TOWN OF
APPLE VALLEY, CALIFORNIA

AGENDA MATTER

Subject Item:

TOWN OF APPLE VALLEY CLIMATE ACTION PLAN: A REQUEST TO ADOPT THE TOWN'S CLIMATE ACTION PLAN.

Summary Statement:

In August of 2009, when the Town Council adopted the General Plan and certified the General Plan EIR, it also directed staff to complete a Climate Action Plan, in order to assure that the Town complies with the requirements of the California Global Warming Solutions Act, also known as AB 32. Staff has undertaken the project, and respectfully requests that the Town Council consider the document, amend it if necessary, and adopt the attached Resolution.

Background and Introduction

The development of strategies for the reduction of greenhouse gas emissions has been evolving rapidly in the last several years. Before 2006, California had enacted a series of bills which required that State departments and agencies develop regulations to reduce greenhouse gases, which are believed to be the primary cause of global warming. In 2006, the governor signed the Global Warming Solutions Act (AB 32), which solidified the process, and requires that all communities establish reduction strategies which will result in greenhouse gas emissions equivalent to 1990 levels by the year 2020. The most common implementation tool, which has evolved to meet the requirements of AB 32, is the Climate Action Plan, or Greenhouse Gas Reduction Plan.

While the General Plan and its EIR were being prepared and the Town joined the San Bernardino Associated Governments in regional efforts to reduce greenhouse gases. The General Plan also includes policies reflecting the need for greenhouse gas reduction planning in its policies and programs (Air Quality Element). The Town also received comments on the General Plan EIR which resulted in the inclusion of mitigation measures which require the preparation of a Climate Action Plan, and which included suggested reduction strategies. The attached Town of Apple Valley Climate Action Plan represents the implementation of those mitigation measures. The Plan complies with the requirements of AB 32. It includes sections which detail the following:

(Continued on next page)

Recommended Action:

Move to open the public hearing and take testimony.
Close the public hearing. Then:

1. **Adopt** Town Council Resolution No. 2010-30, approving the Town of Apple Valley Climate Action Plan.

Proposed by: Planning Division Item Number _____
Town Manager Approval: _____ Budget Item ☐ YES ☐ NO ☒ N/A

1. The history of greenhouse gas emission science and the evolution of the law.
2. An analysis of the Town's current emissions, for both the private sector and the Town government's emissions, and the establishment of targeted reductions for the year 2020.
3. A comprehensive list of reduction measures for new development, existing development, and for Town governmental activities.
4. A quantification of the reductions these measures will achieve, demonstrating that the Town can reach its mandated targets.

It is important to note that all of the reduction strategies suggested in the General Plan EIR are included in the Plan. Additional reduction strategies have also been included to provide the Town with the broadest range of options in implementation of the Plan. It is also important to note that not all of the reduction strategies can be quantified, but that all that can have been so quantified in the Plan. The targeted reduction was established by the State at fifteen percent (15%). With implementation of all the reduction strategies, the private sector reduction would be forty percent (40%), and the Town government reduction would be forty-four percent (44%). The implementation of the CAP will exceed the required emissions reductions and, therefore, would result in the Town exceeding the requirements of AB 32. Since it can be expected that some reduction strategies will not be implemented as effectively as described in the Plan, this allows the Town some flexibility in the Plan's implementation, and also assures that even if the Plan's reduction strategies are not fully implemented, it will comply with State law.

The reduction strategies are implementation measures which the Town, the development community and existing residents and businesses will participate in effecting. Over time, the Town will need to monitor which strategies are implemented and the reductions they achieve. Staff will return a Monitoring Plan for the Town Council's consideration in the near future, which will detail how the Town will keep track of reductions through the life of the Plan. As stated above, because the implementation of all the quantifiable strategies would result in a reduction of over forty percent (40%), it can be expected that the actual implementation of the Plan will result in somewhat lower reductions which still exceed the State's requirements. As the implementation of these Plans is also an evolving process, periodic monitoring will be required to assure that the Town is meeting its obligations under AB 32.

There is a pending ballot measure related to the November election (Proposition 23), which would suspend AB32 until such time as the California economy recovers from the current recession. Should this measure be passed by the voters, the Town would not be obligated to continue to implement the Climate Action Plan. As the mitigation measure states that the Town would prepare a Plan to "meet the greenhouse gas emission targets established in the California Global Warming Solutions Act", and "to reduce greenhouse has emissions within the Town's control to achieve the emission reduction goals required by AB32,"[1] the Town cannot implement targets and requirements which are not in effect. As a result, the Plan's implementation would be suspended as long as AB32 is suspended.

Environmental Review

The Town reviewed this Plan under the requirements of CEQA and determined that the Plan, as the implementation of a mitigation measure of the General Plan EIR, has been considered in that document, and represents a beneficial impact on the environment. No additional environmental review under CEQA is required.

[1] General Plan EIR, page 111-43, Mitigation Measure #41.

Attachments:

1. Town Council Resolution No.
2. Climate Action Plan

TOWN COUNCIL RESOLUTION No. 2010- 30

A RESOLUTION OF THE TOWN COUNCIL OF THE TOWN OF APPLE VALLEY, CALIFORNIA, ADOPTING THE TOWN OF APPLE VALLEY CLIMATE ACTION PLAN

WHEREAS, the Town of Apple Valley adopted its General Plan on August 11, 2009; and

WHEREAS, the Town of Apple Valley certified the General Plan Environmental Impact Report (SCH #2008091077) on August 11, 2009; and

WHEREAS, the Town Council directed that a Climate Action Plan be prepared to conform to the requirements of the General Plan EIR and California law; and

WHEREAS, on June 11, 2010, the Town Council public hearing for the adoption of the Town of Apple Valley Climate Action Plan was duly noticed in the Apple Valley News, a newspaper of general circulation within the Town of Apple Valley; and

WHEREAS, the Climate Action Plan is consistent with the General Plan, insofar as it implements its policies and programs relating to the reduction of greenhouse gas emissions; and

WHEREAS, the General Plan Air Quality Element, Program 1.A.1 requires that the Town "adhere to existing and future greenhouse gas and global warming rules, regulations and requirements" ; and

WHEREAS, The Town Council conducted duly noticed public hearings on June 22, 2010 and heard all testimony of any person wishing to speak on the issue.

NOW, THEREFORE, BE IT RESOLVED, that in consideration of the evidence received at the public hearing, and for the reasons discussed by the Town Council at said hearing, the Town Council of the Town of Apple Valley, California orders, determines and resolves as follows:

Section 1. The Town Council hereby approves and adopts the Town of Apple Valley Climate Action Plan, appended to this Resolution as Exhibit A.

Section 3. Effective Date. This Resolution shall become effective immediately upon adoption by the Town Council of the Town of Apple Valley.

Adopted by the Town Council and signed by the Mayor and attested to by the Town Clerk this 22nd day of June, 2010.

_____
Honorable Peter Allan, Mayor

ATTEST:

_____
Ms. La Vonda M. Pearson, Town Clerk

Exhibit A

Climate Action Plan

TOWN OF APPLE VALLEY

DRAFT
CLIMATE ACTION PLAN

Prepared For

Town of Apple Valley
14955 Dale Evans Parkway
Apple Valley, CA 92307

Prepared By

Terra Nova Planning & Research, Inc.®
400 South Farrell, Suite B-205

Palm Springs, CA 92262

May 18, 2010

Table of Contents

TABLES

CHARTS

APPENDICES

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.

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.

