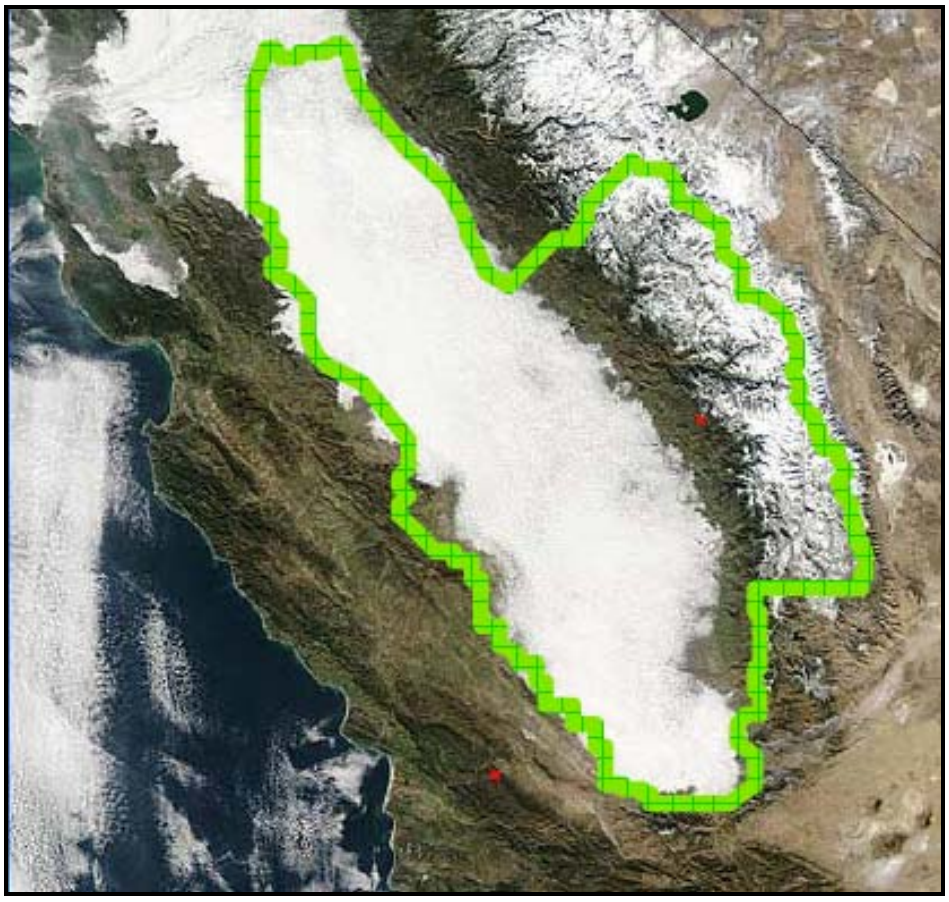
SECTION 2: ENVIRONMENTAL AND REGULATORY SETTING

Air quality in City of Hanford and the rest of the San Joaquin Valley has improved markedly since the regulation of air pollutant emissions began in California over 50 years ago. Although the air is cleaner, it still exceeds state and federal health-based standards on many days each year for some pollutants. This section provides an overview of the region's air quality problems and regulations and programs designed to address these problems. In addition, this section provides the environmental and regulatory setting for greenhouse gases and climate change.

2.1 - Air Quality Setting

The City of Hanford is located within the San Joaquin Valley Air Basin (SJVAB). Regional and local air quality is impacted by topography, dominant airflows, atmospheric inversions, location, and season. The combination of topography and inversion layers generally prevents dispersion of air pollutants. A satellite view of the fog filled SJVAB during the winter (Figure 1) dramatically illustrates these factors.

Figure 1: San Joaquin Valley Air Basin



Air quality impacts are regional problems in the case of ozone and secondary particulate matter that are formed in chemical and photochemical reactions in the atmosphere. These pollutants are often formed in locations distant from where the pollutant precursors are emitted. Air quality impacts can also be localized in cases of directly emitted particulate matter, carbon monoxide, toxic air contaminants, and odors. Localized pollutants disperse and decrease in concentration with distance from the source.

The City of Hanford generates its own pollutant emissions but is also impacted by transport of pollutants from areas of the Valley upwind of Kings County and as far as the Bay Area. In addition, pollutants are recirculated around the Valley during periods of stagnation. Although the Bay Area is classified as an area that transports pollutants to the SJVAB, air quality research studies indicate that pollution generated in the Bay Area is a minor component of the problem, and SJVAB generates sufficient pollution to exceed air quality standards.

