Element Update to estimate that 776.79 million miles (VMT) were traveled in 2005.

Town-wide traffic counts have not been updated since the General Plan Update. Therefore, to estimate 2013 community-wide vehicle miles traveled, an annual growth rate of 1.3% was applied to the 2005 figure. The growth rate was derived by dividing the percent population change from 2005 to 2013 (10.07%) by 8 years, resulting in 1.25% per year and rounded up to 1.3% for conservative analysis. Therefore, a 1.3% annual growth rate yields an estimated 861,349,070 vehicle miles traveled in Apple Valley in 2013. It was assumed that 85% of VMT were gasoline and 15% were diesel. A comparison of 2005 and 2013 vehicle miles traveled is provided below.

**Table 4**
**Community-Wide Vehicle Miles Traveled (VMT)**
**2005 and 2013 Comparison**

| | 2005 | | | 2013 | | |
|---|---|---|---|---|---|---|
| **Sector** | **Total VMT** | **Population** | **VMT Per Resident** | **Total VMT** | **Population** | **VMT Per Resident** |
| Residents, Workers, and Passers-by | 776,790,000 | 63,754 | 12,184 | 861,349,070 | 70,173 | 12,275 |

Source: 2005 VMT is from p. III-7 of 2010 Apple Valley Climate Action Plan. 2013 VMT is based on 2005 VMT plus 1.3% annual growth rate. Population data from U.S. Census Bureau and Department of Finance Report E-1, released May 1, 2014.
* Growth Rate: 63,754 to 70,173 population = a 10.07% growth rate over 8 years, or a 1.26% growth rate per year. 1.3% per year is assumed for conservative analysis.

As shown, the number of vehicle miles traveled per resident is estimated to have increased by approximately 0.8% between 2005 and 2013.

*Public Transportation*

Transportation in Apple Valley also includes a railroad, County-owned regional airport, and transit buses operated by the Victor Valley Transit Authority (VVTA). The Town has no control over either rail or airport activities, and cannot, therefore, control emissions or emission reductions from these operations. GHG emissions associated with air and rail travel were not included in the 2010 CAP and, therefore, are not included in this analysis.

Specific transit data was not available from VVTA for 2005, and the 2010 CAP assumed that VVTA buses accounted for 1.5 million vehicle miles per year. For this update, however, bus and route information was acquired from VVTA (see Appendix C), and it was estimated that VVTA buses traveled 658,637 miles in Apple Valley in 2013.

Five (5) bus routes serve Apple Valley. Some routes extend into neighboring communities; however, only the route mileage located within Apple Valley Town limits was included in this analysis. VVTA provided the number of buses traveling on each route at specific times of day and on each day of the week, and bus schedules were used to determine the total number of roundtrips traveled each day.

All 40-foot transit buses operated by VVTA use compressed natural gas (CNG). Of the smaller 22-foot buses, which include ADA-compliant buses and vans providing curb-to-curb service on flex routes, approximately 25% are gasoline-powered and 75% are CNG-powered. None of the revenue-generating vehicles are diesel-powered.

*Transportation Summary*
The data described above were entered into the CACP model to estimate total GHG emissions generated by community-wide transportation. The following assumptions were used in CACP modeling: 861,349,070 VMT for personal vehicles (732,146,710 VMT gasoline powered passenger vehicles, and 129,202,360 VMT diesel powered light trucks), and 658,637 VMT for transit (33,973 VMT gasoline-powered and 624,664 VMT are CNG-powered).

Using the CACP software, it was determined that in 2013, the transportation sector resulted in the emission of 384,144 tons of CO2e from the combustion of gasoline, 76,492 tons of CO2e from the combustion diesel, and 721 tons of CO2e from the use of CNG. This results in a total of 452,643 tons of CO2e.

Solid Waste
Nearly all the Town's solid waste disposal occurs at the Victorville Landfill on Stoddard Wells Road in Victorville. The 2010 CAP reported that 75,619± tons of solid waste was delivered to landfills by the Apple Valley community in 2005. By 2012 (the most recent year for which data is available), this number had decreased to 45,987 tons, which represents a decrease of 29,632 tons or 39% over the 8-year period. The 2012 data are provided in the Town's Annual Report Summary for its CalRecycle Electronic Annual Report (see Appendix C). A comparison of 2005 and 2012 solid waste figures is shown in the table below.

**Table 5**
**Community-Wide Solid Waste**
**2005 and 2012 Comparison**

| | 2005 | | | 2012 | | |
|---|---|---|---|---|---|---|
| **Sector** | **Tons Disposed** | **Population** | **Tons Per Resident** | **Tons Disposed** | **Population** | **Tons Per Resident** |
| Solid Waste Disposed in Landfills | 75,619 | 63,754 | 1.19 | 45,987 | 70,173 | 0.65 |

Source: 2005 data taken from p. III-7 of 2010 Apple Valley Climate Action Plan. 2013 data from "Annual Report Summary: Apple Valley 2012," Burrtec and Town of Apple Valley (see Appendix C).

The data indicate that per capita solid waste disposal decreased from 1.19 to 0.65 tons per year from 2005 to 2014. This substantial decrease is likely the result of numerous waste reduction efforts. In 2008, San Bernardino County began a Comprehensive Disposal Site Diversion Program at all its landfills, which diverts recyclable materials (including metal, cardboard, glass, carpet, green waste, biomass materials, and others) from landfills. In 2012, 4,120 tons of materials from Apple Valley sources were diverted from County landfills. In the same year, more than 5,014 tons of recyclables were recovered from Apple Valley sources at the Victor Valley Materials Recovery Facility.

The Town has implemented additional waste diversion and recycling programs, including grasscycling and xeriscaping, backyard composting, community and school outreach programs, waste audits, recycling of tires and building materials (including asphalt, scrap metal and concrete), and numerous related programs. In 2011, the Town adopted an ordinance requiring building permit applicants with development projects of 1,000 square feet or more to prepare a Waste Management Plan that demonstrates they have recycled a minimum of 50% of construction debris from projects. A mandatory Commercial Recycling Ordinance was also enacted in 2011 to require all commercial businesses generating 4 or more cubic yards of solid waste per week, and all multi-family dwellings with 5 or more units, to reuse, recycle, compost, or otherwise divert material away from landfills.

The CACP model was used to estimate GHG emissions generated by the decomposition of Apple Valley's solid waste in landfills in 2012. Assumptions used in the model's waste percentage breakdown of the 45,987 tons disposed includes the following: 17% paper products, 16% food waste, 7% plant debris, 22% wood/textiles, and 38% other waste.

CACP model outputs indicate that the decomposition of the Town's waste in 2012 resulted in the generation of 8,500 tons of $CO_2e$.

### D. 2013 Municipal Emissions

Emissions Summary

The Town's 2010 Climate Action Plan included a municipal-specific greenhouse gas emissions inventory to determine emissions generated by Town-owned and operated facilities. It considered emissions resulting from the use of electricity and natural gas, transportation from employee commutes and the Town's fleet of municipal and police vehicles, water and sewer pumping, and decomposition of solid waste generated by Town employees.

The following analysis addresses the same emission sources for year 2013. The same methodology was used, to the greatest extent practical, to provide a meaningful comparison between 2005 and 2013 conditions. The table below shows total GHG emissions from municipal sources for years 2005 and 2013.

**Table 6**
**Municipal GHG Emissions Summary**
**2005 and 2013 Comparison**

| Sector | 2005 Tons $CO_2e$ | 2013 Tons $CO_2e$ |
|---|---|---|
| Buildings and Facilities | 801 | 1,136 |
| Streetlights and Traffic Signals | 193 | 349 |
| Wastewater Facilities | 106 | 376 |
| Employee Commute | 347 | 281 |
| Town Fleet | 256 | 438 |
| Police Fleet | 364 | 600 |
| Solid Waste | 71 | 11 |
| **Total** | **2,138** | **3,191** |

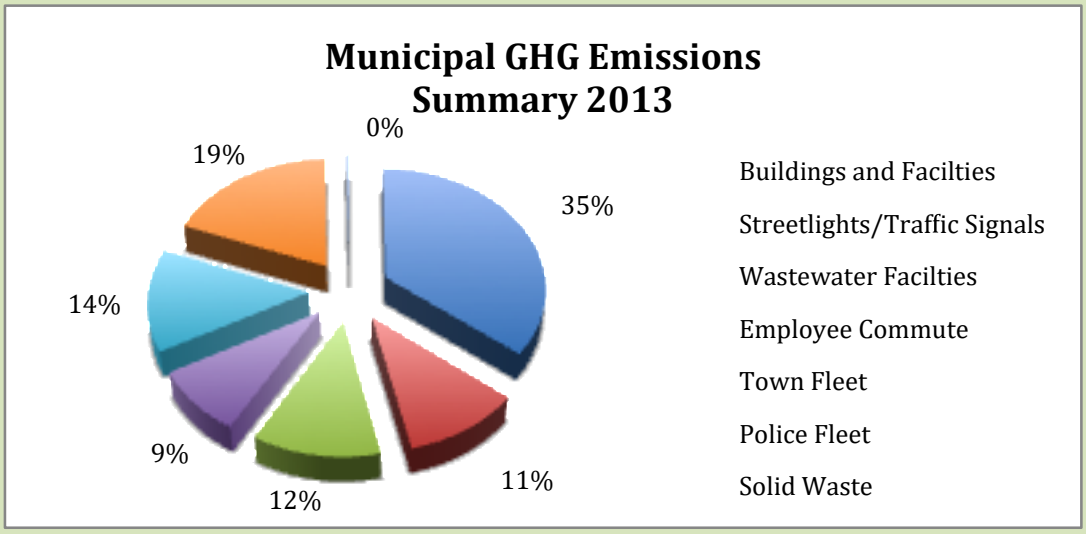


**Chart 6: Municipal GHG Emissions Summary 2013**

The Table and chart reflect an increase in GHG emissions for municipal facilities, particularly for building and facilities. Since the preparation of the 2010 CAP, the Town has added several buildings and facilities to its inventory of facilities. These changes are discussed in greater detail below.

