7 AIR QUALITY & GREENHOUSE GASES

7.1 AIR RESOURCES

Visalia is located in the San Joaquin Valley Air Basin (SJVAB). The Air Quality monitoring has been conducted in the SJVAB for many years. While new and innovative pollution controls have made the San Joaquin Valley Air Pollution Control District (SJVAPCD) a leader in the rate of improvement, the region is not in attainment for numerous criteria air pollutants and the air basin still has poor air quality. Much of this pollution is attributed to the Valley's topography, meteorology, two major highways, and intensive agricultural uses. In 2011, the major sources of air pollution in the San Joaquin Valley were heavy duty trucks, other mobile sources, autos and light trucks, and fuel combustion from stationary sources. Ozone and particulate matter are the two largest contributors to the Valley's poor air quality. The causes and effects of these and other air pollutants are discussed in the next section.

The California Air Resources Board (CARB) operates a regional network of air pollution monitoring stations that provide information on ambient concentrations of criteria air pollutants and toxic air contaminants. In Tulare County, CARB measures certain air pollutants, such as carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO_2), and particulate matter less than 2.5 microns in diameter (PM-2.5). Data is collected at five active air quality stations located in Tulare County. The station in Visalia is on North Church Street.

Physical Setting & Air Quality

The SJVAB has an inland Mediterranean climate that is characterized by warm, dry summers and cooler winters. Summer high temperatures often exceed 100 degrees Fahrenheit (°F). The daily summer temperature variation can be as high as 30°F. Winters are for the most part mild and humid. Average high temperatures during the winter are in the 50s, while the average daily low temperature is approximately 45°F.

The vertical dispersion of air pollutants in the Valley is limited by the presence of persistent temperature inversions. Air temperatures usually decrease with an increase in altitude. A reversal of this atmospheric state, where the air temperature increases with height, is termed an inversion. Air above and below an inversion does not mix because of differences in air density thereby restricting air pollutant dispersal.

Wind speed and direction play an important role in dispersion and transport of air pollutants. During summer periods, winds usually originate from the north end of the San Joaquin Valley and flow in a south-southeasterly direction through the Valley, through the Tehachapi Pass and into the neighboring Southeast Desert Air Basin. During winter months, winds occasionally originate from the south end of the Valley and flow in a north-northwesterly direction. Also, during winter months, the Valley experiences light, variable winds, less than 10 miles per hour. Low wind speeds, combined with low inver-

The Planning Area is in a basin bounded by the Sierra Nevada foothills and mountains to the east and the Coast Ranges to the west.

sion layers in the winter, create a climate conducive to high concentrations of certain air pollutants.

The SJVAB is basically a flat area bordered on the east by the Sierra Nevada Mountains; on the west by the Coast Ranges; and to the south by the Tehachapi Mountains. Airflow in the SJVAB is primarily influenced by marine air that enters through the Carquinez Straits where the San Joaquin-Sacramento Delta empties into the San Francisco Bay. The region's topographic features restrict air movement through and out of the basin. As a result, the SJVAB is highly susceptible to pollutant accumulation over time. Frequent transport of pollutants into the SJVAB from upwind sources also contributes to poor air quality.

Air Quality Regulatory System

Federal and State laws require emission control measures in areas where air pollution exceeds standards. The San Joaquin Valley is one of these areas. The federal government, primarily through the Environmental Protection Agency (EPA) and the federal Clean Air Act, sets standards, oversees state and local actions, and implements programs for toxic air pollutants, heavy-duty trucks, locomotives, ships, aircraft, off-road diesel equipment, and some types of industrial equipment. Currently, EPA has established national standards for criteria air pollutants: ozone (O_3); carbon monoxide (CO); nitrogen dioxide (NO_2); sulfur dioxide (SO_2); suspended particulate matter (PM-10 and PM-2.5); and lead (Pb).

Pursuant to the California Clean Air Act of 1988, the State government, through the Air Resources Board (ARB) and Bureau of Automotive Repair, set more stringent state standards, oversees local actions, and implements programs for motor vehicle emissions, fuels, and smog checks.

The San Joaquin Valley Air Pollution Control District (SJVAPCD) was established in 1991 to administer local, state, and federal air quality management programs and implement control measures. The SJVAPCD is responsible for developing attainment plans for the San Joaquin Valley Air Basin, for inclusion in California's State Implementation Plan (SIP), as well as establishing and enforcing air pollution control rules and regulations. The attainment plans must demonstrate compliance with federal and state ambient air quality standards, and must first be approved by ARB before inclusion into the SIP. The SJVAPCD regulates, permits, and inspects stationary sources of air pollution.