Although air quality has improved, the City of Hanford and other SJVAB jurisdictions still experience unhealthful ozone concentrations on many days each year. The federal 8-hour ozone standard was exceeded 20 days in 2007 at the Hanford air monitoring station. The SJVAPCD cannot predict attainment of the federal standard prior to 2023 even with the implementation of all controls now envisioned for all sources of ozone precursor emissions. It is important to note that the City of Hanford and Kings County are part of the SJVAB and so an exceedance of air quality standards for regional pollutants (ozone, PM_{10}, and $PM_{2.5}$) anywhere in the SJVAB means that the entire air basin is considered “non-attainment” for the standard exceeded.

The EPA recently announced that it had finalized approval of the SJVAPCD’s request for re-designation to attainment of the federal PM_{10} standard. No official exceedances of the PM_{10} standard had been recorded anywhere in the SJVAB since 2003. However, on several occasions, monitors in Kings County and other SJVAB locations exceeded the standard during periods of high winds and blowing dust. The federal Clean Air Act does not count exceedances of air quality standards caused by natural and exceptional events such as dust storms when determining attainment status. However, the area must prepare a Natural Event Action Plan that describes measures that the SJVAPCD will take to inform the public if another event is predicted to occur and actions that can be taken to reduce the chances of future events, if possible. The SJVAPCD has an approved Natural Event Action Plan in place.

Kings County and other SJVAB counties exceed the federal annual $PM_{2.5}$ standard. The SJVAB does not exceed the federal 24-hour $PM_{2.5}$ standard. The SJVAPCD $PM_{2.5}$ Attainment Plan predicts attainment of the standard by 2015. The $PM_{2.5}$ problem is due to a combination of directly emitted particles from combustion such as fireplaces, from diesel engines, and from particles formed in the atmosphere including nitrates and sulfates. The

SJVAPCD strategy relies on reducing emissions by reducing burning, especially on bad air days, with fireplace use and installation restrictions and a phase-out of agricultural burning. Also important for reducing directly emitted $PM_{2.5}$ are regulations to reduce particulate emissions from diesel engines adopted by ARB and the SJVAPCD. The strategy for reducing secondary $PM_{2.5}$ relies primarily on ARB and SJVAPCD regulations to reduce oxides of nitrogen (NO_x) emissions from mobile and stationary sources.

The federal health-based standards are called the National Ambient Air Quality Standards (NAAQS) or federal standards. State standards are called the California Ambient Air Quality Standards (CAAQS) or California standards. Information regarding the federal and California standards and the pollutants of concern in the SJVAB is provided below.

Air Monitoring Data

Table 1, Table 2, and Table 3 provide a quantitative representation of Hanford's air quality in terms of how often national and state standards are exceeded each year and the concentrations people are exposed to on the worst days. The three pollutants of most concern addressed in the tables are ozone, fine particulate matter (PM_{10}) and ultrafine particulate matter ($PM_{2.5}$). Other pollutants do not exceed standards in Hanford and the SJVAB.

Table 1: Ozone Trend Summaries

Hanford – South Irvine Street Monitoring Station/Corcoran- Patterson Avenue							
Year	Days Exceeding Standard				1-Hour Observations (ppm)	8-Hour Averages	
	State		National			State (ppm)	National (ppm)
	1-Hour	8-Hour	1-Hour	8-Hour	Maximum	Maximum	Maximum
2009*	6	43	0	21	0.123	0.091	0.091
2008*	28	66	3	38	0.132	0.124	0.124
2007	2	20	0	8	0.102	0.091	0.091

Notes:
ppm = parts per million (a measure of concentration in the air)
* Ozone data not collected in Hanford in 2008 and 2009.
Source: Air Quality Element Background Report.

Table 2: PM_{10} Trend Summaries

Hanford – South Irvine Street Monitoring Station								
Year	Estimated Days Exceeding Standard		Annual Average ($\mu g/m^3$)		3-Year Average ($\mu g/m^3$)		High 24-Hour Average ($\mu g/m^3$)	
	National	State	National	State	National	State	National	State
2009	0	18	ND	42.1	ND	44	102.9	105.2
2008	2	23	50.9	ND	47	47	229.5	230.6
2007	0	23	43.9	44.3	44	47	100.0	106.0

Abbreviations:
ND = No data available; $\mu g/m^3$ = micrograms per cubic meter (a measure of concentration)
Source: Air Quality Element Background Report.