It is important to note that the municipal emissions shown are a sub-set of the community-wide analysis described in Section C, above. In 2005, municipal operations accounted for 0.29% of community-wide GHG emissions. In 2013, they accounted for 0.48% of community-wide emissions.

Electricity

Southern California Edison provided electricity usage data for municipal accounts in 2013. A comparison or 2005 and 2013 usage is shown in the table below.

**Table 7**
**Municipal Electricity Usage**
**2005 and 2013 Comparison**

| Sector | 2005 kWh | 2013 kWh |
|---|---|---|
| Buildings & Facilities Existing in 2005[1] | 842,006 | 531,076 |
| Buildings & Facilities Built After 2005[1] | --- | 1,465,827 |
| Subtotal: | 842,006 | 1,996,903 |
| Streetlights & Traffic Signals | 543,201 | 725,619 |
| Pumping Facilities | 298,043 | 782,108 |
| **Total:** | **1,683,250** | **3,504,630** |

[1] 2005 is the baseline year used in the 2010 Apple Valley Climate Action Plan. The distinction between buildings/facilities built before or after 2005 is made to accurately analyze changes in 2005 (baseline) conditions.
Source: 2005 data is from Table 6 and Appendix B of Apple Valley 2010 Climate Action Plan. 2013 data is from Nancy Jackson, SCE, March 21, 2014 (see Appendix C).

As shown, electricity usage by municipal accounts increased by 1,821,380 kWh between 2005 and 2013, more than doubling the 2005 consumption levels. Increases occurred in all sectors.

Electricity usage by buildings and facilities in 2013 was more than double that of 2005. However, closer analysis shows that electricity usage by buildings that existed in 2005 (the baseline year of the 2010 Apple Valley Climate Action Plan) decreased by approximately 310,930 kWh or 37% in 2013. They accounted for 27% of electricity used by buildings and facilities in 2013.

Several sizeable Town facilities were built, acquired or remodeled after 2005, including: the acquisition of the Apple Valley Golf Course and clubhouse; the remodeling at the Public Works facility on Nomwaket Road; the expansion of recreation services which resulting in electricity usage for extended hours and field lighting; and the construction of the Development Services, Animal Services, and community center pool buildings. They accounted for approximately 73% of electricity used by buildings and facilities in 2013. The Town's records show that the municipal facility that consumed the most electricity in 2013 was the municipal golf course, which used 715,028 kWh, or approximately 20% of all municipal electricity. Golf course facilities and equipment are older and less efficient, resulting in increased usage, particularly for water pumping. The second largest consumer was the Development Services Building, which used 387,739 kWh or 11% of all municipal electricity.

Analysis of other sectors shows that, between 2005 and 2013, electricity consumption by streetlights and traffic signals increased by 34%, and consumption by pumping facilities more than doubled.

The 2013 electricity usage values were put into the CACP model to determine GHG emissions resulting from the consumption of electricity by municipal facilities. Electricity emissions factors for year 2013 are based on a the LGOP Average Electricity Emission Factors Table G.7 and the latest U.S. EPA eGRID 2010 Summary Tables created February 2014. The model indicates that 1,359 tons of $CO_2e$ were emitted from municipal electricity use in 2013.

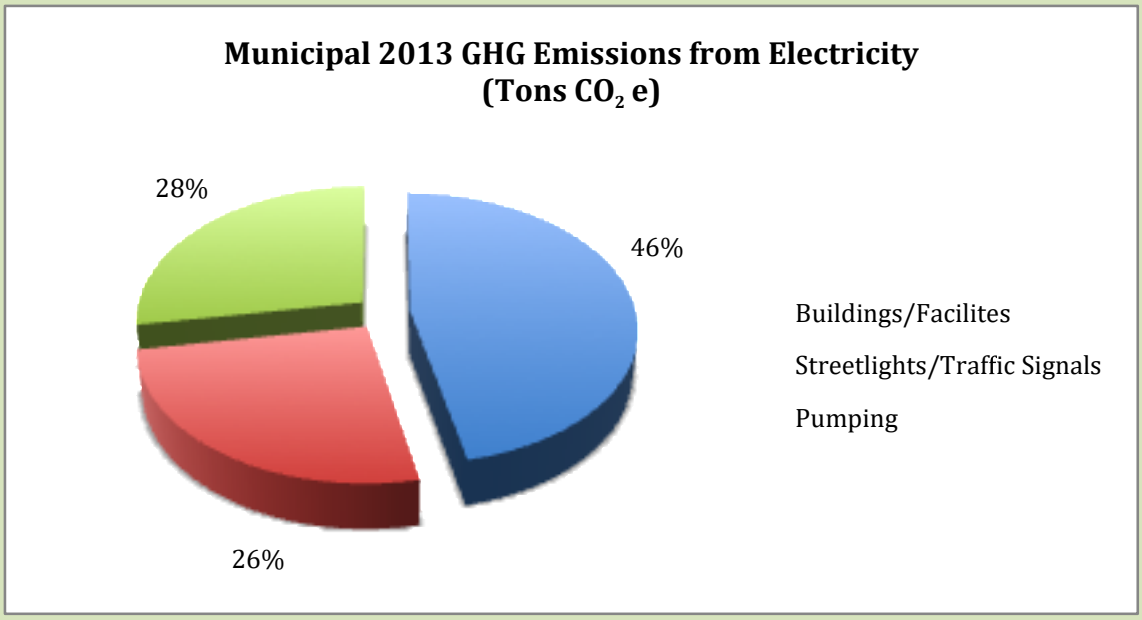


**Chart 7: Municipal 2013 GHG Emissions from Electricity (Tons $CO_2e$)**

Natural Gas

Southwest Gas provided natural gas usage data for municipal accounts for 2013 (see Appendix C). The table below compares natural gas consumption in 2005 and 2013.

**Table 8**
**Municipal Natural Gas Usage**
**2005 and 2013 Comparison**

| Sector | 2005 therms | 2013 therms |
|---|---|---|
| Buildings and Facilities Existing in 2005[1] | 81,211 | 75,658 |
| Buildings and Facilities Built After 2005[1] | --- | 10,006 |
| **Total:** | **81,211** | **85,664** |

[1] 2005 is the baseline year used in the 2010 Apple Valley Climate Action Plan. The distinction between buildings/facilities built before or after 2005 is made to accurately analyze changes in 2005 (baseline) conditions.
Source: 2005 data is from pg. III-10 and Appendix B of Apple Valley 2010 Climate Action Plan. 2013 data is from Noreen Litty, Southwest Gas, April 3, 2014 (see Appendix C).

The data indicate that natural gas usage by municipal buildings and facilities was 4,453 therms (5%) higher in 2013 than in 2005. However, natural gas consumption by buildings and facilities that existed in 2005 (the baseline year of the 2010 Climate Action Plan) was 5,553 therms (7%) less in 2013 than in 2005.

Facilities built or acquired after 2005 that use natural gas include the municipal golf course and clubhouse and the Public Works facility on Nomwaket Road. They used 10,006 therms of natural gas, or 12% of total municipal natural gas usage in 2013.

Southwest Gas usage reports show that the largest municipal consumer of natural gas in 2013 was the community center pool on Dale Evans Parkway. It used 58,202 therms of natural gas, or 70% of all natural gas used by Town facilities. The second largest consumer of municipal natural gas was the Apple Valley Golf Course, which consumed 8,891 therms or 10% of municipal natural gas in 2013.

Figures for municipal natural gas usage were entered into the CACP model to estimate GHG emissions. Based on this model, it was estimated that a total of 503 tons of $CO_2e$ were emitted in 2013 from municipal use of natural gas.

Propane

As was true in 2005, no municipal facilities use propane and, therefore, no GHG emissions resulted from propane use in 2013.

Transportation

The municipal transportation sector includes: 1) municipal fleet of vehicles, 2) Sheriff's Department fleet of vehicles (Apple Valley portion only), and 3) employee commutes. Descriptions of each and their estimated GHG emissions are provided below.

*Municipal Fleet*

According to the 2010 Climate Action Plan, the municipal fleet had 46 vehicles and used 23,860 gallons of fuel in 2005, which yielded an annual consumption rate of 518 gallons per vehicle.

In 2013, the Town owned 69 vehicles that used 43,559 gallons of gasoline. Annual gas consumption was 631 gallons per vehicle. Compared to 2005, this represents an increase of 23 vehicles and 22% more gallons consumed per vehicle. Based on CACP modeling, operation of the municipal fleet in 2013 resulted in the emission of 438 tons of $CO_2e$ .

*Police Fleet*

The Town of Apple Valley contracts with the San Bernardino County Sheriff's Department for police services. The Department generated GHG emissions from the operation of vehicles. In 2005, 31 vehicles were assigned to Apple Valley. They consumed 33,815 gallons of fuel, yielding a consumption rate of 1,090 gallons per vehicle.

In 2013, the Sheriff's Department operated 36 vehicles and used 61,410 gallons of fuel for Apple Valley police services. Annual fuel consumption was 1,705 gallons per vehicle. Compared to 2005, this represents an increase of 5 vehicles and 56% greater fuel consumption per vehicle. CACP modeling indicates that operation of the police fleet generated 600 tons of $CO_2e$ in 2013.

*Fleet Analysis*
The increases in fuel consumption described above could be due to methodology differences used in the 2010 CAP and this update. Actual 2005 data was not available for the 2010 CAP, so assumptions were based on data from other years. Actual 2013 figures from the Town Finance Department and Sheriff's Department were obtained for this update. Increases in fuel consumption may also be partly due to natural growth in the Town, which demands more travel by employees and increased patrols by police personnel.

*Employee Commute*
GHG emissions are also generated by vehicles used by Town employees commuting to and from work. The 2010 CAP states that in 2005, 104 full-time employees traveled an average of 23 miles roundtrip to and from work in passenger vehicles. This resulted in 570,928 total vehicle miles, or 5,489 miles per employee.

In 2013, the Town employed 95 full-time personnel. Consistent with the 2010 CAP, it was assumed they traveled 23 miles roundtrip to and from work. This yields 521,455 total vehicle miles. Compared to 2005, this represents a reduction of 49,473 total vehicle miles (8.66%). CACP modeling estimates that 2013 employee commutes resulted in the generation of 281 tons of $CO_2e$.