SJVAPCD also administers the Air Toxics "Hot Spots" Program which involves reviewing new stationary sources to ensure compliance with required emission controls and limits, maintaining an inventory of existing stationary sources of toxic air contaminants, and developing new rules and regulations to reduce toxic air contaminant emissions.

Local cities and counties are responsible for implementing air friendly community planning that promotes pedestrian traffic, commute alternatives and cleaner transit fleets. They can also regulate odors and nuisances and the release of particulate matter at construction sites.

Criteria Air Pollutants

As required by the Federal Clean Air Act passed in 1977, EPA has identified six criteria air pollutants that are pervasive in urban environments and for which

State and national health-based ambient air quality standards have been established. EPA identifies these pollutants as criteria air pollutants because the agency has regulated them by developing specific public health- and welfare-based criteria as the basis for setting permissible levels. Ozone, carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter (PM), and lead are the six criteria air pollutants.

Ozone

Ozone is a respiratory irritant and an oxidant that increases susceptibility to respiratory infections and that can cause substantial damage to vegetation and other materials. Ozone is not emitted directly into the atmosphere, but is a secondary air pollutant produced in the atmosphere through a complex series of photochemical reactions involving reactive organic gases (ROG) and nitrogen oxides (NOx). ROG and NOx are known as precursor compounds for ozone. Significant ozone production generally requires ozone precursors to be present in a stable atmosphere with strong sunlight for approximately three hours. Ozone is a regional air pollutant because it is not emitted directly by sources, but is formed downwind of sources of ROG and NOx under the influence of wind and sunlight. Ozone concentrations tend to be higher in the late spring, summer, and fall, when the long sunny days combine with regional subsidence inversions to create conditions conducive to the formation and accumulation of secondary photochemical compounds, like ozone. Ground level ozone in conjunction with suspended particulate matter in the atmosphere leads to hazy conditions generally termed as "smog." In the San Joaquin Valley, most haze is due to ammonium nitrate (NOx), the principal factor in the formulation of both ozone and PM-10.

Carbon Monoxide

Carbon monoxide, a colorless and odorless gas, is a non-reactive pollutant that is a product of incomplete combustion and is mostly associated with motor vehicle traffic. High carbon monoxide concentrations develop primarily during winter when periods of light wind combine with the formation of ground level temperature inversions (typically from the evening through early morning). These conditions result in reduced dispersion of vehicle emissions. Motor vehicles also exhibit increased carbon monoxide emission rates at low air temperatures. When inhaled at high concentrations, carbon monoxide combines with hemoglobin in the blood and reduces the oxygen-carrying capacity of the blood. This results in reduced oxygen reaching the brain, heart, and other body tissues. This condition is especially critical for people with cardiovascular diseases, chronic lung disease or anemia.

Nitrogen Dioxide

Nitrogen dioxide is an air quality concern because it acts a respiratory irritant and is a precursor of ozone. Nitrogen dioxide is produced by fuel combustion in motor vehicles, industrial stationary sources, ships, aircraft, and rail transit.

Sulfur Dioxide

Sulfur dioxide is a combustion product of sulfur or sulfur-containing fuels such as coal and oil, which are restricted in the San Joaquin Valley. Its health effects include breathing problems and may cause perma-

Motor vehicles are primary contributors to ozone and carbon monoxide in the atmosphere.

Particulate matter in the atmosphere results from many kinds of dust- and fume-producing industrial and agricultural operations.

nent damage to lungs. SO_2 is an ingredient in acid rain, which can damage trees, lakes and property, and can also reduce visibility.

Particulate Matter

PM-10 and PM-2.5 consist of particulate matter that is 10 microns or less in diameter and 2.5 microns or less in diameter, respectively. (A micron is one-millionth of a meter). PM-10 and PM-2.5 represent fractions of particulate matter that can be inhaled into the air passages and the lungs and can cause adverse health effects. Particulate matter in the atmosphere results from many kinds of dust- and fume-producing industrial and agricultural operations, fuel combustion, and atmospheric photochemical reactions. Some sources of particulate matter, such as demolition and construction activities, are more local in nature, while others, such as vehicular traffic, have a more regional effect. Very small particles (PM-2.5) of certain substances (e.g., sulfates and nitrates) can cause lung damage directly, or can contain adsorbed gases (e.g., chlorides or ammonium) that may be injurious to health. Particulates also can damage materials and reduce visibility.

PM emissions in the Planning Area are mainly from urban sources, dust suspended by vehicle traffic and secondary aerosols formed by reactions in the atmosphere. Particulate concentrations near residential sources generally are higher during the winter, when more fireplaces are in use and meteorological conditions prevent the dispersion of directly emitted contaminants.