Table 3: $PM_{2.5}$ Trend Summaries

Corcoran – Patterson Avenue Monitoring Station					
Year	Estimated Days Exceeding Standard	Annual Average ($\mu g/m^3$)		High 24-Hour Average ($\mu g/m^3$)	
	National	National	State	National	State
2009	43	18.0	ND	75.7	54.2
2008	33	15.7	19.9	51.0	105.8
2007	55	18.3	21.2	75.0	143.2*

Notes:
Corcoran is the closest $PM_{2.5}$ monitoring station to Hanford.
$\mu g/m^3$ = micrograms per cubic meter (a measure of concentration
* July 4, 2007 was determined by EPA to be an exceptional event, due to fireworks displays.
Source: Air Quality Element Background Report

Emissions Inventory

Emissions inventories are compilations of data describing the sources of air pollution in a defined area, usually expressed in tons per day or tons per year of an individual pollutant. Inventories help to identify important categories of sources that require control and are used in air quality modeling to correlate the amount of pollutants being emitted by sources with the atmospheric concentrations measured at the monitoring sites. In the Air Quality Element, the inventory is presented in broad categories to illustrate their relative importance. Emissions inventories are, by nature, the reflection of the best available data and the most applicable methods at the time of their compilation. The inventory is updated and improved as more detailed data is collected and understanding develops.

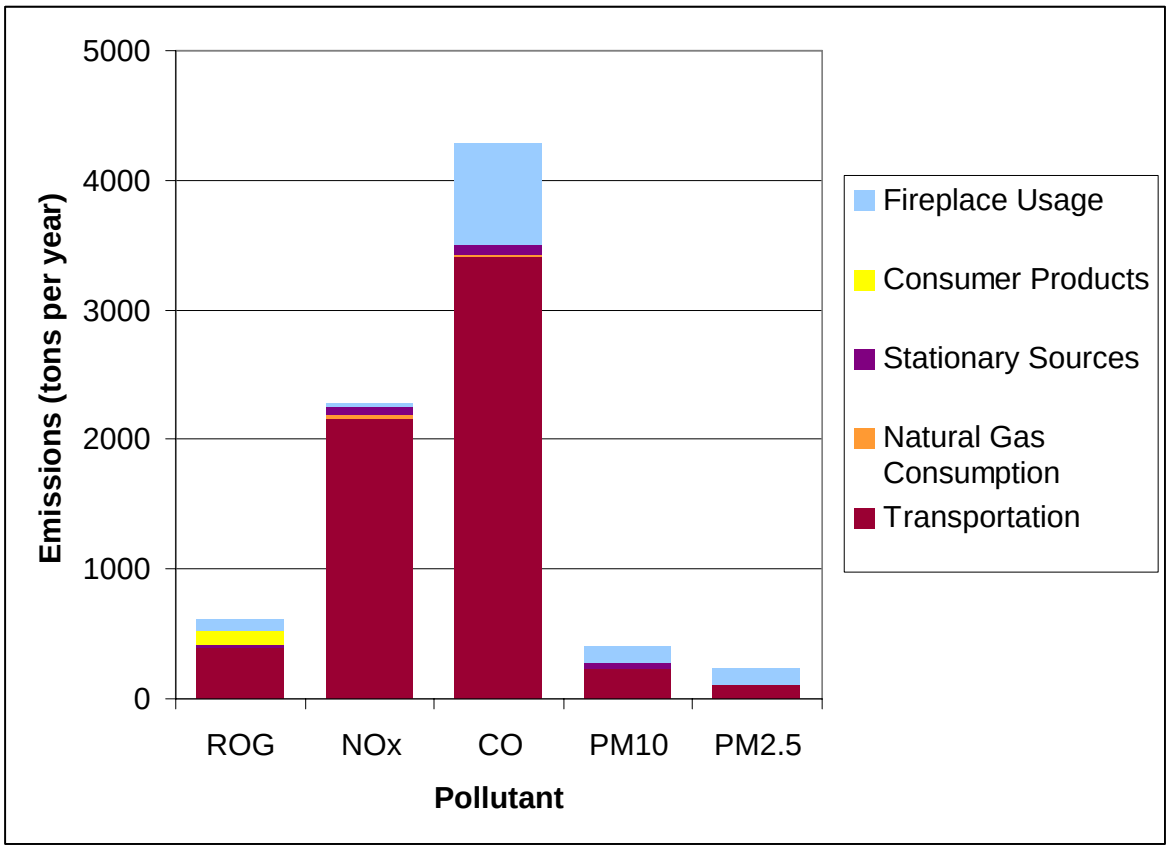
Table 4 provides the emissions inventory for criteria pollutant emissions in the City of Hanford in 2007. Emissions in the City are dominated by transportation sources that primarily consist of car and truck emissions. This information is also presented in Figure 2.