*Transportation Summary*
Municipal mobile sources that generate GHG emissions include the Town and Sheriff's Department (Apple Valley portion only) fleets and employee commutes. These sources are estimated to have produces a total of 1,319 tons of $CO_2e$ in 2013. A comparison of 2005 and 2013 emissions from the municipal transportation sector is provided in the table below.

**Table 9**
**GHG Emissions from**
**Municipal Transportation Sector**
**2005 and 2013 Comparison**

| Sector | 2005 Tons of $CO_2e$ | 2013 Tons of $CO_2e$ |
|---|---|---|
| Town Municipal Fleet | 256 | 438 |
| Sheriff's Department Fleet | 364 | 600 |
| Town Employee Commute | 347 | 281 |
| **Total:** | **967** | **1,319** |

Solid Waste

According to the 2010 CAP, municipal facilities generated 122.68 tons of solid waste in 2005, which resulted in 71 tons of $CO_2e$.

Actual data quantifying solid waste generation at municipal facilities is not available. Therefore, consistent with the methodology used in the 2010 CAP, the Town's community-wide 2013 per capita solid waste disposal figure (see Table 5) was multiplied by the number of Town employees. Assuming that 95 employees generated 0.65 tons of solid waste per employee, a total of 61.75 tons of solid waste was disposed by municipal employees in 2013. Compared to 2005 values, this represents a reduction of approximately 61 tons or 50%.

The reduction is likely due to the Town's and County's implementation of numerous waste diversion and reduction programs since 2005 (described above in Section III-C). In addition to large-scale diversion programs at the Victorville Landfill and Materials Recovery Facility, some programs specifically target municipal facilities. Among these are the Town's Green Purchasing Ordinance, which encourages the purchase of Recycled Content Products (RCP) when financially feasible, and conservation of paper by printing double-sided documents and maximizing the use of electronic mail.

## E. Future Emissions Estimates, Business As Usual

The 2020 emission BAU forecast has been updated to reflect the 2013 inventory using similar methods for GHG emission projections. The 2013 methods and results are described below.

### 1. Community Wide

A community wide emissions forecast was prepared for future year 2020 for the Town of Apple Valley. The GHG forecast is based on the 2005 baseline inventory as described in Section B above and projects future emission for 2020 under business as usual (BAU) conditions. BAU conditions assume that there is no change in the current operating procedures. Forecast conditions assumed an annual growth rate of 1.6% for commercial, industrial, and solid waste. The previous annual growth rate of 1.8% for residential and transportation sectors has been updated to reflect the population growth rate of 10.07% over the 8-year period from 2005-2013. Thus, the revised annual growth rate for residential and transportation sectors is 1.3% (10.07% divided by 8 years).

Using the data set established in the baseline inventory conducted for 2005 and the CACP model to forecast future conditions, the Community-wide GHG emissions for the Town of Apple Valley forecast for 2020 was estimated to be 1,009,561 tons of Carbon Dioxide equivalent ($CO_2e$) for BAU conditions in the 2010 CAP.

The Table and Chart below show Apple Valley's total greenhouse gas emissions forecast from all major sources for the year 2020 under BAU conditions using 2013 analysis. Fuel consumption in the transportation sector is the single largest source of emissions, contributing 61% of total emissions. The residential, commercial, and industrial sectors represent emissions that result from electricity, propane and natural gas used in both private and public buildings and facilities. Streetlights and pumping facilities include energy expenditures required to fulfill operations. Solid waste represents community-wide disposal from all waste brought to landfills in 2020.

**Table 10**
**GHG 2020 Forecast by Sector**

| | 2005 | 2013 |
|---|---|---|
| **Sector** | **Tons $CO_2e$** | **Tons $CO_2e$** |
| Natural Gas[1] | 109,267 | 120,887 |
| Electricity[2] | 203,138 | 170,696 |
| Transportation[3] | 627,170 | 505,014 |
| Streetlights | 2,689 | 1,847 |
| Pumping Facilities | 11,555 | 4,560 |
| Solid Waste | 55,742 | 9,486 |
| **Total** | **1,009,561** | **812,490** |

1 Includes propane.
2 Includes residential, commercial, and industrial
3 Growth rate for 2005 = 1.8%, growth rate for 2013 = 1.3% based on Department of Finance demographic research.

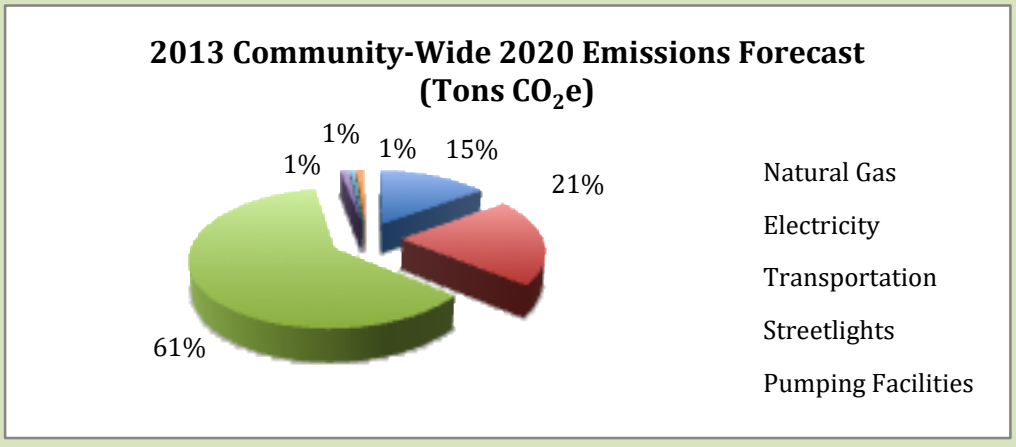


**Chart 8: 2013 Community-Wide 2020 Emissions Forecast (Tons $CO_2e$)**

The Table and Chart below show Apple Valley's total greenhouse gas emissions forecast for Residential, Commercial, and Industrial sectors for the year 2020 under BAU conditions. GHG emissions for these sectors result from electricity, propane and natural gas used in both private and public buildings and facilities.

**Table 11**
**GHG 2020 Forecast**

| | 2005 | 2013 |
|---|---|---|
| **Sector** | **Tons $CO_2e$** | **Tons $CO_2e$** |
| Residential | 232,812 | 222,890 |
| Commercial | 67,275 | 67,164 |
| Industrial | 12,319 | 1,529 |

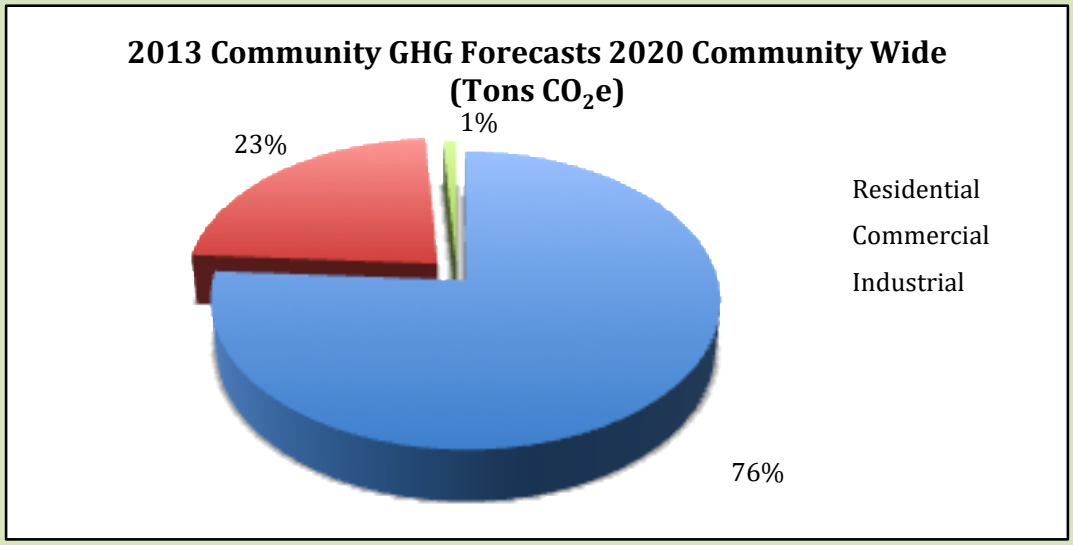


**Chart 9: 2013 Community GHG Forecasts 2020 Community Wide (Tons $CO_2e$)**

### 2. Municipal Specific

A municipal specific emissions forecast was prepared for future year 2020 for Town-owned and operated facilities. The Municipal forecast shows the anticipated GHG Emissions from government operation under BAU conditions and is based on the 2005 baseline inventory. The 2020 forecast for municipal operations assume an annual growth rate of 1.6% for electricity, natural gas, and solid waste, and an annual growth rate of 1.3% for mobile sources including the Town and Police fleet and employee commute.

Using the baseline inventory for 2005 and the CACP model to forecast future conditions, the GHG emissions from municipal operations within the Town of Apple Valley for 2020 was projected to be 3,132 tons of Carbon Dioxide equivalent ($CO_2e$), and is projected at 3,519 tons in 2013. The Table and Chart below shows Apple Valley's total greenhouse gas emissions forecast for municipal operations for the year 2020 under BAU conditions. The increase, as described above, is primarily due to the increase in Town facilities.