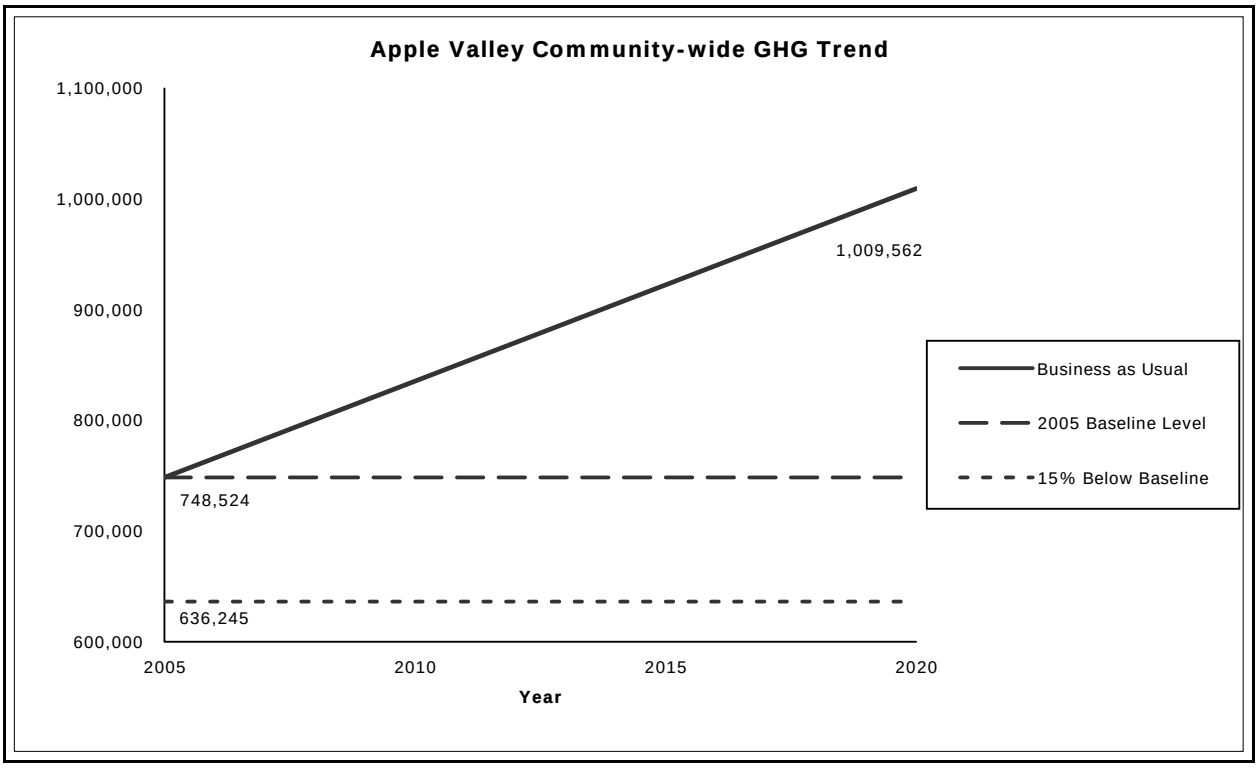

Chart 1: Community-wide GHG Trend

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. The Chart 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.

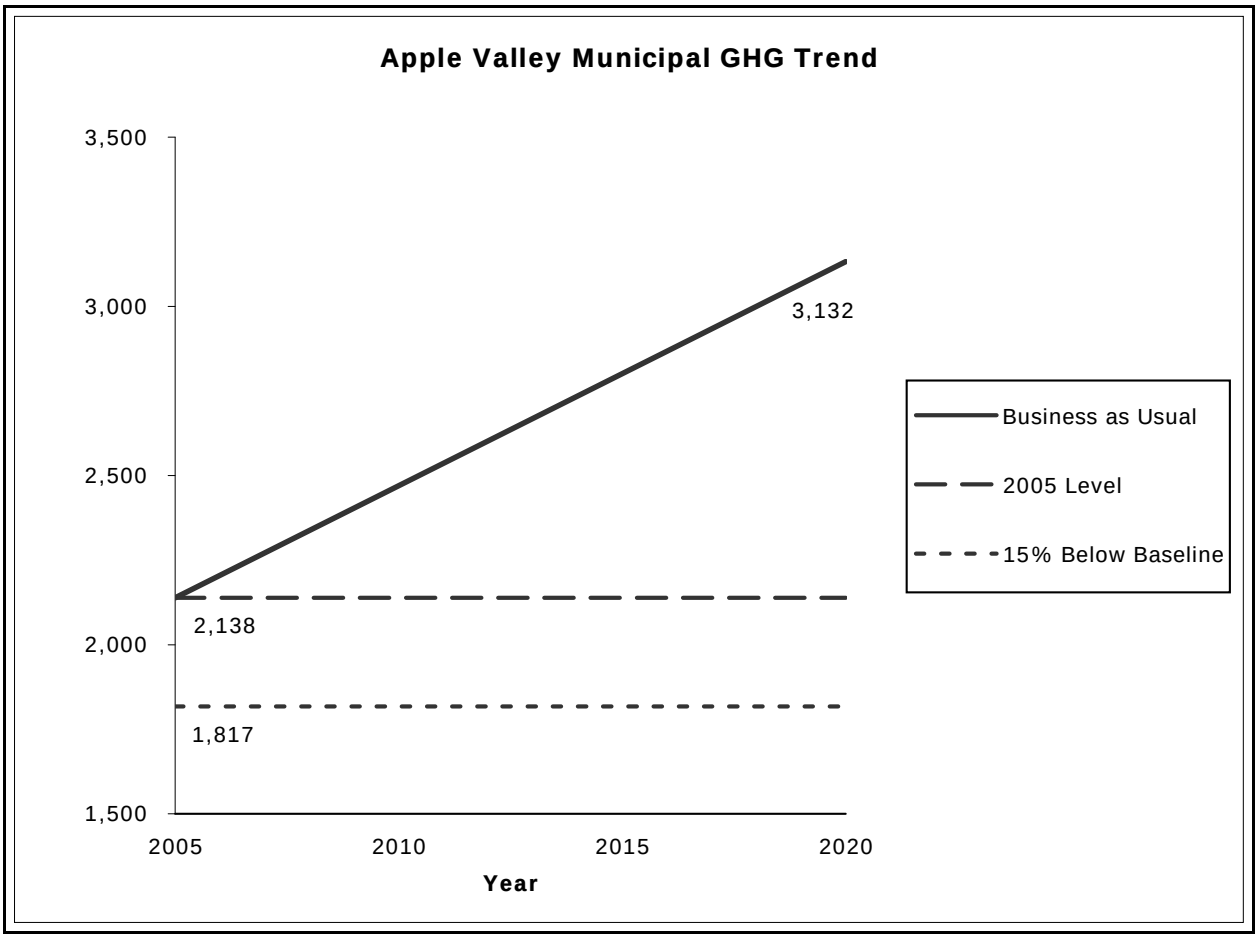

Chart 2: Municipal-specific GHG Trend

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 Evolution of Climate Change

Climate change has been theorized and studied since the late 1800's. By the late 1900's, the study of climate change had evolved and better understood the causal relationship between greenhouse gases and global increases in temperature. The Montreal Protocol was originally signed in 1987, and amended in 1990 and 1992. It required that the production and consumption of chlorofluorocarbons, hallons, carbon tetrachloride, which all deplete ozone in the stratosphere, were to be phased out by 2000. Methyl chloroform was to be eliminated by 2005.

The United Nations established the Intergovernmental Panel on Climate Change ("IPCC") in 1988. Its mission was to evaluate the impacts of global warming and develop strategies which could be implemented by countries across the globe to curtail climate change resulting from human activities, particularly from the burning of fossil fuels for transportation and power generation. The United States and other countries around the world signed the United Nations Framework Convention on Climate Change ("UNFCCC") Agreement in 1992. The treaty's goal was the "stabilization of greenhouse gas concentrations in the atmosphere at a level that would minimize dangerous anthropogenic interference with the climate system[2]." Evolving from the UNFCC, in 1997, in Kyoto Japan, delegations from numerous countries drafted the Kyoto Protocol, which requires industrialized countries to reduce greenhouse gas emissions 5.2% below 1990 levels. By October of 2009, 187 countries had signed and ratified to the Protocol. The United States has also signed the protocol, but is the only country not to ratify it. Since its inception, participating nations have met regularly to discuss implementation of strategies and programs, the latest such meeting being in Copenhagen in early December 2009.

International efforts have translated throughout the world into national programs and strategies which are still evolving today. In the United States, federal requirements and guidance have been limited. However, the United States Supreme Court, in the case of Massachusetts v. The Environmental Protection Agency (EPA), held that the EPA had a mandatory duty to enact rules

[2] Article 2, The United Nations Framework Convention on Climate Change.

regulating mobile emissions of greenhouse gas pursuant to the Federal Clean Air Act. The Court held that greenhouse gases do fit the definition of an air pollutant that may reasonably be anticipated to endanger public health or welfare. It appears that the United States EPA will promulgate regulations pertaining to emissions of greenhouse gases under the authority of the Federal Clean Air Act. Although federal legislation and programs in the US have been limited to date, individual states, most notably California, have implemented programs and strategies to affect reductions in greenhouse gases, and set measurable goals and targets for these reductions.

B. The Impact of Climate Change

The United Nations Intergovernmental Panel on Climate Change predicts that changes in the earth's climate will continue through the 21st century and that human activity may increase the rate of change significantly in the future. These changes are caused by greenhouse gas increases.

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[3]. 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 dependant 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[4]. 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[5].

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.

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%.

---

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

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

5 "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.

The United Nations 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.

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, carbon dioxide concentrations in the atmosphere are around 370 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.[6]. 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.

[6] "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.

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.

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.

C. 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 2010.

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[7] 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 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.[8]"

[7] CARB Scoping Plan, *Table 1*, December 2008.
[8] CARB Scoping Plan, *Introduction – Proposed Measures*, December 2008.

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.

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.

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

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.[9]

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 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.

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

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.