Table 4: Criteria Air Pollutant Emissions in Hanford - 2007

Source	Emissions (tons per year)				
	ROG	NO_x	CO	PM_{10}	$PM_{2.5}$
Transportation	390	2,164	3,416	229	107
Natural Gas Consumption	2	29	12	0	0
Stationary Sources	19	65	81	50	NR
Consumer Products	113	0	0	0	0
Fireplace Usage	86	19	778	127	122
Total	611	2,278	4,287	406	229

Notes:
ROG = reactive organic gases NO_x = nitrogen oxides CO = carbon monoxide
PM_{10} = particulate matter less than 10 microns in diameter $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter.
NR = $PM_{2.5}$ data are not reported by the ARB
Source: Spreadsheets contained in the Air Quality Element Background Report, Appendix A.

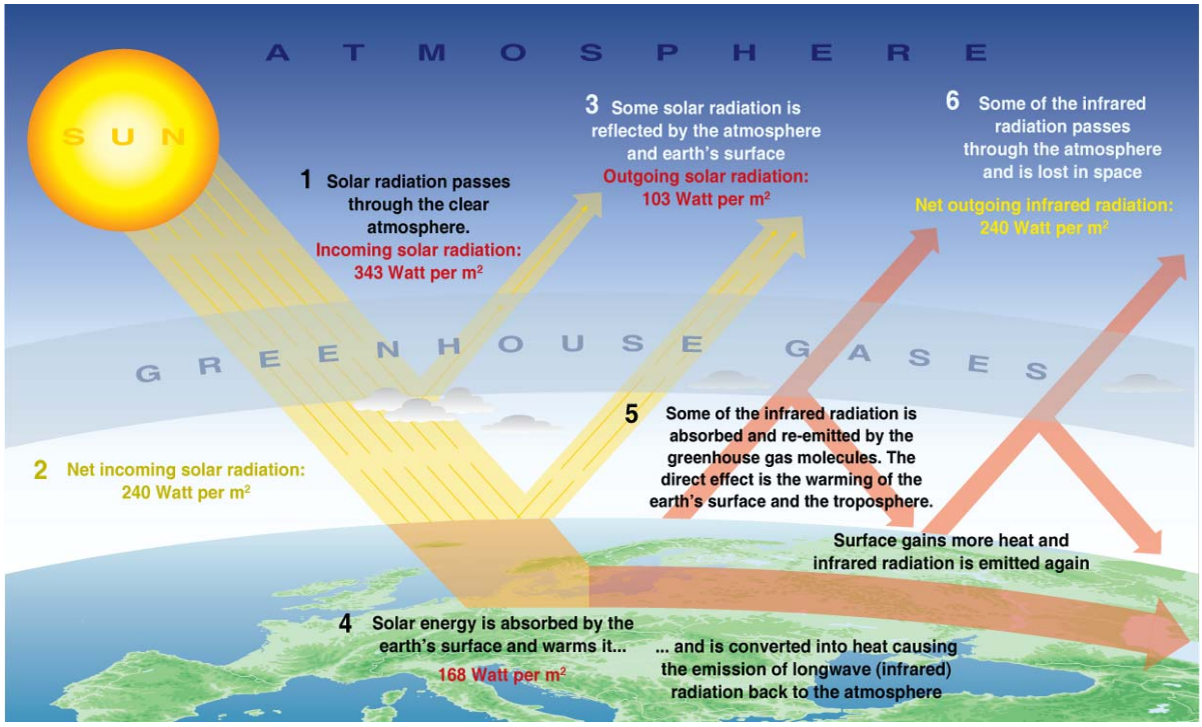
Figure 2: City of Hanford Criteria Pollutant Major Source Categories 2007