**Table 12**
**GHG 2020 Forecast for Municipal Operations**

| | 2005 | 2013 |
|---|---|---|
| **Sector** | **$CO_2e$ Tons** | **$CO_2e$ Tons** |
| Building and Facilities | 1,216 | 1,269 |
| Streetlights and Traffic Signals | 379 | 390 |
| Pumping Facilities | 205 | 421 |
| Employee Commute | 435 | 290 |
| Town Fleet | 333 | 480 |
| Police Department | 474 | 656 |
| Solid Waste | 90 | 13 |
| **Total** | **3,132** | **3,519** |

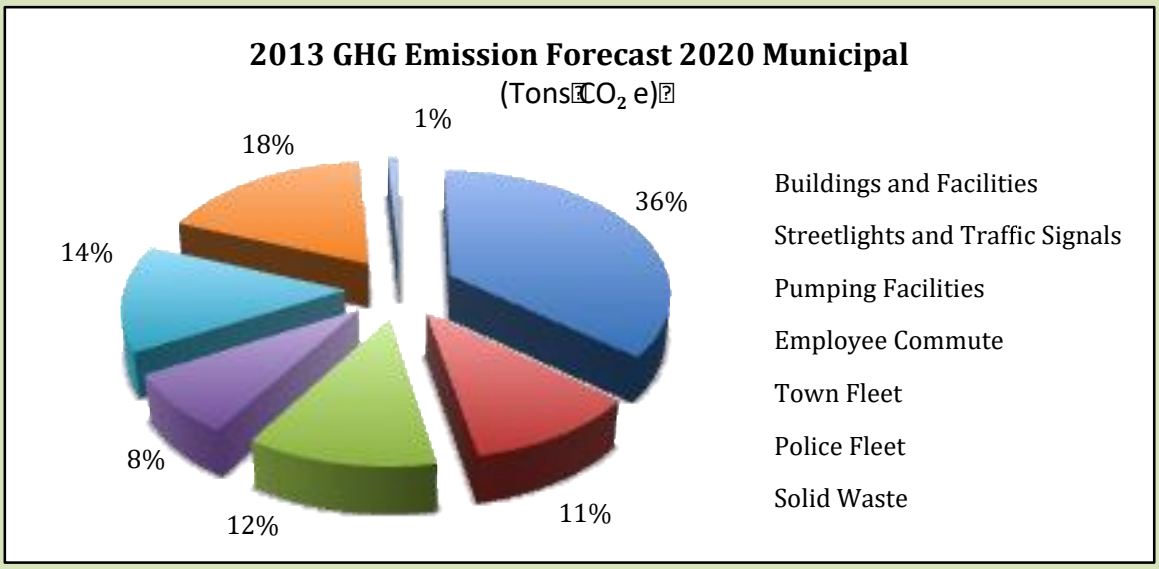


**Chart 10: 2013 GHG Emission Forecast 2020 Municipal (Tons $CO_2e$)**

## F. Reduction Targets

A reduction target provides a tangible goal for emission reduction efforts. Apple Valley's emissions reduction target represents a percentage by which the community aims to decrease emissions, below the 2005 baseline, by 2020.

Many factors were considered when selecting the reduction target. Ultimately, Apple Valley's reduction target is both aggressive and achievable given local circumstances. Local factors considered in selecting the target reduction percentage included estimation of the effects of implemented and planned programs and policies, an approximate assessment of future opportunities to reduce emissions, targets adopted by peer communities, and emissions reductions expected to be achieved by state-level climate policy.

The Town of Apple Valley set a reduction target at 15% below 2005 levels by the year 2020 for both the community and municipal operations. As described above, the 2005 baseline level for GHG emissions was established by conducting a community-wide and government-specific inventory in order to identify and quantify the major GHG emitters within Town limits. Section III-B and III-C above describe the assumptions and data used to arrive at the 2005 baseline. For the community–wide inventory it was determined that 748,524 tons of $CO_2e$ represents the 2005 baseline level and the municipal baseline for 2005 is 2,138 tons of $CO_2e$. To achieve at 15% reduction by 2020 the community-wide GHG emissions level will need to be reduced to 636,245 $CO_2e$ and the municipal GHG emission level will need to be reduced to 1,817 $CO_2e$ by 2020. Therefore, the reduction target community-wide is 373,317 tons of CO2e and the municipal reduction target is 1,315 tons of CO2e by 2020.

**Table 13**
**GHG Reduction Targets**
**Tons CO2e**

| | **Community-wide** | **Municipal** |
|---|---|---|
| **Baseline 2005** | 748,524 | 2,138 |
| **15% Below Baseline** | 636,245 | 1,817 |
| **2020 Forecast BAU (2005)** | 1,009,562 | 3,132 |
| **2020 Forecast BAU (2013)** | 812,490 | 3,519 |
| **2020 Reduction Target (2005)** | 373,317 | 1,315 |
| **2020 Reduction Target (2013)** | **176,245** | **1,702** |

New projects developed after the adoption of this Plan, and demonstrating a reduction in emissions of 15% or more, will be consistent with this Climate Action Plan.

# IV. GREENHOUSE GAS REDUCTION MEASURES

This section describes general policies and specific actions that will move the Town in the direction of realizing GHG emission reductions. Sections IV-A through IV-C provide in broad terms policies that may contribute to GHG reductions. These measures are intended as a menu for existing and future development, any combination of which can be implemented to reach reduction targets on a project-by-project basis. Section IV-D describes specific measures that yield quantifiable GHG reductions.

**Introduction**
Greenhouse gas emissions in Apple Valley are generated by its residents, businesses and institutions. For purposes of this Climate Action Plan, the reduction measures included below are divided into three broad categories:

1. Those which the Town as a government entity can implement (Town Government Operational Measures).
2. Those which existing homes, businesses and institutions can implement (Community Operational Measures).
3. Those which new development proposals for homes, businesses and institutions can implement.

The implementation measures are listed categorically below. Each category also includes sub-categories for general measures, transportation, energy efficiency, renewable energy and solid waste management.

The 2013 Measures have been updated to reflect the evolving needs and successes of Apple Valley's $CO_2e$ reduction efforts over the past 3 years.

## A. Town Government Operational Measures

General Measures

MO-1. Encourage the development of residential projects at a density of at least 15 units per acre in the Medium Density Residential zone along Bear Valley Road, Highway 18, Dale Evans Parkway, Apple Valley Road, Navajo Road, Central Road, and Kiowa Road.

MO-2. Encourage the development of mixed-use projects in the Mixed Use zone along Bear Valley Road, Highway 18, Dale Evans Parkway, Apple Valley Road, Navajo Road, Central Road, and Kiowa Road.

MO-3. Encourage the development of residential projects at a density of at least 15 units per acre in the Medium Density Residential zone along the High Desert Corridor.

MO-4. Encourage the development of mixed-use projects in the Mixed Use zone along the High Desert Corridor.

MO-5. Encourage the development of new infill or reconstruction projects along Bear Valley Road, near its intersections with Apple Valley Road, Kiowa Road and Navajo Road; or along Highway 18.

MO-6. Plant a minimum of 25 trees annually in Town parks, and on other Town properties.

MO-7. Partner with the Apple Valley Unified School District to establish an "adopt a tree" education and maintenance program whereby school classes adopt and maintain specific trees in Town parks and other Town properties.

MO-8. Consider offering a Greenhouse Gas Reduction education program to be held at the Recreation Center, and offer it on a quarterly basis to residents and business persons in Town.

Transportation Measures

MO-9. Install advanced technology systems and implement effective management strategies in order to improve the operational efficiency of transportation systems and the movement of people, goods, and services, including synchronization of traffic lights and signals.

MO-10. Expand bikeways, walking paths and trails connecting residential neighborhoods to commercial projects, schools and other institutions, and transit.

MO-11. Prioritize roadway improvements for areas experiencing Level of Service D or worse.

MO-12. Replace gasoline or diesel fleet vehicles with hybrid or alternative fuel vehicles when they are scheduled for replacement, if available for the use intended.

MO-13. A minimum of 50% of the Town's additional new vehicle purchases in 2014 and beyond (not replacement vehicles) shall be hybrid or alternative fuel vehicles (if available for the use intended).

MO-14. Encourage Victor Valley Transit to install bicycle racks on all buses, and to operate an all-alternative fuel fleet.

MO-15. Encourage Apple Valley Unified School District to replace traditional fueled school buses with CNG fueled school buses upon new bus purchases.

MO-16. Encourage CalTrans to install carpool lanes on the High Desert Corridor.

MO-17. Consider the implementation of a Transportation Demand Management Ordinance for all employers with 50 or more employees working during any given shift.

MO-18. Specify rubberized and/or recycled asphalt in Town-initiated road pavement projects to the extent economically viable.

MO-19. Establish a Town employee car pooling program, including incentives (preferred parking, flex time incentives in addition to the Town's existing 9/80 work week, etc.) for participating employees.

MO-20. Provide employees with free public transit passes.

MO-21. Provide secure bicycle racks at all Town facilities.

Energy Efficiency Measures

MO-22. Reduce energy use at all Town facilities by 15% by 2020.

MO-23. Replace all failing or failed fixtures and appliances in Town facilities with energy efficient fixtures and appliances. Light bulbs shall be replaced with CFL or LED bulbs. Appliances shall be Energy Star rated.

MO-24. Encourage Apple Valley Ranchos, Golden State and other water purveyors to replace water systems with energy efficient motors, pumps and other equipment.

MO-25. Encourage VVWRA to replace wastewater systems with energy efficient motors, pumps and other equipment.

MO-26. Encourage the County of San Bernardino to capture and utilize landfill gas for use as an energy source including fuel for vehicles, operating equipment, and heating buildings.

MO-27. Consider the installation of green roofs on Town facilities.

MO-28. Consider the installation of cool roofs on Town facilities.

MO-29. Reduce turf areas at Town facilities by 20% overall.

MO-30. Modernize facilities and equipment at the golf course when financially feasible, including the well pumps.

MO-31. Install semi-pervious surfaces which allow water to percolate at Town facilities to the extent economically feasible.

MO-32. Install timers for all ball field lighting on Town facilities.

MO-33. Consider a home weatherization and energy efficient appliance replacement grant program for existing residents including extremely low, very low and low-income households.

MO-34. Continue to require that improvements made under the Residential Rehabilitation Loan Program and the Mobile Home Repair Program be energy efficient.

MO-35. Promote third-party energy efficiency programs, including the HERO and Energy Upgrade California programs.

Renewable Energy Measures

MO-36. Consider an Energy Savings Performance Contract with a private entity to retrofit public buildings, which will allow the private entity to fund all energy improvements in exchange for a share of the energy savings over a period of time.

MO-37. Partner with Southern California Edison in establishing a rebate/incentive/refund program for the installation of Energy Star appliances or alternative energy systems on private projects, including single family homes. Consider issuance of bonds for such a program.

MO-38. Install photovoltaic systems on the buildings and carports located at the Public Works facility and Town Hall/Police Department, which will provide electricity for the Civic Center and the Public Works/Animal Control facilities. And consider installing wind energy resources on properties greater than 2 acres.