Lead

Paint (houses, cars) and manufacture of lead storage batteries have been the primary sources of lead released into the atmosphere. Lead has a range of adverse neurotoxic health effects for which children are at special risk. Some lead-containing chemicals cause cancer in animals.

Ambient Air Quality Standards

Regulation of air pollution is achieved through both national and State ambient air quality standards and emissions limits for individual sources of air pollutants. As required by the Federal Clean Air Act, the EPA has established National Ambient Air Quality Standards (national standards) to protect public health and welfare. California has adopted more stringent ambient air quality standards for most of the criteria air pollutants (referred to as State Ambient Air Quality Standards or State standards). In addition, California has established State ambient air quality standards for sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particles. Because of California's unique meteorological problems, there are considerable differences between State and federal standards currently in effect in California, as shown in Table 7-1. The table also summarizes the related health effects and principal sources for each pollutant.

The ambient air quality standards are intended to protect the public health and welfare, and they incorporate an adequate margin of safety. They are designed to protect those segments of the public most susceptible to respiratory distress, known as sensitive receptors, including asthmatics, the very young,

Table 7-1: State and National Criteria Air Pollutant Standards (2012)

Pollutant	*Averaging Time*	*California Standard*	*National Primary Standard*	*Major Pollutant Sources*	*Pollutant Health and Atmospheric Effects*
Ozone (O_3)	1 hour	0.09 ppm	—	On-road motor vehicles, other mobile sources, solvent extraction, combustion, industrial and commercial processes.	High concentrations can directly affect lungs, causing irritation. Long-term exposure may cause damage to lung tissue.
	8 hours	0.070 ppm	0.075 ppm		
Carbon Monoxide (CO)	1 hour	20 ppm	35 ppm	Internal combustion engines, primarily gasoline-powered motor vehicles.	Classified as a chemical asphyxiant, carbon monoxide interferes with the transfer of fresh oxygen to the blood and deprives sensitive tissues of oxygen.
	8 hours	9.0 ppm	9 ppm		
Nitrogen Dioxide (NO_2)	1 hour	0.25 ppm	100 ppb	Motor vehicles, petroleum refining operations, industrial sources, aircraft, ships, and railroads.	Irritating to eyes and respiratory tract. Colors atmosphere reddish brown.
	Annual Average	0.03 ppm	53 ppb		
Sulfur Dioxide (SO_2)	1 hour	0.25 ppm	75 ppb	Fuel combustion, chemical plants, sulfur recovery plants, and metal processing.	Irritates upper respiratory tract, injurious to lung tissue. Can yellow the leaves of plants, destructive to marble, iron and steel. Limits visibility and reduces sunlight.
	24 hours	0.04 ppm	0.14 ppm		
	Annual Average	—	0.03 ppm		
Respirable Particulate Matter (PM_{10})	24 hours	50 µg/m^3	150 µg/m^3	Dust- and fume-producing industrial and agricultural operations, combustion, atmospheric photochemical reactions, and natural activities (e.g., wind-raised dust and ocean sprays).	May irritate eyes and respiratory tract, decreases lung capacity and increases risk of cancer and mortality. Produces haze and limit visibility.
	Annual Average	20 µg/m^3	—		
Fine Particulate Matter ($PM_{2.5}$)	24 hours	—	35 µg/m^3	Fuel combustion in motor vehicles, equipment and industrial sources; residential and agricultural burning. Also formed from photochemical reactions of other pollutants, including NOx, sulfur oxides, and organics.	Increases respiratory disease, lung damage, cancer and premature death. Reduces visibility and results in surface soiling.
	Annual Average	12 µg/m^3	15 µg/m^3		
Lead	Monthly Average	1.5 µg/m^3	—	Present source: lead smelters, battery manufacturing & recycling facilities. Past source: combustion of leaded gasoline.	Disturbs gastrointestinal system, and causes anemia, kidney disease, and neuromuscular and neurological dysfunction.
	Quarterly	—	1.5 µg/m^3		
Sulfates	24 hours	25 µg/m^3	—	Combustion of petroleum-derived fuels (e.g., gasoline and diesel fuel) that contain sulfur.	Aggravation of respiratory symptoms, decrease in ventilatory function, aggravation of asthmatic symptoms, and an increased risk of cardio-pulmonary disease.
Hydrogen Sulfide	1 hour	0.03 ppm	—	Bacterial decomposition of sulfur-containing organic substances.	Exposure to very disagreeable odor.
Vinyl Chloride	24 hours	0.01 ppm	—	Microbial breakdown of chlorinated solvents, detected near landfills, sewage plants, and hazardous waste sites.	Short-term exposure: central nervous system effects, such as dizziness, drowsiness, and headaches. Long-term exposure: liver damage and cancer.