C. Community Emissions Inventory (Baseline 2005)

Summary

A community-wide emissions inventory for greenhouses was conducted for the Town of Apple Valley. The GHG inventory establishes an emissions baseline for the year 2005. The GHG inventory considers emissions generated by the Town of Apple Valley from the use of electricity and natural gas, transportation, pumping, streetlights and traffic signals, and decomposition of solid waste. Using the data and methodology described below, the baseline GHG emission, Community-wide for the Town of Apple Valley is estimated to be 748,524 tons of Carbon Dioxide equivalent (CO_2e) for 2005.

Table 1
Apple Valley GHG Emission Summary 2005

Sector	Tons $_{CO2e}$
Residential	141,417
Commercial	38,039
Industrial	7,118
Transportation	510,676
Solid Waste	43,932
Pumping Facilities	5,956
Streetlights and Signals	1,386
Total	**748,524**

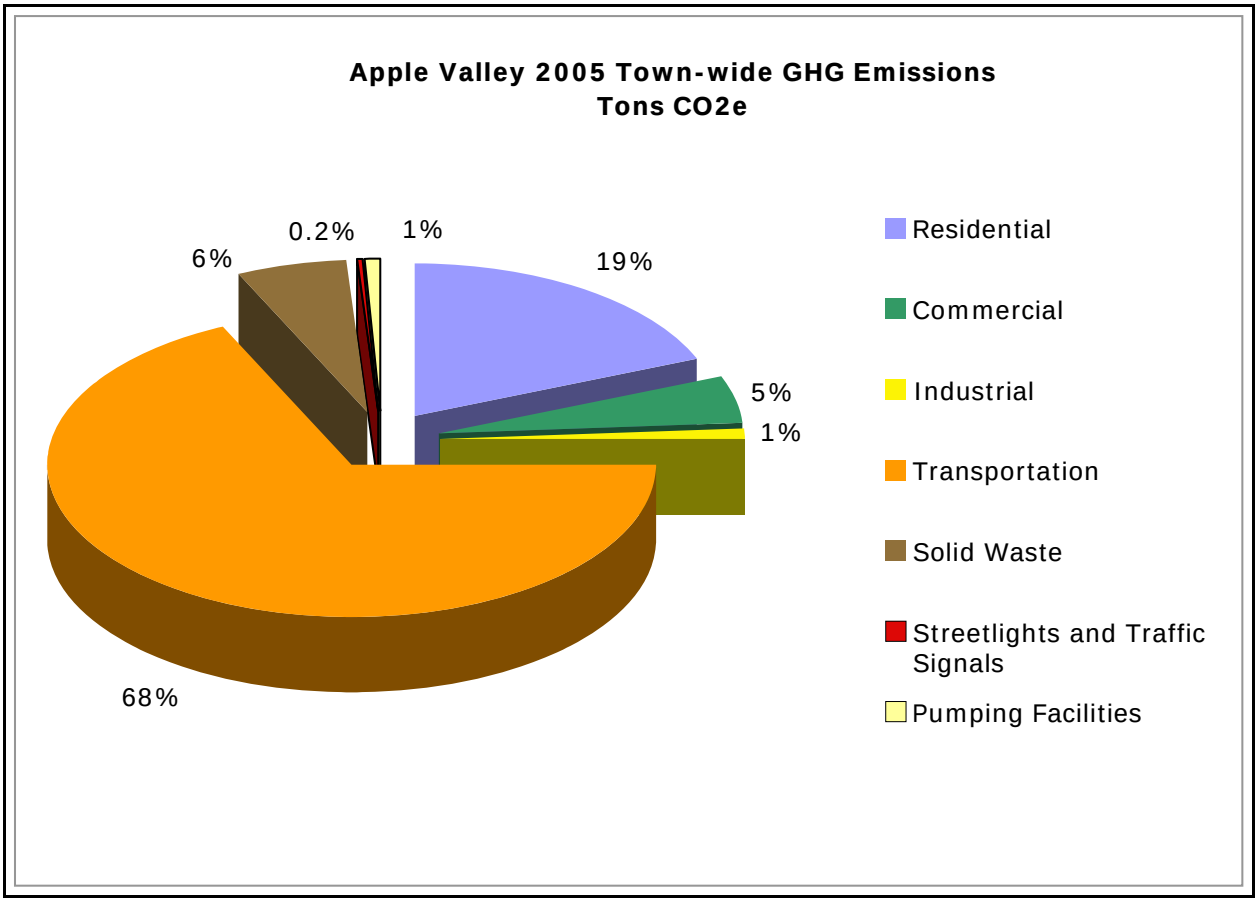

Chart 3: Community GHG Emissions Summary

Electricity

Southern California Edison prepared a community-wide report for electricity usage for 2005.[10] Annual electricity usage is presented in kilowatt-hours by rate group and includes the number of accounts for each, see Table 2 below.

Table 2
Electricity Assumptions for Baseline

Sector	Rate Group	Annual kwh	Accounts	kwh per account
Residential	Domestic	195,613,488	23,316	8,390
Commercial	GS-2, and TOU-8	79,780,787	301	265,052
Industrial	GS-1	13,799,465	1,848	7,467
Streetlight	ST LIGHT	3,905,754	160	24,411
Pumping	AG TOU, and PA-2	16,783,859	96	174,832
Total		**309,883,353**		

In order to determine the quantity of greenhouse gas emissions associated with the production of the Town-wide electricity, kwh values for each sector were plugged into the CACP Software.

[10] "Electricity Use Report for Town of Apple Valley Year 2005," prepared by Southern California Edison, Version 5.0, March 22, 2010.

Electricity emission factor for year 2005 are based on the Western Systems Coordinating Council/CNV and represent the following tons/GWh: 343.3 for CO_2, 0.027 for CH_4, and 0.035 for N_2O. To obtain results in tons of Carbon Dioxide equivalence, units were converted and a global warming potential of 21 for methane and 310 for nitrous oxide was applied. The 2005 baseline community-wide electricity use for the Town of Apple Valley is 309,883,353 kwh, which results in the generation of 109,954 tons of CO2e.

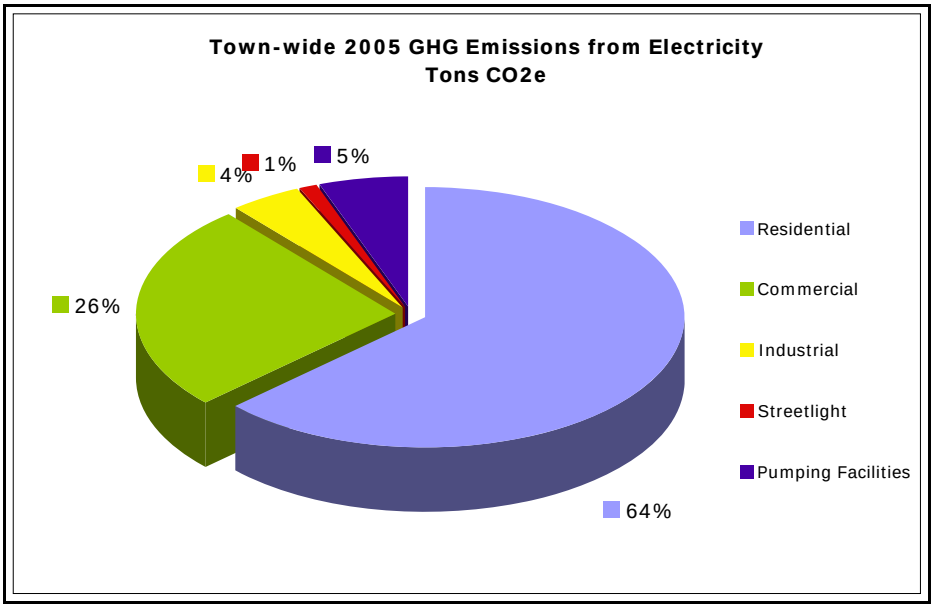

Chart 4: Community GHG Emissions from Electricity by Sector

Natural Gas

Figures for Town-wide natural gas use were provided by Kurt Edwards, Southwest Gas Corporation, on February 24, 2010. The data summarized Town-wide use of natural gas in 2005 by quarter for ten customer categories including commercial, residential, industrial and GTS Transporter. For the purposes of this analysis GTS Transporter was lumped with industrial.

Table 3
CO_2e from Natural Gas Use

Sector	**2005 Therms**
Residential	11,576,524
Commercial	1,574,978
Industrial	359,547
Total	**13,511,049**

Natural gas data is provided in therms, which is a standard unit for heat energy. One therm is equal to 100,000 British thermal units (BTU), which is the energy equivalent of burning approximately 100 cubic feet of natural gas. The therm unit provides energy content, which varies due to variation in the mix of hydrocarbons.