MO-39. Consider installing a CNG fueling station and establish a public access program for same.

MO-40. Consider replacing failing or failed traditional water heaters in Town facilities with solar water heaters.

MO-41. When it fails, consider replacing the municipal pool heater with a solar pool heating system.

Solid Waste Management Measures

MO-42. Require composting of all landscaping waste from Town facilities.

MO-43. Implement a two-sided copy policy at all Town offices.

MO-44. Provide recycling bins for all offices, and at all employee gathering points (lunch room, conference rooms, etc.).

MO-45. Reuse and replace transport packaging including the reuse of cardboard boxes, and the recycling of plastic film, cardboard, and paper. Utilize reusable plastic transport packaging in place of limited-use wood pallets or cardboard boxes.

- For every 1-ton of corrugated cardboard boxes that is kept from entering the landfill, about 3.87 tons of CO2e are avoided.
- For every ton of plastic film (in the form of Low Density Polyethylene LDPE) that is recycled, about 1.9 tons of CO2e are avoided annually.
- For every ton of mixed general paper recycled about 4.3 tons of CO2e are avoided.

## B. Community Operational Measures

Community Operational Measures will be implemented in a variety of ways, including voluntary implementation, partnerships with utility and appliance companies, Town incentive programs, and state and federal incentive programs as they become available.

Transportation Measures

CO-1. Encourage replace of personal vehicle with hybrid or alternative fuel vehicle.

CO-2. Establish and enforce idling time limits for delivery vehicles. Idling shall not be permitted for more than 5 minutes.

CO-3. For employers, implement a Transportation Demand Management program, and document trip reduction by employees.

CO-4. Encourage the replacement of gasoline or diesel fleet vehicles with hybrid or alternative fuel vehicles, if available for intended use.

CO-5. Establish an employee carpooling program, including incentives (preferred parking, flex time incentives, etc.) for participating employees.

CO-6. (Encourage) Provide employees with free or discounted public transit passes.

Energy Efficiency Measures

CO-7. Replace failing or failed fixtures and appliances with energy efficient fixtures and appliances. Light bulbs shall be replaced with CFL or LED bulbs. Appliances shall be Energy Star rated.

CO-8. Replace traditional water heater with an instant water heating system.

CO-9. Replace traditional roofing with a green roof.

CO-10. Replace traditional flat roofing with a cool roof.

CO-11. Increase insulation in walls and roof to a minimum R-30.

CO-12. Install weather-stripping on all doors and windows.

CO-13. Replace grass/turf areas with drought tolerant or native plants, or with decorative rock or gravel.

CO-14. Replace water fixtures (faucets, toilets, etc.) with high efficiency fixtures.

Renewable Energy Measures

CO-15. Replace water heater and/or pool heater with a solar water heating system.

CO-16. Install solar panels or photovoltaic.

CO-17. For apartment or condominium projects, install solar or photovoltaic systems on carport roofs.

Solid Waste Management Measures

CO-18. Install a home composting system.

CO-19. Increase recycling by 20%.

CO-20. For businesses, implement a two-sided copy policy.

## C. New Development Measures

General Measures

ND-1. Develop a residential project at a density of at least 15 units per acre in the Medium Density Residential zone along Bear Valley Road, Highway 18, Dale Evans Parkway, Apple Valley Road, Navajo Road, Central Road, and Kiowa Road.

ND-2. Develop a mixed-use project in the Mixed Use zone along Bear Valley Road, Highway 18, Dale Evans Parkway, Apple Valley Road, Navajo Road, Central Road, and Kiowa Road.

ND-3. Develop a residential project at a density of at least 15 units per acre in the Medium Density Residential zone along the High Desert Corridor.

ND-4. Develop a mixed-use project in the Mixed Use zone along the High Desert Corridor.

ND-5. Develop a new infill or redevelopment project along Bear Valley Road, near its intersections with Apple Valley Road, Kiowa Road and Navajo Road; or along Highway 18.

ND-6. For projects within the North Apple Valley Industrial Specific Plan, develop employee housing within one mile of the industrial project.

ND-7. Preserve trees occurring on-site either through in situ protection during and after construction, or through transplant and relocation within landscaped areas.

ND-8. Utilize the Collaborative for High Performance Schools (CHPS) best practices for school design, building, and operation.

Transportation Measures

ND-9. During project construction, on-site off-road construction equipment shall utilize biodiesel fuel (a minimum of B20), except for equipment where use of biodiesel fuel would void the equipment warranty. The applicant shall provide documentation to the Town that verifies that certain pieces of equipment are exempt, a supply of biodiesel has been secured, and that the construction contractor is aware that the use of biodiesel is required. As a conservative measure, no reduction in GHG emissions was taken for the implementation of this measure as it is unknown if biodiesel can be readily applied to the various pieces of construction equipment that will be necessary for the project.

ND-10. Install bus stop(s) and secure scheduled transit service from Victor Valley Transit.

ND-11. Install pedestrian, bicycle and/or equestrian trails connecting project to school(s), commercial project(s) or transit.

ND-12. For employers, implement a Transportation Demand Management program, and document trip reduction by employees.

Energy Efficiency Measures

ND-13. Building and site plan designs shall ensure that the project energy efficiencies meet applicable California Title 24 Energy Efficiency Standards. Verification of increased energy efficiencies shall be documented in Title 24 Compliance Reports provided by the applicant, and reviewed and approved by the Town prior to the issuance of the first building permit. Any combination of the following design features may be used to fulfill this measure provided that the total increase in efficiency meets or exceeds Title 24 standards:

- Buildings shall exceed California Title 24 Energy Efficiency performance standards for water heating and space heating and cooling.
- Increase in insulation such that heat transfer and thermal bridging is minimized.
- Limit air leakage through the structure or within the heating and cooling distribution system to minimize energy consumption.
- Incorporate dual-paned or other energy efficient windows.
- Incorporate energy efficient space heating and cooling equipment.
- Incorporate the use of tankless water heaters in all residential units and community buildings.
- Promote building design that will incorporate solar control in an effort to minimize direct sunlight upon windows. A combination of design features including roof eaves, recessed windows, "eyebrow" shades and shade tress shall be considered.
- Interior and exterior energy efficient lighting which exceeds the California Title 24 Energy Efficiency performance standards shall be installed, as deemed acceptable by Town. Automatic devices to turn off lights when they are not needed shall be implemented.
- To the extent that they are compatible with landscaping guidelines established by the Town, shade producing trees, particularly those that shade paved surfaces such as streets and parking lots and buildings shall be planted at the Project site.
- Paint and surface color palette for the Project shall emphasize light and off-white colors which will reflect heat away from the buildings.
- All buildings shall be designed to accommodate renewable energy sources, such as photovoltaic solar electricity systems, wind energy systems on properties greater than 2 acres, appropriate to their architectural design.
- Consideration shall be given to using LED lighting for all outdoor uses (i.e. buildings, pathways, landscaping, carports).

ND-14. For residential projects, implement Green Building practices and document GHG reduction resulting from same.

ND-15. Use passive solar design by orienting buildings and incorporating landscaping to maximize passive solar heating during the winter, and minimize solar heating during the summer.

ND-16. To reduce energy demand associated with potable water conveyance:

- Landscaping palette emphasizing drought tolerant plants and exceeding Town standards for water conservation.
- Limit turf areas to no more than 20% of all landscaped areas.
- Use of water-efficient irrigation techniques exceeding Town standards for water conservation.
- U.S. EPA Certified WaterSense labeled or equivalent faucets, high-efficiency toilets (HETs), and water-conserving shower heads.

ND-17. Install Energy Star appliances and energy efficient fixtures.

ND-18. Install all CFL or LED light bulbs.

ND-19. Install common area electric vehicle charging station(s) and secure bicycle racks.

Renewable Energy Measures

ND-20. To reduce the project's energy use from the grid:

- Install solar panels sufficient to heat water within the project, and/or
- Install solar panels sufficient to provide electric power for the project, and/or
- Install photovoltaic systems sufficient to heat water within the project, and/or
- Install photovoltaic systems sufficient to provide electric power for the project, and/or
- Install other clean energy system sufficient to heat water within the project, and/or
- Install other clean energy system sufficient to provide electric power for the project.

ND-21. Install solar or photovoltaic systems on new roofs whether on residential, commercial or industrial buildings.

ND-22. Use on-site generated bio-gas in appropriate applications.

ND-23. Install combined heat and power facilities in appropriate applications.

ND-24. Specify rubberized and/or recycled asphalt for roads and driveways to the extent economically viable.

Solid Waste Management Measures

ND-25. Recycle and/or salvage non-hazardous construction and demolition waste, and develop and implement a construction waste management plan quantifying the reduction in the waste stream.

ND-26. Reuse construction waste in project features (e.g. shattered concrete or asphalt can be ground and used in walkways and parking lots).

ND-27. Facilitate the reduction of waste generated by building occupants that is hauled to and disposed of in landfills by providing easily accessible areas that serve each building and are dedicated to the collection and storage of paper, cardboard, glass, plastics, and metals.

ND-28. Provide educational information to residents addressing energy efficiency, solid waste reduction, and water conservation measures.

## D. Quantified Reductions

Specific reduction levels have been quantified based on the general measures listed above. Given that not all measures can be quantified, and many of the aforementioned measures will result in GHG reductions, the quantifiable reductions listed below are considered conservative.

To achieve quantifiable reductions the energy demand from electricity and natural gas use must be decreased, combustion of fuels from transportation must become more efficient, and disposal of waste to landfills must be lessened. There are numerous methods to achieve reductions from each of these sectors. The general approach taken in this action plan are described below, followed by the specific measures and assumptions set forth to achieve the reduction target.

GHG reductions to energy use can be achieved through remodeling and retrofitting existing structures, upgrading existing electric and natural gas appliances, and reducing energy use. New development can be constructed to require very little energy through building design, the use of energy efficient appliances, and use of sustainable materials.