2.2 - Climate Change Science Background

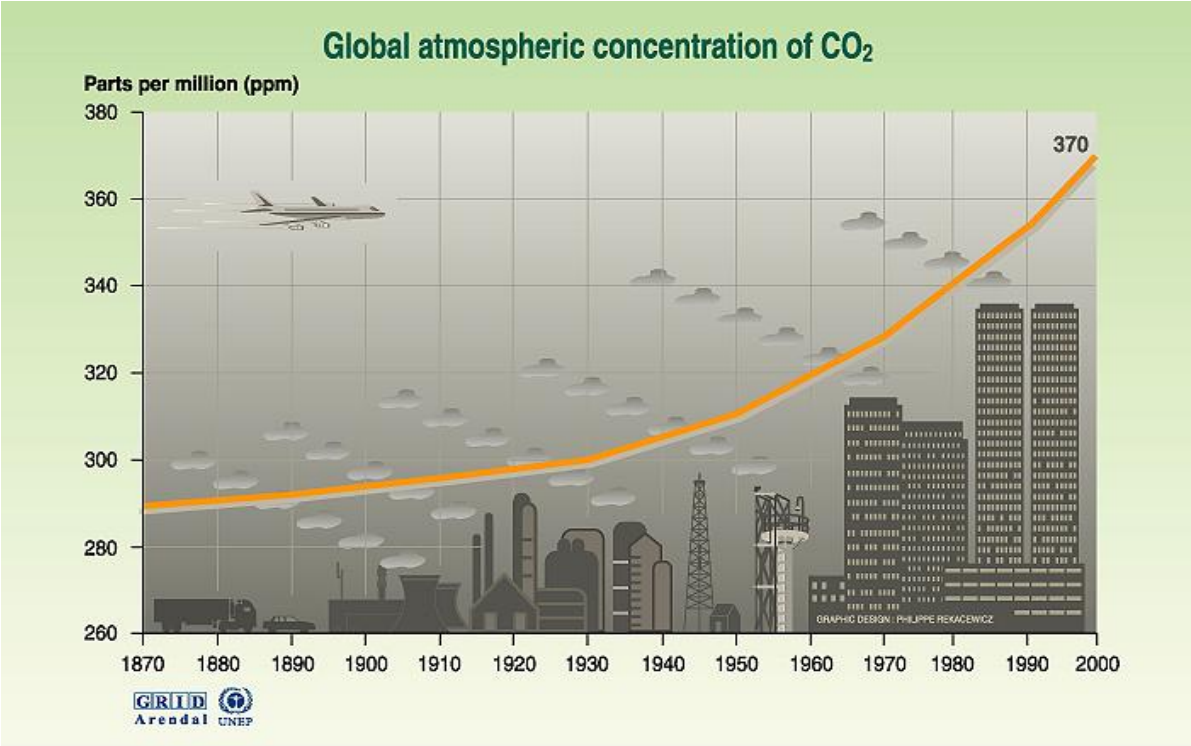
Gases that trap heat in the atmosphere are referred to as greenhouse gases. The effect is analogous to the way a greenhouse retains heat, as shown in Figure 3.

Figure 3: The Greenhouse Effect



Greenhouse gases include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6), hydrofluorocarbons (HFC), and perfluorocarbons (PFC). Natural processes and human activities emit greenhouse gases. The presence of greenhouse gases in the atmosphere regulates the earth's temperature. Without the natural heat trapping effect of greenhouse gas, the earth's surface would be about 34 degrees Centigrade cooler. Carbon dioxide concentrations in the atmosphere have steadily increased over time. As shown in Figure 4, global atmospheric concentration of CO_2 (carbon dioxide) data prior to 1958 are from ice core measurements, and post-1958 data are from the Mauna Loa measurement site in Hawaii. A growing number of scientific analyses indicate that rising levels of greenhouse gases in the atmosphere are contributing to climate change. Important scientific questions remain about how much warming will occur, how fast it will occur, and how the warming will affect the rest of the climate system, including precipitation patterns and storms.

Figure 4: Global Concentration of Carbon Dioxide



Sources: TP Whorf Scripps, Mauna Loa Observatory, Hawaii, institution of oceanography (SIO), university of California La Jolla, California, United States, 1999

Greenhouse gases have varying global warming potential and atmospheric lifetimes. Carbon dioxide, the reference gas for global warming potential, has a global warming potential of 1. The calculation of the carbon dioxide equivalent (CO_2e) is a consistent methodology for comparing greenhouse gas emissions, since it normalizes various greenhouse gas emissions to a consistent metric. Methane's warming potential of 21 indicates that methane has 21 times the warming effect than carbon dioxide on a molecule-per-molecule basis. A carbon dioxide equivalent is the mass emissions of an individual greenhouse gas multiplied by its global warming potential. Emissions are typically shown in metric tons of carbon dioxide equivalents ($MTCO_2e$) or a million times that amount, million metric tons of carbon dioxide equivalents ($MMTCO_2e$).