In 2005 the annual Town-wide use of natural gas was 13,511,049 therms. The CACP heat coefficients in pounds per therm are: 0.007 for CO_2, and 0.000001 for CH_4. Using these factors and the global warming potential of 21 for methane, a total of 83,474 tons of CO_2e were emitted in 2005 from Town-wide use of natural gas.

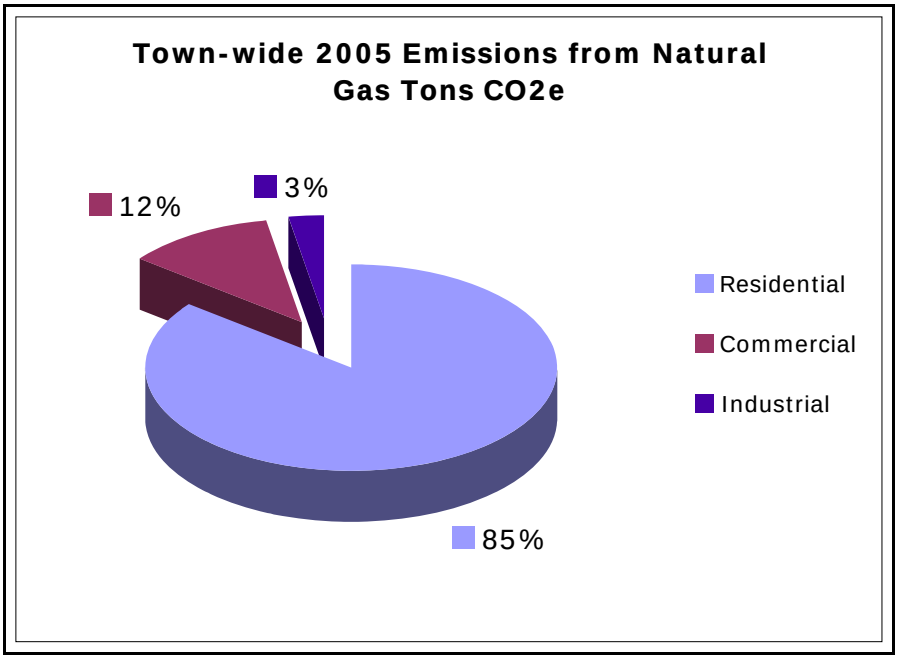

Chart 5: Community GHG Emission for Natural Gas by Sector

Propane

In order to account for the use of propane within the Town of Apple Valley it was assumed that on average a single family home utilizes 1,000 gallon of propane annually. It was estimated that homes not using natural gas utilized propane. In 2005 there was an average of 22,455 residential natural gas accounts. The Department of Finance estimated that in 2005 there were 22,453 households town-wide. Therefore, it was assumed that in 2005 72 homes relied exclusively on propane and used 1,000 gallon per year of a total of 72,000 gallons. The use of 72,000 gallons of propane results in the emission of 486 tons of CO_2e in 2005.

Transportation

The majority of GHG emissions from the transportation sector are from Apple Valley residents' vehicle miles traveled. The public transportation, Victor Valley Transit Authority, has several routes within Town limits that also result in a minor contribution to GHG emissions in the transportation sector. Although specific data on VVTA routes was not available, it was assumed that transit buses accounted for 1.5 million vehicle miles per year in 2005.[11] Although there is a small regional airport within the Town of Apple Valley GHG emissions associated with air travel are not included in this analysis. Similarly, although there is a railroad within Town limits GHG emissions associated with rail travel is not included in this analysis.

[11] Assumes a standard breakout of vehicle mix and type.

Average Daily Trips
Total average daily trips for 2005 was obtained from the Town of Apple Valley General Plan Circulation Update, prepared by Urban Crossroads. To quantify traffic counts and verify 2005 daily trips generated by the Town of Apple Valley, Urban Crossroads utilized guidelines from the National Cooperative Highway Research Program, Report 225 (NCHRP-225).

Using ITE standard trip length per trip type, average daily trips were converted into total miles traveled. Using this methodology it was determined that the Town of Apple Valley generated a total of 776.79 million miles in 2005.

GHG Emissions
Using the CACP software it was determined that in 2005 the transportation sector resulted in the emission of 422,335 tons of CO_2e from the combustion of gasoline and the emission of 88,341 tons of CO_2e from the combustion of diesel, for a total of 510,676 tons of CO_2e.

Solid Waste
Apple Valley's solid waste stream is divided into waste that is hauled directly to the landfill and commingled recycling, which is processed through the Victor Valley Materials Recovery Facility (MRF). As much as 70% of the total volume of commingled recyclables received at the MRF is recovered, baled and sold. The remaining 30% is non-recyclable or non-capturable and goes to the landfill for disposal.

Solid waste in the Town of Apple Valley is generated in all sectors, but is assimilated and weighed per load. Currently available data for 2005 provides summary data for franchise collectors (AVCO), self-hauling companies, and Cash costumers (individuals who self-haul material to landfills for disposal). In 2005 the Town of Apple Valley contributed a total of 75,618.71 tons of solid waste to surrounding landfills, 99% of which went to the Victorville Landfill.

Table 4
Solid Waste Disposal to Landfills 2005

	Solid Waste Tons
Victorville Landfill	74,478.48
Mid-Valle Landfill	621.55
Barstow Landfill	509.69
Landers Landfill	8.08
San Timoteo	0.91
	75,618.71

Using the CACP software it was determined that in 2005 the decomposition of solid waste in managed landfills with no methane capture technology resulted in the generation of 43,932 tons of CO_2e.

D. Municipal Emissions Inventory (Baseline 2005)

Summary
A municipal specific inventory for greenhouse gasses was also conducted in order to determine GHG emissions generated directly by Town-owned and operated facilities. In keeping with the community inventory, the municipal inventory establishes a baseline of emissions for the year 2005. The municipal GHG inventory considers emissions generated by the operation of Town facilities and local government activities including emissions from the use of electricity, natural gas, transportation from the Town's fleet, the police fleet, and employee commute, water and sewage pumping, and decomposition of solid waste.

A concerted effort was made to obtain sector specific data for 2005. Where data was not available for the 2005 year, data from 2008 was used and an 8.47% reduction factor was applied to the 2008 quantities to account for growth between 2005 and 2008.

Using the data and methodology described below, the baseline GHG emission for municipal operation is estimated to be 2,138 tons of Carbon Dioxide equivalent (CO_2e) for 2005. The Table below shows total greenhouse gas emissions from all municipal sources for the year 2005.

Table 5
GHG Baseline for Municipal Operations

Sector	**CO_2e Tons**
Building and Facilities	801
Streetlights and Traffic Signals	193
Wastewater Facilities	106
Employee Commute	347
Town Fleet	256
Police Department	364
Solid Waste	71
Total	**2,138**

It should be noted that Municipal operations account for 0.29% of the community wide GHG emission for the Town of Apple Valley. Emissions from municipal operations are a sub set of the community-wide analysis.

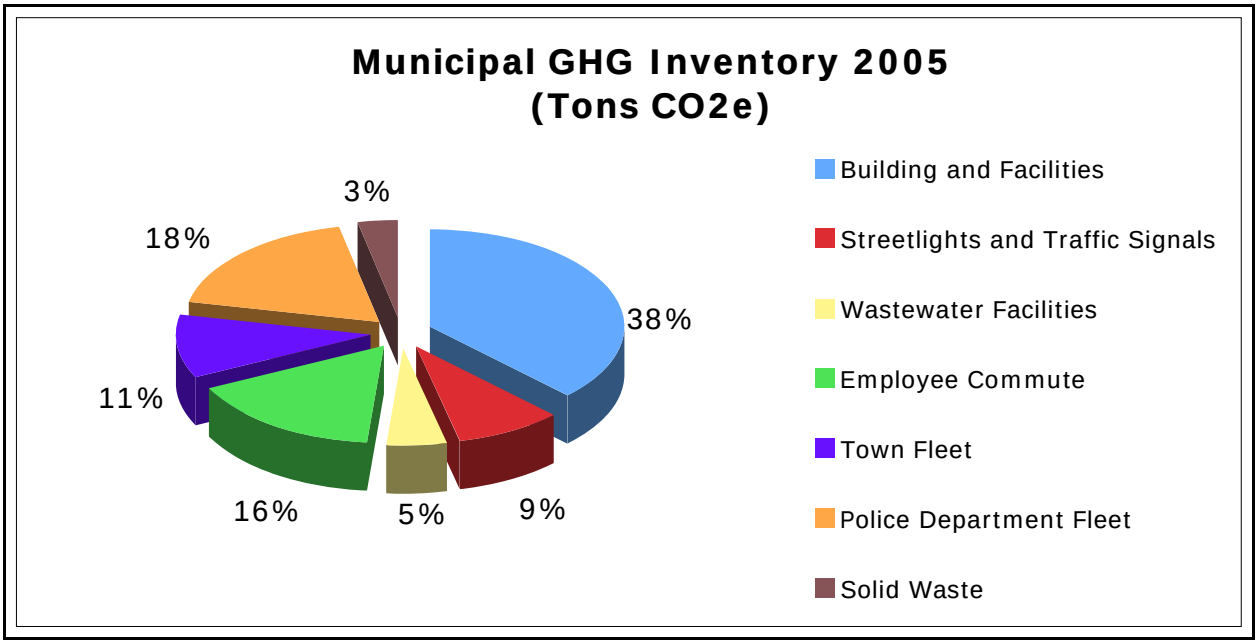

Chart 6: Municipal GHG Baseline

Electricity

Southern California Edison provided data use information for the Town of Apple Valley municipal accounts for 2005, which includes accounts from streetlights and traffic signals, buildings and structures, and pumping facilities.