Note: ppm=parts per million; ppb = parts per billion; µg/m^3=micrograms per cubic meter

Source: California Air Resource Board, 2012

the elderly, people weak from other illness or disease, or persons engaged in strenuous work or exercise. Healthy adults can tolerate occasional exposure to air pollution levels somewhat above the ambient air quality standards before adverse health effects are observed.

Attainment Status

Under amendments to the Federal Clean Air Act, the EPA has classified air basins or portions thereof, as either "attainment" or "nonattainment" for each criteria air pollutant, based on whether or not the national standards have been achieved. The California Clean Air Act, which is patterned after the Federal Clean Air Act, also requires areas to be designated as "attainment" or "nonattainment" for the State standards. Thus, areas in California have two sets of attainment/nonattainment designations: one set with respect to the national standards and one set with respect to the State standards.

Table 7-2 shows the attainment status of the San Joaquin Valley with respect to the national and State ambient air quality standards for criteria pollutants.

Table 7-2: San Joaquin Valley Attainment Status for Ambient Air Quality Standards

	Attainment Status	
Pollutant	*Federal Standards*	*State Standards*
Ozone – one hour	No Federal Standard	Nonattainment/Severe
Ozone – eight hour	Nonattainment/Extreme	Nonattainment
PM-10	Attainment	Nonattainment
PM-2.5	Nonattainment	Nonattainment
CO – Tulare County	Attainment/Unclassified	Attainment/Unclassified
Nitrogen Dioxide	Attainment/Unclassified	Attainment
Sulfur Dioxide – Tulare County	Attainment/Unclassified	Attainment
Lead	No Designation/Classification	Attainment
Hydrogen Sulfide	No Federal Standard	Unclassified
Sulfates	No Federal Standard	Attainment
Visibility-Reducing Particles	No Federal Standard	Unclassified
Vinyl Chloride	No Federal Standard	Attainment

Source: San Joaquin Valley Air Pollution Control District, 2012

Toxic Air Contaminants

The ambient background of toxic air contaminants (TACs) is the combined result of many diverse human activities, including emissions from gasoline stations, automobiles, dry cleaners, industrial operations, hospital sterilizers, and painting operations.

In 1987, the California State legislature enacted, through Assembly Bill 2588, the Air Toxics Hot Spots Information and Assessment Act, which requires companies in California to provide information to the public about emissions of toxic air contaminants and their possible impact on public health. The SJVAPCD implements this act through the local Air Toxics "Hot Spots" Program. Toxic air contaminants are pollutants that occur at relatively low concentrations and are associated with carcinogenic and other adverse health effects, but for which no ambient air quality standards have been established. Impact is measured as "maximum individual cancer risk" which is the likelihood that a person exposed to concentrations of TACs over a lifetime will develop cancer. As of 2011, there were no facilities located in the Visalia Planning Area identified as a significant risk.[1]

The Air Resources Board maintains an inventory of toxic air contaminants concentrations and their health risks. Total emissions in the year 2011 from stationary sources of TACs in the San Joaquin Valley included: 6,073 tons per year of diesel particulate matter, 4,065 tons per year of formaldehyde, 1,680 tons per year of benzene, 1,602 tons per year of acetaldehyde, 515 tons per year of butadiene, 404 tons per year of methylene chloride, 360 tons per year of perchloroethylene, and 156 tons per year of para-dichlorobenzene.

The SJVAPCD regulates toxic air contaminants from stationary sources through their permit process. Mobile sources of toxic air contaminants are regulated indirectly through vehicle emissions standards for reactive organic gas (ROG) and through fuel specifications. Cities play a role in reducing public exposure to TACs by enforcing zoning ordinances and ensuring proper buffer zones between stationary sources that emit toxic contaminants and sensitive receptors located down wind.

Sensitive Receptors

Some receptors are considered more sensitive than others to air pollutants. The reasons for greater than average sensitivity include pre-existing health problems, proximity to emissions source, or duration of exposure to air pollutants. Land uses such as schools, children's day care centers, hospitals, and convalescent homes are considered to be more sensitive than the general public to poor air quality because the population groups associated with these uses have increased susceptibility to respiratory distress and other air quality-related health problems. Persons engaged in strenuous work or exercise also have increased sensitivity to poor air quality. Residential areas are considered more sensitive to air quality conditions than commercial and industrial areas, because people generally spend longer periods of time at their residences, resulting in greater exposure to ambient air quality conditions. Recreational uses are also considered sensitive, due to the greater exposure to ambient air quality conditions, and because the presence of pollution detracts from the recreational experience.