To achieve GHG reduction from the transportation sector the Town intends to a) implement policies that reduce dependence on personal motor vehicles and encourage alternative modes of transportation, such as public transit, cycling, and walking; b) utilize vehicles that release fewer greenhouse gases, such as hybrids, more fuel efficient vehicles, and vehicles that run on alternative fuels; and c) encourage 'smart growth' or policies that promote efficient land use development, such as reduce the need to travel long distances, facilitate transit and other non-automotive travel, increase the availability of affordable housing, employ existing infrastructure capacity, promotes social equity, helps protect natural assets, and maintain and reinforce existing communities.

Residential and commercial recycling and composting, buying recycled products, green building and demolition practices, and Desert Friendly Landscaping play an important role in reducing emissions from the solid waste sector. Emission reductions from solid waste can be achieved by reducing the quantity of the waste stream. Avoiding disposal to landfills by increasing recycling and composting are effective ways to achieve landfill diversion targets.

### 1. Community

Measures are divided into the following sectors: residential, commercial, industrial, transportation, streetlights, water and sewer, and solid waste management.[7]

[7] Waste Management is used in the broader sense to include, waste reduction, recycling, composting and final disposal activities.

| Measure Number | Measure Type | Measure Name | Assumptions | Sector | $CO_2e$ Reductions (tons) |
|---|---|---|---|---|---|
| CO-16<br>CO-17<br>MO-35 | Change in Energy Source | Expand Rooftop Solar | Rooftop solar and renewable energy production is expanded to replace 40,408,243 kwh annually. Equates to 15% of forecast 2020 electricity after accounting for new home efficiency and existing home upgrades (ND-13 and MO-32). | Residential | 19,447 |
| ND-13<br>ND-14 | Energy Efficiency: Appliances and Equipment | New Homes Natural Gas Efficiency | 4,800 homes built after 2013 save 18% (519,740 therms) of overall natural gas use (2,887,442 therms) due to energy efficient appliances that reduce natural gas use under BAU conditions. | Residential | 3,048 |
| MO-32<br>MO-33<br>MO-34 | Energy Efficiency: Appliances and Equipment | Upgrade Existing Home Appliances | Upgrades result in the following savings, 25% from TV, 50% from lighting, 5% from water heating, 13% from central AC, and 15% from refrigerators and freezers. Upgrading 23,727 home (the number of homes constructed before 2013 per DOF) would save 63,644,842 kwh per year. | Residential | 30,629 |
| MO-32<br>MO-33<br>MO-34 | Energy Efficiency: Appliances and Equipment | Upgrade Natural Gas Appliances | Upgrades result in the following savings, 12% for water heaters, 11% space heaters, and 10% for clothes dryers that have moisture sensing. Upgrading 23,727 homes would result in an annual savings of 2,519,182 therms. | Residential | 14,772 |
| ND-13<br>ND-14 | Energy Efficiency: Buildings | New Homes Efficiency | Homes built after 2013 are 10% more efficient than Title 24. Assumes that a typical Title 24 home uses 6,000 kwh per year, a 10% more efficient home uses 5,400 kwh per year. Under BAU 4,800 homes would have generated 62,200,128 kwh per year (12,958.36 kwh per home) compared to 36,280,128 kwh per year for efficient homes. (25,920,000 kwh saved) | Residential | 12,474 |

| Measure Number | Measure Type | Measure Name | Assumptions | Sector | $CO_2e$ Reductions (tons) |
|---|---|---|---|---|---|
| CO-7 through CO-15 MO-22, MO-23 MO-27 MO-37 | Energy Efficiency: Buildings | Existing Account Retrofit and Upgrade (Electric) | Replacing failing or failed fixtures and appliances with energy efficient models, installing cool roofs, weatherization of structures (calking, weather-stripping, double-pane, windows, and insulation), and use of solar panels or photovoltaic achieve an overall reduction in electricity demand for 1,902 existing accounts of 58,304,859 kwh by 2020. | Commercial | 28,059 |
| CO-7 CO-8 CO-9 through CO-15 MO-22 MO-23 MO-27 MO-28 MO-37 | Energy Efficiency: Buildings | Existing Account Retrofit and Upgrade (Natural Gas) | Replacing appliances with energy efficient models, installing cool roofs, and weatherizing structures to reduce heat and cooling costs for 600 accounts (half of all commercial accounts for 2013) will achieve an overall reduction in the natural gas usage rate of 10%. A commercial account uses approximately 1,870 therms of natural gas per year, if 600 existing commercial accounts reduce their natural gas usage by 187 therms (10%) then a total of 112,200 therms will be saved. | Commercial | 658 |
| ND-8 ND-13 | Energy Efficiency: Buildings | Whole Building Electric | 168 (75%) new commercial accounts in 2020 use 50% less electricity compared to BAU, a savings of 5,149,956 kwh of electricity. | Commercial | 2,478 |
| ND-8 ND-13 | Energy Efficiency: Buildings | Whole Building Natural Gas | 114 new commercial accounts in 2020 use 50% less natural gas compared to BAU, a savings of 106,590 therms. | Commercial | 625 |
| CO-7 through CO-15 | Energy Efficiency: Buildings | Existing Retrofit and Upgrade (Electric) | Compared to BAU retrofitting 557 industrial accounts to achieve 50% savings in electricity demand results in an annual savings of 2,038,815 kwh. | Industrial | 981 |

| Measure Number | Measure Type | Measure Name | Assumptions | Sector | $CO_2e$ Reductions (tons) |
|---|---|---|---|---|---|
| CO-7 through CO-15 | Energy Efficiency: Buildings | Existing Account Retrofit and Upgrade (Natural Gas) | On average an industrial account uses 4,245 therms of natural gas per year. Reducing this use by 10% (425) therms per account (3) will save a total of 1,275 therms compared to BAU. | Industrial | 7 |
| ND-13 | Energy Efficiency: Buildings | Whole Building Electric | 50 (75%) new industrial accounts in 2020 use 50% less electricity compared to BAU, a savings of 178,425 kwh per year. | Industrial | 86 |
| ND-13 | Energy Efficiency: Buildings | Whole Building Natural Gas | New industrial accounts use 50% less natural gas compared to BAU, a savings of 743 therms. | Industrial | 4 |
| MO-9 | Change in Fuel Type or Technology | Truck Fuel Economy | Trucks equipped with advanced diesel engines increase fuel economy by 20%, bringing the fuel efficiency from 16.9 miles (BAU) per gallon to 20.28 miles per gallon for heavy trucks. | Transportation | 12,608 |
| MO-9 MO-11 | Other VMT Reduction | Signal Synchronization for Light Trucks | Town-wide signal synchronization measure would increase fuel efficiency by 12% for all trucks. 113,142,703 vehicle miles (after accounting for reduction in miles from land use efficiencies) achieve a 12% increase in fuel efficiency from 20.28 miles per gallon to 22.7 miles per gallon. | Transportation | 6,045 |
| MO-12 MO-14 MO-36 CO-4 | Change in Fuel Type or Technology | Use CNG for Transit Bus | All transit bus miles (37,188 miles) operating on gasoline fuel, with a fuel efficiency of 4.9 miles per gallon, are replaced with CNG fuel with a fuel efficiency of 6.9 miles per gallon. | Transportation | 32 |

| Measure Number | Measure Type | Measure Name | Assumptions | Sector | $CO_2e$ Reductions (tons) |
|---|---|---|---|---|---|
| MO-12<br>CO-1<br>CO-4 | Increase Fuel Efficiency | Elevate Number of Fuel Efficient Vehicles | Vehicle fleet averages 21.3 miles per gallon. 50% of the vehicle fleet (356,019,558 vehicle miles) will increase fuel efficiency by 50% (31 mpg).[8] | Transportation | 53,676 |
| ND-1 through ND-6 | Land Use Related | Mixed Use Reduces Miles for Trucks | The total miles traveled for trucks using diesel, with a fuel economy of 16.9 miles, are reduced by 20%, a savings of 28,285,675 miles. | Transportation | 16,746 |
| ND-1-ND-6<br>MO-1-MO-5 | Land Use Related | Mixed Use Reduces Miles for Passenger Vehicles[9] | The total miles traveled for passenger vehicles, with a fuel economy of 26.9 miles, are reduced by 20%, a savings of 178,009,779 miles. (Accounts for reduction in miles from ridesharing, transit, and alternative modes of transport.) | Transportation | 66,131 |
| MO-16<br>MO-17<br>MO-19<br>CO-3<br>CO-5<br>ND-12 | Other VMT Reduction | Rideshare at Businesses | 5% (864) of the projected 2020 employees (17,282) participate. An average employee travels 23 miles to and from work, 5 days a week, or 5,520 passenger miles per year. Ridesharing replaces 4,769,832 passenger miles traveled by single occupancy vehicles with an occupancy rate of 5 employees per vehicle. | Transportation | 2,567 |
| MO-9<br>MO-11 | Other VMT Reduction | Signal Synchronization for Passenger Vehicles | Town-wide signal synchronization measure would increase fuel efficiency by 12% for passenger vehicles. 712,039,116 vehicle miles (after accounting for reduction in miles from ridesharing, transit, alternative modes of transport, and land use efficiencies) achieve a 12% increase in fuel efficiency from 26.9 miles per gallon to 30.2 miles per gallon. | Transportation | 28,073 |

[8] The community vehicle fleet (excluding transit bus) will generate a total of 712,039,116 vehicle miles in 2020 (after accounting for reduced miles from walking/biking, use of transit, ridesharing, and reduced miles from land use efficiencies.