Table 6
Municipal Electricity Use 2005

Sector	SCE kwh 2005[1]
Buildings and Facilities	842,006
Streetlights and Traffic Signals	543,201
Pumping Facilities	298,043
Total	**1,683,250**

1 Provided by SCE for Town Specific Facilities.

In order to determine the quantity of greenhouse gas emissions associated with the production of the municipal electricity demand the aforementioned values were plugged into the CACP Software. Electricity emission factor for year 2005 are based on the Western Systems Coordinating Council/CNV and represent the following tons/GWh: 343.3 for CO_2, 0.027 for CH_4, and 0.035 for N_2O. To obtain results in tons of Carbon Dioxide equivalence units were converted and a global warming potential of 21 for methane and 310 for nitrous oxide was applied. Municipal operations resulted in the emission of 1,100 tons of CO_2e due to electricity use in 2005.

Table 7
Municipal GHG Emissions from Electricity

2005

Sector	Tons CO_2e
Building and Facilities	299
Streetlights and Traffic Signals	193
Wastewater Facilities	106
Total	**1,100**

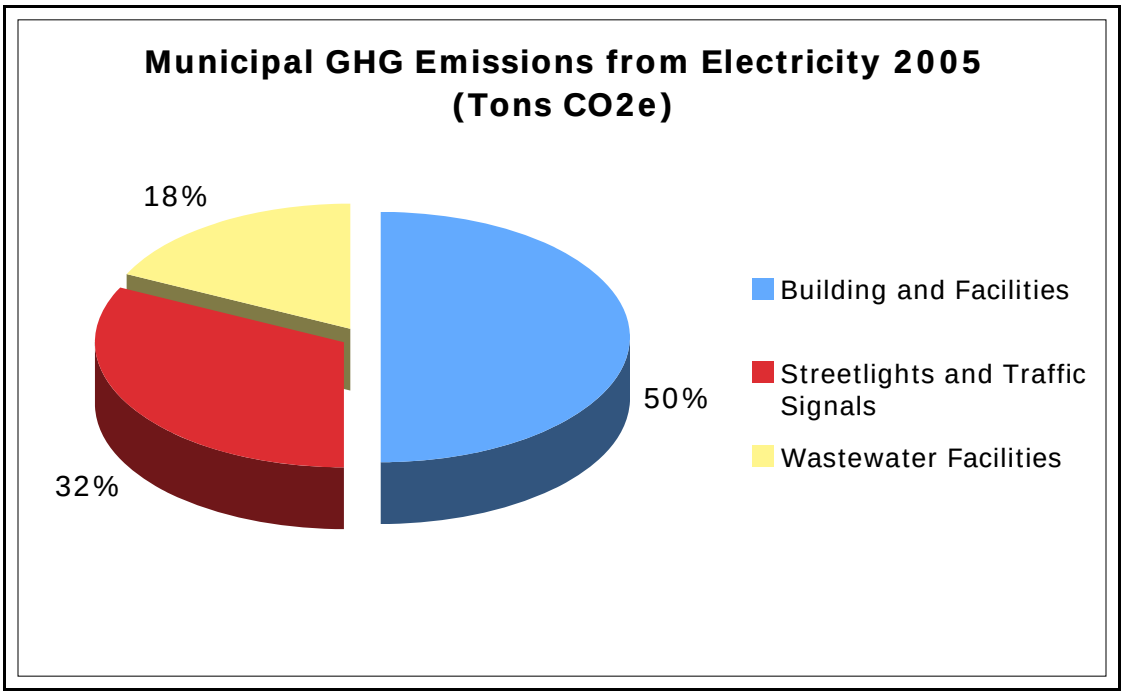

Chart 7: Municipal GHG Emissions from Electricity

Natural Gas

Figures for municipal natural gas use was provided by Jessica Gaither, Energy Services, Southwest Gas Corporation, on May 5, 2009. The data summarized 2008 natural gas usage rates per month for each of the Town municipal accounts. In order to estimate usage rates for 2005, an 8.47% reduction factor was applies to the 2008 total, resulting in the use of 81,211 Therms of natural gas in 2005.

The CACP heat coefficients in pounds per therm are: 0.007 for CO_2, and 0.000001 for CH_4. Using these factors and the global warming potential of 21 for methane, it was estimated that a total of 502 tons of CO_2e were emitted in 2005 from municipal operation's use of natural gas.

Mobile Combustion

GHG emissions from the transportation sector associated with municipal activities are from the combustion of fuels in the operation of vehicle.

Municipal Fleet

The Town's municipal fleet includes a variety of vehicle makes and models and is comprised primarily of light-trucks and pickups. The Town's Finance Department provided annual gallons used by each vehicle for 2008. In order to estimate the total gallons used by the Municipal Fleet for 2005 an 8.47% reduction factor was applied. Using this methodology it was estimated that in 2005 total gallons used by the Municipal Fleet was 21,433 gallons of gasoline and 2,427 gallon of diesel in 2005. Total GHG emission from operation of the Town's Municipal Fleet in 2005 was 256 tons of carbon dioxide equivalent.

Police Fleet

The Police Department also generated GHG emissions from the operation of vehicles for policing activities. The Police Department fleet is comprised of approximately 30 vehicles ranging in make and model and fuel economy. In order to determine emissions from the police fleet total miles traveled by each vehicle was multiplied by the vehicles miles per gallon using EPA estimates for various vehicle types. Since data for the Police Fleet was provided for 2008, an 8.47% reduction factor was applied in order to estimate 2005 levels. [12] This calculation provided a total fuel use of 33,815 gallons of gasoline for operation of the police fleet. As seen below 364 tons of CO_2e was generated by police fleet activities in 2005.

Employee Commute

Town employees commuting to and from work also generated GHG emissions from the operation of vehicles. It was estimated that in 2005 there was 104 full time employees working for the Town of Apple Valley. It was assumed that on average employees travel 23 miles roundtrip to and from work in a passenger vehicle. Assuming a 5 day work week, year round, Town employee commutes in 2005 resulted in 570,928 total vehicle miles traveled and the generation of 347 tons of CO_2e.

Mobile Summary

Total municipal emissions from mobile sources includes operation of the Town fleet, Police fleet, and employee commutes is estimated to total 967 tons of carbon dioxide in 2005, see seen in the Table 8 and Chart 8 below.

[12] Data was provided for year 2008 at 36,945 gallons and an 8.47% reduction factor was applied in order to estimate 2005 emissions.

Table 8
GHG Emissions from Mobile Sources
2005

Sector	CO_2e Tons
Town Municipal Fleet	256
Police Fleet	364
Town Employee Commute	347
Total	**967**