Land uses such as schools, children's day care centers, hospitals, and convalescent homes are considered to be more sensitive than the general public to poor air quality.

1 San Joaquin Valley Air Pollution Control District, 2011 Annual Report on the District's Air Toxics Program.

Objectives

AQ-O-1 Coordinate air quality planning efforts with other local, regional and State agencies.

AQ-O-2 Strive to improve air quality by implementing emissions reduction efforts targeting mobile sources, stationary sources and construction-related sources.

Policies

AQ-P-1 Amend the Zoning Ordinance to prohibit locating new "sensitive receptor" uses—hospitals, residential care facilities and child care facilities—within 500 feet of a limited access state highway (SR 99 and SR 198), except as provided by approved master plans.

For those projects permitted, require site-specific project design improvements (such as higher-performance windows and HVAC systems) in order to reduce public health risks associated with poor air quality in these locations.

AQ-P-2 Require use of Best Management Practices (BMPs) to reduce particulate emission as a condition of approval for all subdivisions, development plans and grading permits, in conformance with the San Joaquin Valley Air Pollution Control District Fugitive Dust Rule.

AQ-P-3 Support implementation of the San Joaquin Valley Air Pollution Control District's regulations on the use of wood-burning fireplaces, as well as their regulations for the installation of EPA-certified wood heaters or approved wood-burning appliances in new residential development and a "No Burn" policy on days when the air quality is poor.

AQ-P-4 Support the San Joaquin Valley Air Pollution Control District's "change-out" program, which provides incentives to help homeowners replace old word-burning fireplaces with EPA-certified non wood-burning appliances.

Smoke released from fireplaces and wood stoves contains carbon monoxide, nitrogen dioxide, volatile organic compounds, and inhalable particulate matter (PM-10). The change-out programs have been successful in areas of the State where emissions from wood-burning fireplaces cause significant air pollution. Many grant programs offer cash rebates to encourage replacement of old wood-burning appliances with more efficient ones.

AQ-P-5 When asbestos has been identified in the preliminary soils report, require all new development and public works projects to comply with all provisions of State and regional ATCM regulations for control of airborne asbestos emissions relating to construction, road maintenance, and grading activities.

State and regional agencies identify Best Management Practices for construction, grading and road maintenance in areas with naturally-occurring asbestos. BMPs may include but are not limited to:

- *Wetting soil during excavation and other dust suppression measures;*
- *Wetting roads, excavated materials and rinsing equipment;*
- *Limiting vehicle speeds within construction areas;*
- *Creating wind breaks and berms;*
- *Suspending activities when wind creates visible dust;*
- *Prohibiting rock-crushing of asbestos-containing materials;*
- *Monitoring dust levels;*
- *Posting warning signs;*
- *Replanting; and*
- *Paving or other permanent sealants or covers.*

AQ-P-6 Amend the Street Tree Ordinance to promote use of plants and trees that are efficient pollutant absorbers.

AQ-P-7 Be an active partner with the Air District in its "Spare the Air" program. Encourage businesses and residents to avoid pollution-producing activities such as the use of fireplaces and wood stoves, charcoal lighter fluid, pesticides, aerosol products, oil-based paints, and automobiles and other gasoline engines on days when high ozone levels are expected, and promote low-emission vehicles and alternatives to driving.

AQ-P-8 Update the Zoning Ordinance to strictly limit the development of drive-through facilities, only allowing them in auto-oriented areas and prohibiting them in Downtown and East Downtown.

Drive-through businesses result in the idling of car engines and the concentrated emission of carbon monoxide and other tailpipe air pollutants.

AQ-P-9 Continue to mitigate short-term construction impacts and long-term stationary source impacts on air quality on a case-by-case basis and continue to assess air quality impacts through environmental review. Require developers to implement Best Management Practices (BMPs) to reduce air pollutant emissions associated with the construction and operation of development projects.

BMPs include transportation demand management strategies for large development projects such as:

- *Providing bicycle access and parking facilities;*
- *Providing preferential parking for high-occupancy vehicles, carpools, or alternative fuels vehicles;*

- *Establishing telecommuting programs or satellite work centers;*
- *Allowing alternative work schedules;*
- *Subsidizing public transit costs for employee;*
- *Scheduling Deliveries at off-peak traffic periods; and*
- *Providing recharge stations for plug-in electric vehicles (PEVs).*

The San Joaquin Valley Air Pollution Control District Guidelines for Assessing and Mitigating Air Quality Impacts provide BMPs for determining and mitigating project air quality impacts and related thresholds of significance for use in environmental documents.