[9] Passenger Vehicles includes both diesel and gasoline operated vehicles.

| Measure Number | Measure Type | Measure Name | Assumptions | Sector | $CO_2e$ Reductions (tons) |
|---|---|---|---|---|---|
| MO-9<br>MO-11 | Other VMT Reduction | Signal Synchronization for Transit Bus | Town-wide signal synchronization measure would increase fuel efficiency by 12% for all transit buses. 720,962 vehicle miles achieve a 12% increase in fuel efficiency from 6.9 miles per gallon to 7.7 miles per gallon. | Transportation | 76 |
| MO-4<br>MO-5<br>MO-20<br>CO-6 | Switch to Public Transport | Free Transit Pass | 5% (864) of the projected 2020 employees (17,282) participate. An average employee travels 23 miles to and from work, 5 days a week, or 5,520 passenger miles per year. Use of transit bus replaces 4,769,832 passenger miles traveled by single occupancy vehicles with an occupancy rate of 6.9 per transit bus operating on CNG.[10] (864/6.9=125; 125x23x5x4x12= 690,000 VMT) | Transportation | 1,413 |
| ND-11<br>MO-10 | Walking/Biking | Alternative Mode of Transport | Expanded walking/biking infrastructure and promotion there of shift 46,844,679, 5% of vehicle miles traveled 890,048,895 by all passenger vehicles (excluding transit buses) to bicycle or walking. | Transportation | 21,872 |
| MO-40<br>MO-41<br>CO-18<br>CO-19 | Avoided Disposal to Landfill | Increase Recycling of Paper Products | 20% (1,747 tons) of paper products are recycled rather than disposed of in a landfill. | Solid Waste | 5,304 |
| CO-18 | Avoided Disposal to Landfill | Compost Food Waste | 20% (1,645 tons) of food waste are composted rather than disposed of in a landfill. | Solid Waste | 498 |
| | | | | **TOTAL** | **328,328** |

[10] 4.769 million passenger miles at single occupancy equates to 2.981 million vehicle miles at an occupancy factor of 1.6.

### 2. Municipal-Specific

Measures are divided into the following sectors: buildings, streetlight, transportation[11], water and sewer, and solid waste management.

| Measure Number | Measure Type | Measure Name | Assumptions | Sector | $CO_2e$ Reductions (tons) |
|---|---|---|---|---|---|
| CO-16<br>CO-17<br>MO-27<br>MO-35 | Change in Energy Source | Rooftop and Above Parking Solar | Half of all municipal building' energy demand (2,140,513 kwh) will be met through on-roof and above parking solar. (accounts for energy reductions from 15% savings) | Buildings | 1,030 |
| MO-22<br>MO-23<br>MO-27<br>MO-28<br>ND-13 | Energy Efficiency: Buildings | Reduce Electricity Demand | Overall municipal buildings will use 15% less energy compared to BAU as a result of new building design, upgrades to efficient appliances, and retrofit and weatherization of existing buildings. 334,737 kwh will be avoided. | Buildings | 161 |
| MO-22<br>ND-13<br>ND-14 | Energy Efficiency: Buildings | Reduce Natural Gas Use | On average municipal buildings will use 15% less natural gas compared to BAU. 12,850 therms will be avoided. | Buildings | 202 |
| MO-12<br>CO-4 | Change in Fuel Type | Replace Diesel with B100 | 2,348 gallons of diesel is replaced with a B100 blend. | Vehicle Fleet | 26 |
| MO-12<br>MO-13<br>CO-4 | Change in Fuel Type | Replace Gasoline Vehicles with B100 | 21,457 gallons of gasoline is replaced with a B100 blend. | Vehicle Fleet | 213 |
| MO-12<br>MO-13<br>CO-4 | Change in Fuel Type | Replace Gas Vehicles with Fuel Efficient Models | 8,851 gallons are gasoline are avoided by replacing older fleet vehicles with fuel efficient models. | Vehicle Fleet | 88 |

[11] Transportation accounts for vehicles from employee commutes, the Town's vehicle fleet, and the Police Fleet.

| Measure Number | Measure Type | Measure Name | Assumptions | Sector | $CO_2e$ Reductions (tons) |
|---|---|---|---|---|---|
| MO-19<br>CO-3<br>CO-5 | Car/Van Pooling | Municipal Rideshare | 5 employees participate in a rideshare program saving 22,080 vehicle miles and use a fuel-efficient vehicle that achieved 26.9 miles to the gallon. | Employee Commute | 8 |
| MO-20<br>CO-6 | Switch to Public Transport | Public Transit | 5 employees use the public transit system to travel to and from work save 27,600 vehicle miles. | Employee Commute | 13 |
| CO-4 | Increase in Fuel Efficiency | Improve Fleet MPG | On average an employee's passenger vehicle used for work commute achieves 32.2 mpg. Applied to 621,858 vehicle miles traveled (accounts for reductions from rideshare and transit). | Employee Commute | 37 |
| MO-9<br>MO-11 | Increase in Fuel Efficiency | Signal Synchronization | On average vehicles achieve an additional 3.864 miles per gallon due to efficiencies gained from signal synchronization. 621,858 miles achieve 36.1 mpg rather than 32.2 mpg. | Employee Commute | 20 |
| CO-7<br>MO-31 | Change in Energy Source | Streetlights and Traffic Signals | 50% of electricity used for streetlights and traffic signals will come from solar electricity, 405,448 kwh. | Streetlight | 195 |
| MO-25<br>MO-38 | Change in Energy Source | Use Solar for Pumping | 20% of 2020 kwh used for pumping (174,805 kwh) is generated by green electricity, such as solar. | Water/Sewage | 195 |
| MO-25<br>MO-38 | Energy Efficiency: Equipment and Lighting | Use Solar for Upgrade/Install Efficient Pumps | 43,701 kwh (5%) are avoided through installation of new and more efficient pumps including replacing existing pumps with efficient models. | Water/Sewage | 21 |
| MO-40<br>MO-41<br>CO-18 | Avoided Disposal to Landfill | Increase Recycling of Paper Products | 20% (2.35 tons) of paper products are recycled rather than disposed of in a landfill. | Solid Waste | 10 |
| CO-18<br>ND-27 | Avoided Disposal to Landfill | Compost Food Waste | 20% (2.21 tons) of food waste are composted rather than disposed of in a landfill. | Solid Waste | 1 |
| ND-27<br>ND-28 | Avoided Disposal to Landfill | Recycle Misc. Waste | 20% (5.24 tons) of mixed general waste is recycled | Solid Waste | 18 |
| | | | | **TOTAL** | **2,239** |

## E. GHG Reduction Summary

The Town of Apple Valley may choose to implement a number of policies and programs intended to reduce emissions from greenhouses gases. The purpose of this Plan is to show those measure types and target quantities that are likely to be most effective. A necessary consideration when weighing the effectiveness of each measure is cost of implementation, which is not accounted for in this Climate Action Plan. The above list of quantifiable reduction measures shows that with an aggressive schedule the targeted 15% reduction below 2005 levels can be realized by 2020.

Reduction measure assumptions and reduction calculations have been updated to reflect 2013 emissions and 2020 projections.

### 1. Community-wide

In the event that all of the reduction measures set forth above were implemented by 2020 and resulted in the projected reduction quantities then the community-wide greenhouse emissions, would be reduced by 407,941 tons of $CO_2e$. Under the business as usual conditions, GHG emissions are projected to be 1,009,562 tons of CO2e in 2020. A reduction of 407,941 ton of CO2e exceeds the 15% reduction target, bringing the 2020 emission level to 602,071 tons of CO2e with implementation of this CAP.

The updated 2013 community-wide reduction measures set forth above have the potential to result in a 328,328 $CO_2e$ reduction. Under business as usual conditions (2013), GHG emissions are projected to be 812,490 tons of CO2e in 2020. A reduction of 328,328 tons of CO2e exceeds the 15% reduction target, bringing the 2020 emission level to 484,162 tons of CO2e with implementation of the 2013 CAP updates.

### 2. Municipal-Specific

In the event that all of the reduction measures set forth above were implemented by 2020 and resulted in the projected reduction quantities, then the municipal-specific greenhouse emissions would be reduced by 1,369 tons of $CO_2e$. Under the business as usual conditions, GHG emissions are projected to be 3,132 tons of CO2e in 2020. A reduction of 1,369 ton of CO2e exceeds the 15% reduction target, bringing the 2020 emission level to 1,763 tons of CO2e with implementation of this CAP.

The updated 2013 municipal-specific reduction measures set forth above have the potential to result in a 2,239 $CO_2e$ reduction. Under business as usual conditions (2013), GHG emissions are projected to be 3,519 tons of CO2e in 2020. A reduction of 2,239 tons of CO2e exceeds the 15% reduction target, bringing the 2020 emission level to 1,280 tons of CO2e with implementation of the 2013 CAP updates.

# V. IMPLEMENTATION AND ADMINISTRATION

## A. Introduction

This section addresses the steps required by the Town to maintain and update the Climate Action Plan over time. The estimates of potential reduction provided in Section IV will need to be tracked to assure that the Town is meeting its targeted reductions. Since this document assumes certain growth and participation factors which may or may not prove to be accurate, the activities described below will allow the Town to record the actual progress made to meeting reduction targets.

As with the reduction measures, implementation and administration activities associated with the tracking of the Town's progress will be divided between municipal activities and community activities. The Town has greatest control over those measures it can implement itself. Those are also the measures which will be easiest to track. Community activities can be tracked by establishing an information gathering network with local businesses and agencies. A wide range of monitoring options are described below.

## B. Implementation and Administration

### Annual Activities

Implementation of this CAP will occur at many levels. The monitoring of the Town's reductions will require annual reporting. The activities required to accomplish this reporting effort are detailed below. The annual reports from all departments are to be forwarded to the Community Development Department, which will be responsible for the maintenance of the Town's database for this effort.

Municipal Activities

1. Tabulate the number of new trees planted, and existing trees removed in Town parks, parkways and other open space (Parks Department).
2. Establish a liaison with School District to:
   a. Implement an "adopt a tree" program in Town schools for the planting and maintenance of trees on school grounds and in Town parks. Tabulate number of trees planted as a result.
   b. Tabulate the use of CNG or other alternative fuel school buses used by the District. (Town Manager's Office)
3. Establish and implement a quarterly Greenhouse Gas Reduction class for Town residents and businesses (Parks and Recreation Department).
4. Tabulate the number of intersections at which traffic signals have been synchronized (Town Engineer).
5. Tabulate the new trails, bikeways and sidewalks constructed in linear miles (Town Engineer).

6. Tabulate the number of gasoline and diesel vehicles removed, and the hybrid or electric vehicles added to the Town's vehicle fleet. A minimum of 50% of the Town's new vehicle purchases shall be hybrid or alternative fuel vehicles, beginning in 2011 (Finance Department).
7. Require reporting of carpool, vanpool and other Transportation Demand Management activities from all businesses subject to the Transportation Demand Management Ordinance in vehicle trips reduced (Community Development Department).
8. Tabulate the carpooling, vanpooling and other activities of Town employee programs in vehicle trips reduced (Community Development Department).
9. Tabulate the new Energy Star rated appliances, and CFL or LED light bulbs installed at Town facilities (Building Department).
10. Tabulate water use at Town facilities (Finance Department).
11. Tabulate electric usage at Town facilities (Finance Department).
12. Tabulate natural gas usage at Town facilities (Finance Department).
13. Tabulate propane usage (if any) for Town equipment or facilities (Finance Department).