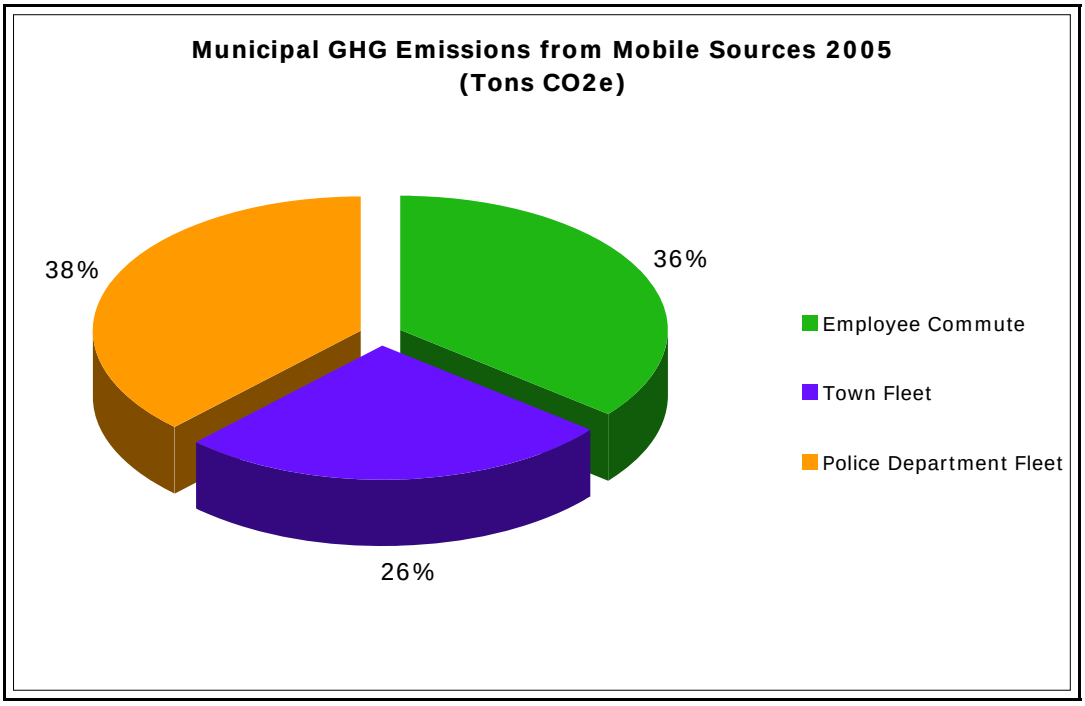

Chart 8: Municipal GHG Emissions from Mobile Sources

Solid Waste

Although no direct data was available for Municipal-specific generation of solid waste, in order to estimate the Municipal contribution, the Town-wide 2005 quantity of 75,618 tons was divided by 63,754, the 2005 population size, to determine the per person waste generation rate. Using this factor, 1.186 tons of solid waste per person, and multiplying by the Town employee number of 104 people in 2005, it was estimated that the Municipal contribution of solid was 122.68 tons. The decomposition of 122.68 tons of solid waste based on the waste sector primer and coefficients from the CACP software results in the generation of 71 tons of CO_2e.

E. Future Emissions Estimates, Business As Usual

An emission forecast for year 2020 was conducted using the CACP model based on the 2005 Inventory, described above. The forecast showing GHG emission projections for 2020 represent business as usual (BAU) conditions, it is assumed that there is no change in the current operating procedures.

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, and an annual growth rate of 1.8% for residential the transportation sectors.

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 is estimated to be 1,009,561 tons of Carbon Dioxide equivalent (CO_2e).

The Table and Chart below shows Apple Valley's total greenhouse gas emissions forecast from all major sources for the year 2020 under BAU conditions. Fuel consumption in the transportation sector is the single largest source of emissions, contributing 62% 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 9
GHG 2020 Forecast by Sector

Sector	Tons CO_2e
Natural Gas[1]	109,267
Electricity[2]	203,138
Transportation	627,170
Streetlights	2,689
Pumping Facilities	11,555
Solid Waste	55,742
Total	**1,009,561**

1 Includes propane.
2 Includes residential, commercial, and industrial

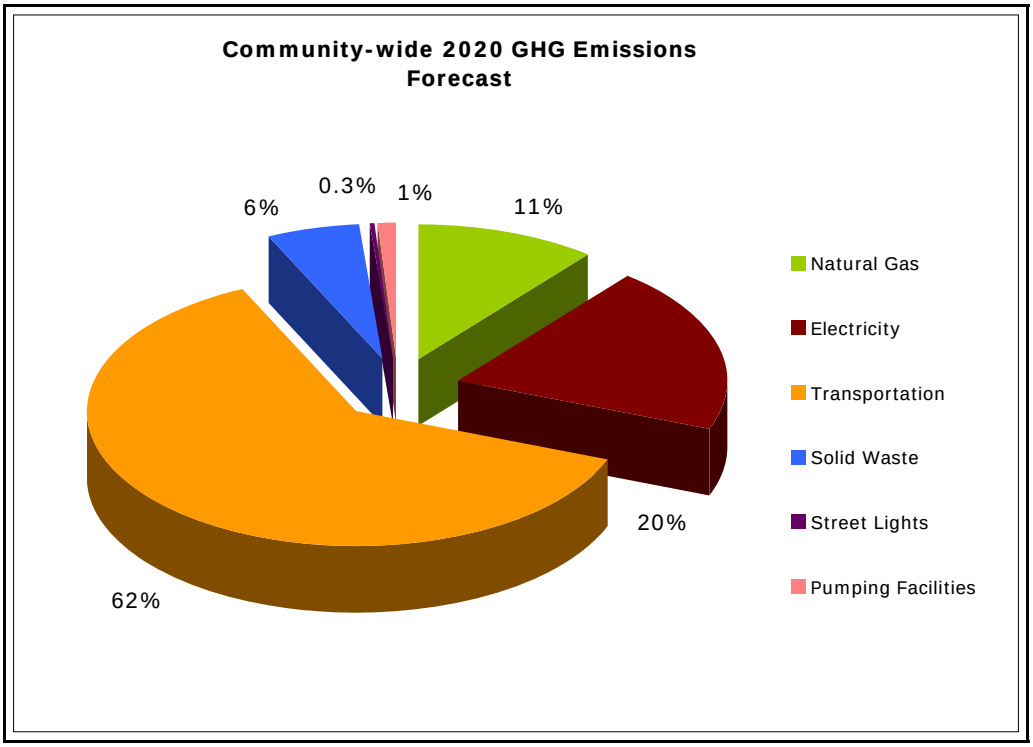

Chart 9: Community GHG Emissions Forecast by Sector

The Table and Chart below shows 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 10
GHG 2020 Forecast

Sector	Tons CO_2e
Residential	232,812
Commercial	67,275
Industrial	12,319

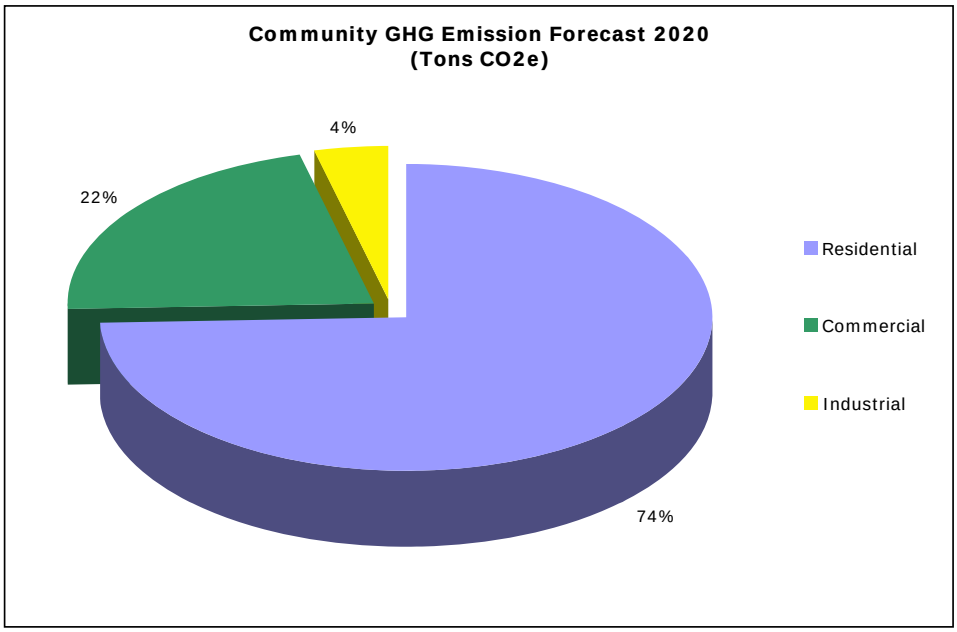

Chart 10: Community GHG Emissions Forecast

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 as described in Section B above. 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 1.8% 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 is projected to be 3,132 tons of Carbon Dioxide equivalent (CO_2e).

The Table and Chart below shows Apple Valley's total greenhouse gas emissions forecast for municipal operations for the year 2020 under BAU conditions.