AQ-P-10 Develop public information regarding high- and low-pollen producing landscape species, to be made available at City Hall and other relevant locations throughout the City. Work with Chamber of Commerce, local landscape architects, nursery contractors, and arborists to promote landscaping with low-pollen plants.

AQ-P-11 Continue to work in conjunction with the San Joaquin Valley Air Pollution Control District and others to put in place additional Transportation Control Measures that will reduce vehicle travel and improve air quality and to implement Air Quality Plans.

7.2 CLIMATE CHANGE AND GREENHOUSE GASES

Energy Resources

The City of Visalia depends on energy to maintain a vital economy and desirable lifestyle. It uses electricity and natural gas to light, heat, and cool structures and to power its office equipment, industrial machinery, public services, and home appliances. The City also uses petroleum products to move people and products along its transportation corridors.

By reducing the amount of energy consumed in housing, commercial structures, public facilities, and transportation and the energy demand per capita plus using more renewable sources of energy, the environment and public health will be better protected, Visalia's standard of living can be increased, and the cost of new infrastructure to deliver energy to the city will be reduced. Building design standards that recommend better use of materials and insulation, plus solar-oriented site design, reduces demand for natural gas and heating products. Transportation and land use measures that support transit and facilitate walking and bicycling reduce dependence on fossil fuels. Low impact development and landscaping can reduce the urban heat island effect. Together, these steps will lead to a more sustainable energy future.

In addition to the policies included at the end of this section, Land Use and Circulation element policies in this General Plan contribute to the goals of reducing energy consumption and per capita energy use.

Global Climate Change

Global climate change (GCC) is currently one of the most significant scientific, economic, and political issues in the United States. GCC refers to a change in the average climate of the earth that may be measured by wind patterns, storms, precipitation, and temperature. The baseline by which these changes are measured originates in historical records identifying temperature changes that have occurred in the distant past, such as during previous ice ages. The rate of temperature change has typically been incremental, with warming and cooling occurring over the course of thousands of years. In the past 10,000 years the earth has experienced incremental warming as glaciers retreated across the globe. However, scientists have observed an unprecedented increase in the rate of warming over the past 150 years, roughly coinciding with the global industrial revolution.

Potential Impacts in California

According to the California Climate Action Team (CCAT), accelerating GCC has the potential to cause a number of adverse impacts in California, including but not limited to:

- A shrinking Sierra snowpack that would threaten the state's water supply;
- Public health threats caused by higher temperatures and more smog;
- Damage to agriculture and forests due to reduced water storage capacity, rising temperatures, increasing salt water intrusion, flooding, and pest infestations;
- Critical habitat modification and destruction;
- Eroding coastlines;
- Increased wildfire risk; and
- Increased electricity demand.[2]

These impacts have and will continue to have considerable costs associated with them.

Greenhouse Gases

Gases that that trap heat in the Earth's atmosphere are called greenhouse gases (GHGs). These gases play a critical role in determining the Earth's surface temperature. Some GHGs occur naturally and are emitted to the atmosphere through natural processes and human activities, while others are created and emitted solely through human activities. The six primary GHGs are:

- **Carbon dioxide** (**CO_2**), emitted as a result of fossil fuel combustion, with contributions from cement manufacture;
- **Methane** (**CH_4**), produced through the anaerobic decomposition of waste in landfills, animal digestion, decomposition of animal wastes, production and distribution of natural gas and petroleum, coal production, and incomplete fossil fuel combustion;
- **Nitrous oxide** (**N_2O**), typically generated as a result of soil cultivation practices, particularly the use of commercial and organic fertilizers, fossil fuel combustion, nitric acid production, and biomass burning;
- **Hydrofluorocarbons** (**HFCs**), primarily used as refrigerants;

2 California Climate Action Team, April 2006.

Visalia can help to counteract climate change by promoting smart energy choices for residents and planning land use in such a way that residents can shift away from long automobile trips.

- **Perfluorocarbons** (**PFCs**), originally introduced as alternatives to ozone depleting substances and typically emitted as by-products of industrial and manufacturing processes; and
- **Sulfur hexafluoride** (**SF_6**), primarily used in electrical transmission and distribution systems.

Greenhouse gas emissions contributing to global climate change are attributable in large part to human activities associated with the industrial/manufacturing, transportation, utilities, residential, and agricultural sectors. Major sources in California include fossil fuel consumption from transportation (38 percent), industry (20 percent), and electricity production (25 percent).[3]

Counteracting Climate Change: The City's Role

These trends call for significant changes over the coming decades in the way we produce and consume energy. The City of Visalia can continue to do its part by shifting to renewable energy use and improving energy conservation in its municipal operations, by promoting smart energy choices for residents and businesses, and by land use planning in such a way that allows for residents to meet more of their daily needs (commute trips, shopping, etc.) without requiring long automobile trips. The City can also educate residents and businesses about the economic benefits, as well as the environmental benefits, of making these changes. Economic benefits of increased energy efficiency in particular must not be overlooked.