Community Activities

1. Tabulate the number of new units constructed at a density of 15 units or more per acre (Building Department).
2. Tabulate the number of new units constructed on infill lots on Bear Valley Road and Highway 18 (Building Department).
3. Tabulate the number of new residential units by type (single family, multi-family), and the square footage of commercial and industrial development constructed (Building Department).
4. Tabulate the number of Energy Star appliances, high efficiency water heaters, pool pumps and pool heaters installed in new residential units (Building Department).
5. Tabulate all alternative energy installations on residential, commercial or industrial buildings (new or additions) (Building Department).
6. Establish a liaison with Southern California Edison and Southwest Gas to:
   a. Collect data on Energy Star appliances, high efficiency pool pumps and other appliances and fixtures replaces in Apple Valley under a rebate or other incentive program.

   (Community Development Department)
7. Tabulate any and all Energy Star appliances installed through a Town-operated rebate program (Town Manager's Office).
8. Track buildings constructed which exceed Title 24 Building Code standards by percentage exceeded (Building Department).
9. Track buildings constructed to LEED, by certification level (Community Development Department).
10. Track solid waste and recycling tonnage generated by Town residents and businesses (Community Development Department).
11. Track the use of B20 or other biodiesel fuel in construction equipment (Town Engineer, Community Development Department).

The annual reports prepared by the Town's departments will be the basis for the Town's GHG Reduction Database. This database will cumulatively record the annual reports.

This database must also include an annual reporting of new units constructed and Town population (Department of Finance annual report). The database will calculate the actual growth in Town, to be used to compare to the growth assumptions used in this document. As less growth will result in lower greenhouse gas emissions, population growth is an important component of the implementation program.

**Activities Conducted Every Three Years**

Every three years, starting in 2013, the Town will run its Greenhouse Gas Reduction Measures through the program prepared for this document, to determine if its targets are being reached. After each run of the program, Town staff will determine which measures, if any must be modified to reach the Town's reduction targets.

The analysis for each update must be conducted based on known actual activities, and known actual growth rates to be effective. This document assumes a steady annual rate of growth, for example, over the life of the program. In the last three years, however, growth in Town has been significantly less than anticipated, due to economic and market conditions. A lower growth rate will be reflected in greenhouse gas emissions which are less than those anticipated in the model. Conversely, should the Town experience an economic boom in the future, that increased growth should be reflected in the CAP update undertaken at that time. By establishing and maintaining an annual reporting program, the Town can be assured that the data required to conduct the update is available at the time it is needed, and in one database (as described above).

This effort will also require the preparation of a GHG inventory, similar to the one provided in this report, but for the reporting year. The components of the inventory, and the information needed to complete it, are detailed below.

*Municipal Activities and Accounts*

Electricity

The Town should maintain a list for easy reference of all existing account numbers and account types currently held with SCE that can be updated when new accounts are opened or when existing accounts are closed. This will be implemented through the tracking of usage for Town facilities described above.

Natural Gas

The Town should maintain a list for easy reference of all existing account numbers and account types currently held with Southwest Gas that can be update periodically when new accounts are opened or when existing accounts are closed. This will be implemented through the tracking of usage for Town facilities described above.

Propane

The Town should maintain a list for easy reference of all quantities of propane purchased for municipal use. This will be implemented through the tracking of usage for Town facilities described above.

Transportation
To be consistent with the Community-wide analysis it was assumed that on average Town employees travel 23 miles to work. A polling of employees during reporting years should be conducted to establish the actual commute trip length at the time of each inventory update. The actual number should be input into the model when updates are conducted.

Solid Waste
For purposes of the CAP, it was assumed that Municipal waste generation was consistent with the Community-wide waste generation rate on a per person basis. That is, each employee generates an equivalent amount of waste as a resident. The Town's actual solid waste contribution should be surveyed for total tonnage as well as waste type. Town staff should coordinate with the Town's solid waste hauler to develop a tracking system for annual reporting.

*Community Based Activities and Accounts*

Electricity
Southern California Edison (SCE's) provided annual electricity usage per rate group including the number of accounts for the inventory in this document. SCE's rate groups are independently defined -- that is there is no direct nexus between residential, commercial, and industrial as defined by SCE, Apple Valley's General Plan, and other utilities. SCE's Hany Elgayar, Business Customer Division Rate & Data Analysis, has indicated that SCE is working to redefine rate groups in order to be able to provide electricity usage reports by sector. A coordinated effort to similarly define rate groups and sectors would assure that similar users are properly grouped together for future inventories.

Natural Gas
While Southwest Gas provided customer categories that include residential, commercial, and industrial sectors, more specific information on account type -- such as defining customer categories -- would confirm consistency with the General Plan's and other utilities' definitions of these sectors.

Propane
For the purpose of the original inventory, propane usage was estimated by taking the difference between the total number of households, (22,455 as reported by DOF) and the average number of residential customer accounts, (22,527 as reported by Southwest Gas). More refined propane usage could be obtained by surveying local and regional propane suppliers. The same tabulation will be required in subsequent inventory years.

Transportation
The CAP uses the General Plan's traffic analysis for community wide traffic count data. Some mobile sources, such as Victor Valley Transit, AV Unified School District and others, can be refined with actual vehicle miles traveled, vehicle type, and fuel use. For future inventory years, base year traffic will be increased by actual growth data, to reflect an accurate growth in vehicle trips. This estimate should be compared to Town Engineer trip counts to assure consistency.

Solid Waste

Actual tonnage by type of waste for the following categories would yield more precise data and would determine which types of waste reduction programs would be most effective: paper products, plant debris, wood/textiles. Should this data not be available for future inventories, tonnage provided by the Town's waste hauler will be required.

**Modification of the CAP**

If the analysis during any given update cycle shows that the reduction measures must be amended to achieve the stated targets, such an amendment shall be completed by staff during the same year as the update was undertaken. The amended reduction measure assumptions shall be appended to this document, and disseminated to Town staff for implementation. If the amended measures result in an increase of less than 20% in activity (percentage increase over the reduction measure in this document), the change shall not require adoption by the Town Council. If, however, a reduction strategy requires an increase of 21% or more in a reduction strategy, the amended CAP shall be considered by the Town Council, and adopted by Resolution.

# Appendix A

# 2010 CAP Methodology

## 2010 Climate Action Plan Methodology

An inventory of greenhouse gas emissions requires the collection of information from a variety of sectors and sources. For electricity and natural gas data Southern California Edison (SCE) and Southwest Gas Corporation were consulted. The Traffic Study prepared for Apple Valley's General Plan served as the source of transportation data. Solid waste data was gathered from the California Department of Resource Recycling and Recovery, the County of San Bernardino Solid Waste Management Division (SWMD), and the Victor Valley Materials Recovery Facility. Town staff including Diana McKeen, Environmental and Regulatory Compliance Manager, and Kaye Reynolds, Assistant Director of Finance, were instrumental in providing data on municipal operations and support for the Town-wide inventory and invoice records, respectively.

Apple Valley's community inventory includes all energy consumed within Town limits. This means that even though the electricity used is actually produced elsewhere, this energy and emissions associated with it appears in Apple Valley's inventory. The decision to calculate emissions in this manner reflects the general philosophy that a community should take full ownership of the impacts associated with its energy consumption, regardless of whether the generation occurs within the geographical limits of the community.

Data was assimilated using 2005 as the base year. For utilities and agencies that could not readily provide data for the 2005 year, data was obtained for the closest year available and a reduction factor was applied in order to account for the difference in demand. According to the Department of Finance City/County Population Estimates in 2005 Apple Valley's population size was 63,754 people. In 2008 the Town's population size was 69,654 people. This represents a growth rate of 8.47% over the three year period from 2005 to 2008.[12]

Assimilating data from all utilities and agencies provided the base information needed to build a comprehensive community emissions inventory and a municipal emissions inventory. The Clean Air and Climate Protection (CACP) software, Version 1.1., June 2005, was utilized in order to systematically estimate and track greenhouse gas emissions from energy and waste related activities at the community-wide scale and those resulting directly form municipal operations.

ICLEI's Emissions Analysis Software

To facilitate local government efforts to identify and reduce greenhouse gas emissions, the International Council for Local Environmental Initiatives (ICLEI) developed the Clean Air and Climate Protection (CACP) software package with Torrie Smith Associates. This software estimates emissions derived from energy consumption and waste generation within a community. The CACP software determines emissions using specific factors (or coefficients) according to the type of fuel used.

Emissions are aggregated and reported in terms of carbon dioxide equivalent units, or $CO_2e$. Converting all emissions to carbon dioxide equivalent units allows for the consideration of different greenhouse gases in comparable terms. As mentioned above, methane is twenty-one

[12] Department of Finance Table E-5A, City/County Population.

times more powerful than carbon dioxide in its capacity to trap heat, so the model converts one ton of methane emissions to 21 tons of $CO_2e$.

The emissions coefficients and methodology employed by the software are consistent with national and international inventory standards established by the Intergovernmental Panel on Climate Change (1996 Revised IPCC Guidelines for the Preparation of National GHG Emissions Inventories), the U.S. Voluntary Greenhouse Gas Reporting Guidelines (EIA form1605), and, for emissions generated from solid waste, the U.S. EPA's Waste Reduction Model (WARM).

Although the software provides Apple Valley with a sophisticated and useful tool, calculating emissions from energy use with precision is difficult. The model depends upon numerous assumptions, and it is limited by the quantity and quality of available data. With this in mind, it is useful to think of any specific number generated by the model as an approximation rather than an exact value.

# Appendix B

# CACP Output Tables

# Appendix C

## Statistical Background Data

- **SCE Account Information**
- **Southwest Gas Account Information**
- **VVTA Fleet Data**
- **CalRecycle Electronic Annual Report**