Table 11
GHG 2020 Forecast for Municipal Operations

Sector	CO_2e Tons
Building and Facilities	1,216
Streetlights and Traffic Signals	379
Pumping Facilities	205
Employee Commute	435
Town Fleet	333
Police Department	474
Solid Waste	90
Total	**3,132**

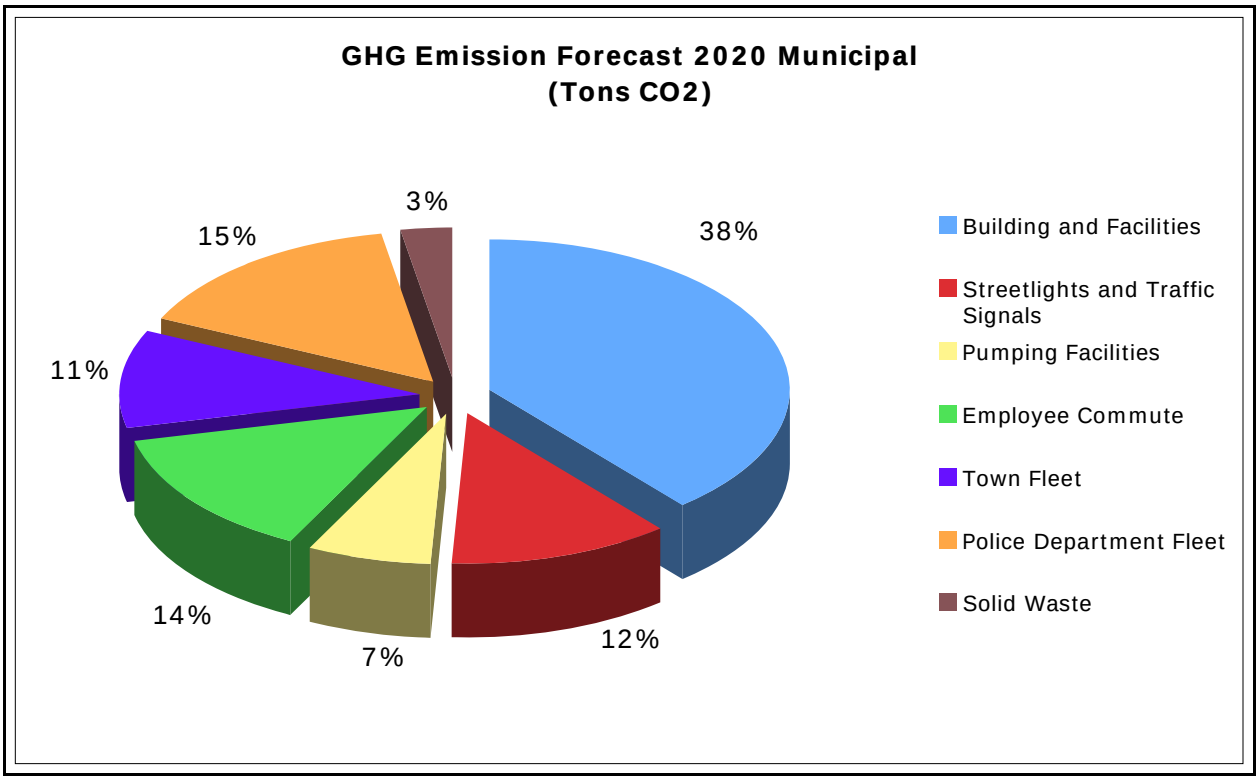

Chart 11: Municipal GHG Emissions Summary

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 12
GHG Reduction Targets
Tons CO2e

	Community-wide	**Municipal**
Baseline 2005	748,524	2,138
15% Below Baseline	636,245	1,817
2020 Forecast BAU	1,009,562	3,132
2020 Reduction Target	373,317	1,315

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.

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 redevelopment 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 2011 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 Highway 18 and on the High Desert Corridor.

MO-17. Adopt and implement 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, 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. Install green roofs on Town facilities.

MO-28. Install cool roofs on Town facilities.

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

MO-30. Install semi-pervious surfaces which allow water to percolate at Town facilities to the extent economically feasible.

MO-31. Install timers for all ball field lighting on Town facilities.

MO-32. Establish a home weatherization and energy efficient appliance replacement grant program for existing residents including extremely low, very low and low income households.

Renewable Energy Measures

MO-33. 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-34. 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-35. Install photo voltaic 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 install wind energy resources on properties greater than 2 acres.

MO-36. Install a CNG fueling station and establish a public access program for same.

MO-37. Replace failing or failed traditional water heaters in Town facilities with solar water heaters.

MO-38. When it fails, replace the municipal pool heater with a solar pool heating system.

Solid Waste Management Measures

MO-39. Require composting of all landscaping waste from Town facilities.

MO-40. Implement a two-sided copy policy at all Town offices.

MO-41. Provide recycling bins for all offices, and at all employee gathering points (lunch room, conference rooms, etc.).

MO-42. 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.
- Plastic pallets are more durable and last about 50 times longer than wood pallets and therefore produce less waste. For every reusable plastic pallet utilized in place of a wooden one, the community is achieving an emissions reduction of approximately 830 pounds CO2e.

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 car pooling 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.

CO-18. On properties greater than 2 acres install wind energy resources.

Solid Waste Management Measures

CO-19. Install a home composting system.

CO-20. Increase recycling by 20%.

CO-21. 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 surpass applicable 2008 California Title 24 Energy Efficiency Standards by a minimum of 20%. 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 20% beyond 2008 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 commercial, industrial and institutional projects, secure Leadership in Energy and Environmental Design (LEED) Silver, Gold or Platinum certification and document GHG reduction resulting from same.

ND-15. For residential projects, implement Green Building practices and document GHG reduction resulting from same.

ND-16. 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-17. 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-18. Install Energy Star appliances and energy efficient fixtures.

ND-19. Install all CFL or LED light bulbs.

ND-20. Install common area electric vehicle charging station(s) and secure bicycle racks.

Renewable Energy Measures

ND-21. 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.
- Install wind energy systems on properties greater than 2 acers.

ND-22. Install solar or photovoltaic systems on new roofs whether on residential, commercial or industrial buildings.

ND-23. Use on-site generated bio-gas in appropriate applications.

ND-24. Install combined heat and power facilities in appropriate applications.

ND-25. Specify rubberized and/or recycled asphalt for roads and driveways to the extent economically viable.

Solid Waste Management Measures

ND-26. 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-27. Reuse construction waste in project features (e.g. shattered concrete or asphalt can be ground and used in walkways and parking lots).

ND-28. 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-29. 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.[13]

[13] 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 CO-17 MO-35	Change in Energy Source	Expand Rooftop Solar	Rooftop solar and renewable energy production is expanded to replace 28,622,872 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	15,531
ND-13 ND-15	Energy Efficiency: Appliances and Equipment	New Homes Natural Gas Efficiency	5,500 homes built after 2010 save 18% (2,409,304 them) of overall natural gas use due to energy efficient appliances that reduce natural gas use to 438 therms per year compared to 2,925,687 therms (531.9 therms per home) under BAU conditions.	Residential	8,210
MO-32 MO-33 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 22,453 home (the number of homes constructed before 2005 per DOF) would save 41,776,350 kwh per year.	Residential	22,668
MO-32 MO-33 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 22,453 homes would result in an annual savings of 2,108,067 therms.	Residential	33,515
ND-13 ND-15	Energy Efficiency: Buildings	New Homes Efficiency	Homes built after 2010 are 20% more efficient than Title 24. Assumes that a typical Title 24 home uses 6,000 kwh per year, a 20% more efficient home uses 4,800 kwh per year. Under BAU 5,500 homes would have generated 49,436,585 kwh per year (8,988.47 kwh per home) compared to 23,036,585 kwh per year for efficient homes.	Residential	12,500

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 301 existing accounts of 39,890,326 kwh by 2020.	Commercial	21,645
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 198 accounts (average of all commercial accounts for 2005) will achieve an overall reduction in the natural gas usage rate of 10%. On average a commercial account uses 6,299 therms of natural gas per year, if 198 existing commercial accounts reduce their natural gas usage by 629.9 therms (10%) then a total of 124,720 therms will be saved.	Commercial	1,983
ND-14 ND-16 ND-21	Energy Efficiency: Buildings	Net-Zero Commercial	20 (25%) new commercial accounts in 2020 are net zero users of electricity, saving 5,301,040 kwh of electricity compared to BAU.	Commercial	2,876
ND-8 ND-14	Energy Efficiency: Buildings	Whole Building Electric	61 (75%) new commercial accounts in 2020 use 50% less electricity compared to BAU, a savings of 8,084,086 kwh of electricity.	Commercial	4,387
ND-8 ND-14	Energy Efficiency: Buildings	Whole Building Natural Gas	119 new commercial accounts in 2020 use 50% less natural gas compared to BAU, a savings of 374,790 therms.	Commercial	5,959
CO-7 through CO-15	Energy Efficiency: Buildings	Existing Retrofit and Upgrade (Electric)	Compared to BAU retrofitting 1,848 industrial accounts to achieve 50% savings in electricity demand results in an annual savings of 6,899,508 kwh.	Industrial	3,744