Sources of Greenhouse Gases in the Planning Area

GHG Emissions Inventories

The first step in managing greenhouse gas emissions is to establish an inventory of those emissions. Table 7-3 shows global greenhouse gas emissions in metric tons (MT) of CO_2e generated worldwide, within the United States, within California, and within Visalia, with Visalia data coming from the City's Draft Final Climate Action Plan (CAP) dated May 2013. If Cali-

3 California Climate Action Registry, 2009.

Table 7-3: Greenhouse Gas Emissions Inventories Comparison (2000)

Locations	*Emissions ($MTCO_2e$*)*	*Population (Millions)*	*Average Per Capita Emissions ($MTCO_2e$)*
World	33,712,900,000	6,055	5.6
United States	7,033,000,000	281	25.0
California	458,450,000	33.9	13.5
Visalia Community (Draft Final CAP Inventory)	1,140,724	0.09	12.5
Visalia Municipal (Draft Final CAP Inventory)	17,412	N/A	0.19

*$MTCO_2e$ = Metric tons of carbon dioxide equivalents

Source: World emissions from World Resources Institute – Climate Analysis Indicators tool (2004); U.S. emissions from Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2006, USEPA #430-R-08-005; California emissions from California Air Resources Board; Visalia emissions from Draft Final Climate Action Plan (May 2013); U.S. Census.

fornia were considered a country of its own, it would be the 16th largest emitter in the world. Per capita emissions in California, however, are among the lowest in the U.S.

At the state level in 2000, the transportation sector was the largest source of GHG emissions, accounting for 38 percent of all emissions. Electricity generation—both in-state production and imported electricity—accounted for 22 percent of the state's total GHG emissions. The remaining emissions sources include: industrial uses, 22 percent; residential and commercial uses, 10 percent; agriculture uses, 6 percent; and other sources, 3 percent.[4]

Visalia's Draft Final CAP inventory of community (i.e. citywide, from all uses and sectors; versus municipal, which is attributable only to municipal operations) GHG emissions in 2005 indicates that emissions by sector are: transportation, 55 percent; commercial and industrial uses, 23 percent; residential uses, 22 percent; solid waste, -1 percent (net negative due to GHG emissions avoided by composting and recycling efforts).[5] Emissions from gasoline in the transportation sector account for 38 percent of the City's total inventoried emissions. Within the commercial and industrial sector, electricity accounts for 62 percent of the total emissions inventoried;[6] natural gas, 33 percent; propane, 4 percent; and wastewater, 1 percent. Within the residential sector, electricity

4 California Air Resources Board, California Greenhouse Gas Inventory for 2000-2006, updated March 13, 2009.

5 Visalia Draft Final CAP, Table 10, page 28.

6 Visalia Draft Final CAP, Table 14, page 31. The CAP states on page 32 that refrigerant emissions data were not included in the community inventory due to the lack of reliable and accurate information.

Table 7-4: Visalia GHG Emissions 2005 Baseline, 2020 Forecasts, and Recommended Reduction Targets ($MTCO_2e$)

	Community Sector Emissions	*Municipal Sector Emissions*
2005 Baseline Inventory	906,337	16,446
Recommended 2020 Reduction Target	770,386[1]	13,157[2]
2020 Year Emissions under Business-As-Usual	1,231,637	27,831
Reduction Attributable to State Select Measures	270,416	6,150
Reduction Attributable to Existing Community Measures	40,319	7,016
Remaining Reduction Needed	150,516	1,508

1. A reduction target of 15% below 2005 base year level by 2020 (ARB's recommended reduction target).

2. A reduction target of 20% below 2005 emissions level by 2020.

Source: Visalia Draft Final Climate Action Plan (May 2013), Tables 3 and 4, Figures 1 and 2.

accounts for 50 percent of the total emissions inventoried; natural gas, 47 percent; and propane, 3 percent.[7]

The City's Draft Preliminary CAP shows a "business-as-usual" (BAU) emission forecast based on the annual average population growth rate from 2005 to 2020. This BAU forecast shows over 1.2 million $MTCO_2e$ in 2020, a 36 percent increase from 2005 levels. However, the CAP also accounts for emissions reductions that can be expected from existing statewide initiatives, such as the Renewables Portfolio Standard, vehicle fuel efficiency requirements, low carbon fuel standard, and other new legislation. Accounting for these State efforts, Visalia community emissions are expected to grow by only 19 percent between 2005 and 2020, to about 1.1 million $MTCO_2e$.

The City's Draft Final CAP currently proposes a 2020 community sector emissions reduction target equivalent to 15 percent below 2005 levels (or a reduction of 461,251 metric tons CO_2e from business-as-usual), and a municipal sector emissions reduction target equivalent to 20 percent below 2005 levels.[8] By implementing measures specified in the CAP, Visalia can achieve over 9 percent of total emissions reduction needed.[9] Anticipated emissions reductions from State initiatives will achieve another 59 percent of the needed reduction. The Draft Final CAP analysis suggests that remaining reduction needed to achieve the recommended community target may be achieved through implementation of additional State and local measures related to municipal emissions, but more analysis and monitoring will be necessary to ensure that the City is on track to achieve this goal.

Visalia's Climate Change Initiatives

In January 2007, Visalia's mayor signed the "Cool Cities" pledge, part of the U.S. Mayors Climate Protection Agreement. By signing this pledge, the City adopted the goal of reducing citywide emissions to 7 percent below 1990 levels by 2012 (An inventory of 1990 emissions has not yet been completed, so this reduction is not quantified). In 2008, the City also became a partner in the San Joaquin Valley Clean Energy Organization (SJVCEO), non-profit serving the eight-county region.

The methodology to provide a framework for reducing GHG production includes the following five steps: 1) conduct an inventory of local GHG emissions; 2) establish a GHG reduction target; 3) develop a climate action plan (CAP) for achieving the emissions reduction target; 4) implement the climate action plan; and 5) re-inventory emissions to monitor and report on progress toward the target. Through the Draft Final CAP, the City has completed draft versions of steps 1 through 3, though the CAP has not yet been adopted.

The Draft Final CAP is the culmination of the City's efforts to-date to quantify local GHG impacts, to develop a set of reasonable and feasible reduction measures, and to evaluate the potential for those measures to help Visalia play its part in achieving statewide AB 32 goals.

7 Visalia Draft Final CAP, Table 15, page 32.

8 These suggested reduction targets have not yet been approved or adopted by the City.

9 These measures are referred to within the Draft Final CAP as "existing measures," and encompass emissions reductions already achieved since the 2005 base year as well as emissions reductions from future measures that will be implemented with high probability.

Objectives

AQ-O-3 Reduce emissions of greenhouse gases that contribute to global climate change in accord with federal and State law.

Policies

AQ-P-12 Support the implementation of Voluntary Emissions Reduction Agreements (VERA) with the San Joaquin Valley Air Pollution Control District (the District) for individual development projects that may exceed District significance thresholds.

A VERA is a volunary mitigation measure where a project proponent provides pound-for-pound mitigation of emissions increases through a process that develops, funds, and implements emissions reduction projects, with the District serving a role of administrator of emissions reduction programs and verifier of successful mitigation effort. To implement a VERA, the project proponent and the District enter into a contractual agreement in which the project proponent agrees to mitigate project-specific emissions by providing funds for the District's Strategies and Incentives Program. The funds are disbursed in the form of grants for projects that achieve emisson reductions.

AQ-P-13 Where feasible, replace City vehicles with those that employ low-emission technology.

AQ-P-14 Promote and expand the trip-reduction program for City employees to reduce air pollution and emissions of greenhouse gas.

The program may include carpooling and ridesharing; reimbursement of transit costs; encouragement of flexible work schedules, telecommuting, and teleconferencing.

AQ-P-15 Maintain an inventory of greenhouse gas emissions from City operations and track related solid waste, energy, economic, and environmental data. Update the inventory periodically as additional data and methodologies become available.

AQ-P-16 Support State efforts to reduce greenhouse gases and emissions through local action that will reduce motor vehicle use, support alternative forms of transportation, require energy conservation in new construction, and energy management in public buildings, in compliance with AB 32.

By proposing compact development, mixed use centers, walkable neighborhoods, green building technology, and jobs-housing balance, the City will be helping to implement many of the strategies and programs in the San Joaquin Valley 2007 Ozone Plan.

AQ-P-17 Prepare and adopt a Climate Action Plan that incorporates a Greenhouse Gas (GHG) Emissions Reduction Plan. The GHG Emissions Reduction Plan will quantify current and anticipated future emissions and focus on feasible actions the City can take to minimize the adverse impacts of General Plan implementation on climate change and air quality.

Compact development, mixed use centers, and walkable neighborhoods will help implement the San Joaquin Valley 2007 Ozone Plan, as well as reduce greenhouse gas emissions.

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