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 171,528 therms of natural gas per year. Reducing this use by 10% (17,153) therms will save a total of 34,306 therms compared to BAU.	Industrial	545
ND-14 ND-16 ND-21	Energy Efficiency: Buildings	Net-Zero Industrial	124, new accounts are built and equipped to be net zero facilities, then 925,908 kwh of electricity will be saved compared to BAU.	Industrial	502
ND-14	Energy Efficiency: Buildings	Whole Building Electric	373 (75%) new industrial accounts in 2020 use 50% less electricity compared to BAU, a savings of 1,395,595.5 kwh per year.	Industrial	756
ND-14	Energy Efficiency: Buildings	Whole Building Natural Gas	New industrial accounts use 50% less natural gas compared to BAU, a savings of 56,604 therms.	Industrial	900
MO-9	Change in Fuel Type or Technology	Heavy Trucks Fuel Economy	Heavy trucks equipped with advanced diesel engines increase fuel economy by 20%, bringing the fuel efficiency from 5.6 miles (BAU) per gallon to 6.72 miles per gallon for heavy trucks.	Transportation	16,168
MO-9 MO-11	Other VMT Reduction	Signal Synchronization for Heavy Trucks	Town-wide signal synchronization measure would increase fuel efficiency by 12% for all heavy trucks. 42,229,292 vehicle miles (after accounting for reduction in miles from land use efficiencies) achieve a 12% increase in fuel efficiency from 6.7 miles per gallon to 7.5 miles per gallon.	Transportation	7,267
MO-12 MO-14 MO-36 CO-4	Change in Fuel Type or Technology	Use CNG for Transit Bus	All transit bus miles (2,030,254 miles) operating on diesel fuel, with a fuel efficiency of 5.6 miles per gallon, are replaced with CNG fuel with a fuel efficiency of 6.9 miles per gallon.	Transportation	1,588
MO-12	Increase Fuel	Elevate Number	Vehicle fleet averages 26.9 miles per gallon. 50%	Transportation	57,456

Measure Number	Measure Type	Measure Name	Assumptions	Sector	CO_2e Reductions (tons)
CO-1 CO-4	Efficiency	of Fuel Efficient Vehicles	of the vehicle fleet (361,109,270 vehicle miles) is replaced with fuel efficient models that achieve an average of 46 miles per gallon.[14]		
ND-1 through ND-6	Land Use Related	Mixed Use Reduces Miles for Heavy Trucks	The total miles traveled for heavy trucks using diesel, with a fuel economy of 6.72 miles, are reduced by 20%, a savings of 10,557,323 miles.	Transportation	17,145
ND-1, through ND-6 MO-1 through MO-5	Land Use Related	Mixed Use Reduces Miles for Passenger Vehicles[15]	The total miles traveled for passenger vehicles, with a fuel economy of 26.9 miles, are reduced by 20%, a savings of 108,554,635 miles. (Accounts for reduction in miles from ridesharing, transit, and alternative modes of transport.)	Transportation	73,049
MO-16 MO-17 MO-19 CO-3 CO-5 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. The rideshare vehicle achieves an average of 26.95 miles per gallon, compared to 18.4 miles per gallon under BAU.[16]	Transportation	2,395
MO-9	Other VMT	Signal	Town-wide signal synchronization measure would	Transportation	29,730

[14] The community vehicle fleet (excluding heavy truck and transit bus) will generate a total of 722,218,540 vehicle miles in 2020 (after accounting for reduced miles from walking/biking, use of transit, ridesharing, and reduced miles from land use efficiencies. According to the California Energy Commission the average fuel economy of a passenger vehicle is 46 miles per gallon for hybrids.

[15] Passenger Vehicles includes full, mid, and sub-size autos, and light trucks. Includes both diesel and gasoline operated vehicles.

[16] 4.769 million passenger miles at single occupancy equates to 2.981 million vehicle miles at an occupancy factor of 1.6.

Measure Number	Measure Type	Measure Name	Assumptions	Sector	CO_2e Reductions (tons)
MO-11	Reduction	Synchronization for Passenger Vehicles	increase fuel efficiency by 12% for all passenger vehicles. 722,218,540 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.		
MO-9 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. 2,030,254 vehicle miles achieve a 12% increase in fuel efficiency from 6.9 miles per gallon to 7.7 miles per gallon.	Transportation	235
MO-9 MO-11	Other VMT Reduction	Signal Synchronization for Motorcycles	Town-wide signal synchronization measure would increase fuel efficiency by 12% for all motorcycles. 4,060,509 vehicle miles achieve a 12% increase in fuel efficiency from 25.4 miles per gallon to 28.4 miles per gallon.	Transportation	177
MO-4 MO-5 MO-20 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.[17]	Transportation	2,265
ND-11	Walking/Biking	Alternative	Expanded walking/biking infrastructure and	Transportation	27,706

[17] 4.769 million passenger miles at single occupancy equates to 2.981 million vehicle miles at an occupancy factor of 1.6.

Measure Number	Measure Type	Measure Name	Assumptions	Sector	CO_2e Reductions (tons)
MO-10		Mode of Transport	promotion there of shift 47,514,378, 5% of vehicle miles traveled 902,773,174 by all passenger vehicles (excluding motorcycles, heavy trucks, and transit buses) to bicycle or walking.		
CO-16 CO-18 ND-19	Use of Solar	Green Energy for Streetlights	Switch 50% of demand from typical grid mix to green energy.	Streetlight	870
CO-16 CO-18 ND-21	Change in Energy Source	Green Energy for Pumping	Replace 75% of demand (after accounting for upgraded equipment) from typical grid mix to green energy.	Water/Sewage	6,343
CO-15 ND-17	Energy Efficiency: Equipment and Lighting	Upgrade and Install New Equipment	Replace older pumps and install new more efficient pumps. Achieved an overall reduction of 5% of forecast demand.	Water/Sewage	445
MO-40 MO-41 CO-19 CO-20	Avoided Disposal to Landfill	Increase Recycling of Paper Products	20% (7,292 tons) of paper products are recycled rather than disposed of in a landfill.	Solid Waste	27,066
CO-18	Avoided Disposal to Landfill	Compost Food Waste	20% (2,494.6 tons) of food waste are composted rather than disposed of in a landfill.	Solid Waste	2,315

2. Municipal-Specific

Measures are divided into the following sectors: buildings, streetlight, transportation[18], water and sewer, and solid waste management.

Measure Number	Measure Type	Measure Name	Assumptions	Sector	CO_2e Reductions (tons)
CO-16 CO-17 MO-27 MO-35	Change in Energy Source	Rooftop and Above Parking Solar	Half of all municipal building' energy demand will be met through on-roof and above parking solar. (accounts for energy reductions from 15% savings)	Buildings	194
MO-22 MO-23 MO-27 MO-28 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. 63,150.5 kwh will be avoided.	Buildings	69
MO-22 ND-13 ND-15	Energy Efficiency: Buildings	Reduce Natural Gas Use	On average municipal buildings will use 15% less natural gas compared to BAU. 15,456 therms will be avoided.	Buildings	246
MO-12 CO-4	Change in Fuel Type	Replace Diesel with B20	1,586 gallons of diesel is replaced with a B-20 blend.	Vehicle Fleet	3
MO-12 MO-13 CO-4	Change in Fuel Type	Replace Gasoline Vehicles with B20	14,005 gallons of diesel is replaced with a B-20 blend.	Vehicle Fleet	144
MO-12 MO-13 CO-4	Change in Fuel Type	Replace Gas Vehicles with Fuel Efficient Models	5,777 gallons are gasoline are avoided by replacing older fleet vehicles with fuel efficient models.	Vehicle Fleet	62

[18] 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 CO-3 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	14
MO-20 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	16
CO-4	Increase in Fuel Efficiency	Improve Fleet MPG	On average an employees passenger vehicle used for work commute achieves 32.2 mpg. Applied to 696,320 vehicle miles traveled (accounts for reductions from rideshare and transit).	Employee Commute	168
MO-9 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. 696,320 miles achieve 36.1 mpg rather than 32.2 mpg.	Employee Commute	24
CO-7 MO-31	Change in Energy Source	Streetlights and Traffic Signals	50% of electricity used for streetlights and traffic signals will come from solar electricity, 349,116.5 kwh.	Streetlight	189
MO-25 MO-38	Change in Energy Source	Use Solar for Pumping	20% of 2020 kwh used for pumping is generated by green electricity, such as solar.	Water/Sewage	146
MO-25 MO-38	Energy Efficiency: Equipment and Lighting	Use Solar for Upgrade/Install Efficient Pumps	18,908 kwh are avoided through installation of new and more efficient pumps including replacing existing pumps with efficient models.	Water/Sewage	10
MO-40 MO-41 CO-19	Avoided Disposal to Landfill	Increase Recycling of Paper Products	20% (9.3 tons) of paper products are recycled rather than disposed of in a landfill.	Solid Waste	47
CO-18 ND-28	Avoided Disposal to Landfill	Compost Food Waste	20% (3.2 tons) of food waste are composted rather than disposed of in a landfill.	Solid Waste	3
ND-28 ND-29	Avoided Disposal to Landfill	Recycle Misc. Waste	20% (8.5 tons) of mixed general waste is recycled	Solid Waste	32
MO-42	Avoided Disposal to Landfill	Reuse Crate Transport	20% of wood waste is avoided by replacing transport wood crates with reusable crates	Solid Waste	2

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.

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.

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.