2.3 - Regulatory Setting for Air Quality

Air pollutants are regulated at the national, state, and air basin level. Each agency has a different level of regulatory responsibility. The United States Environmental Protection Agency (EPA) regulates air quality at the national level. The California Air Resources Board (ARB) regulates at the state level and the SJVAPCD regulates at the air basin level. EPA, ARB, and the SJVAPCD work collaboratively with Kings County Association of Governments (KCAG) for transportation-related air quality regulations affecting Kings County and the City.

Federal and State Programs

The EPA handles global, international, national, and interstate air pollution issues and policies. The EPA sets national vehicle and stationary source emission standards, oversees approval of all State Implementation Plans, provides research and guidance in air pollution programs, and sets NAAQS, also known as federal standards. There are NAAQS for six common air pollutants, called criteria air pollutants, which were identified resulting from provisions of the Clean Air Act of 1970. The six criteria pollutants are:

- Ozone
- Particulate matter (PM_{10} and $PM_{2.5}$)
- Nitrogen dioxide
- Carbon monoxide (CO)
- Lead
- Sulfur dioxide

The ARB also administers the CAAQS for the 10 air pollutants designated in the California Clean Air Act. The 10 state air pollutants are the six criteria pollutants listed above as well as visibility-reducing particulates, hydrogen sulfide, sulfates, and vinyl chloride.

The primary NAAQS were set to protect public health, including that of sensitive individuals; thus, the standards continue to change as more medical research is available regarding the health effects of the criteria pollutants. There are also secondary NAAQS to prevent environmental and property damage.

Local Air Pollution Regulation

The local air pollution control agency for the SJVAB is the SJVAPCD. The SJVAPCD is responsible for controlling emissions primarily from stationary sources and certain areawide sources. The SJVAPCD maintains air quality monitoring stations throughout the SJVAB. The SJVAPCD, in coordination with the eight countywide transportation agencies, is also responsible for developing, updating, and implementing the Air Quality Attainment Plans (AQAPs) for the SJVAB that become part of the State Implementation Plan. The SJVAPCD has adopted the following attainment plans:

- 2004 Extreme Ozone Attainment Demonstration Plan (1-Hour Standard)
- 2007 Ozone Plan (8-Hour Standard)
- 2003 PM_{10} Plan
- 2006 PM_{10} Plan
- 2007 PM_{10} Maintenance Plan and Request for Redesignation
- 2008 $PM_{2.5}$ Plan

The SJVAPCD adopts rules and regulations to implement the attainment plans and to comply with state and federal regulations. The SJVAPCD has adopted rules for nearly every possible source of emissions. Some specific rules that affect development in the City of Hanford include:

- Rule 2201 – New and Modified Stationary Source Review: Requires controls and offsets for certain new stationary sources.
- Regulation VIII – Fugitive PM10 Prohibitions: Dust control for construction, open areas, roads, and storage.
- Rule 9410 – Employer Based Trip Reduction: Requires large employers (over 100 employees) to establish trip reduction programs.
- Rule 9510 – Indirect Source Review: Requires mitigation of construction and operational emissions from development projects through onsite measures and off-site mitigation fees.

2.4 - Regulatory Setting for Climate Change

California has adopted a wide variety of regulations aimed at reducing the State's greenhouse emissions. While state actions alone cannot stop climate change, the adoption and implementation of this legislation demonstrates California's leadership in addressing this critical challenge. Key legislation and Governor's Executive Orders pertaining to the State's reduction targets are described below.

AB 32. The California State Legislature enacted AB 32, the California Global Warming Solutions Act of 2006. AB 32 requires that greenhouse gases emitted in California be reduced to 1990 levels by the year 2020. Greenhouse gases as defined under AB 32 include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6), hydrofluorocarbons (HFC) and perfluorocarbons (PFC), and sulfur hexafluoride. ARB is the state agency charged with monitoring and regulating sources of greenhouse gases.

ARB Scoping Plan. The ARB approved the Climate Change Scoping Plan (Scoping Plan) in December 2008 to implement AB 32. The Scoping Plan contains measures designed to reduce the State's emissions to 1990 levels by the year 2020. Local governments must achieve reductions through land use measures that will be substantially dependent on the General Plan for success. The Scoping Plan recommends a greenhouse gas reduction goal for local governments of 15 percent below today's levels by 2020 to ensure that their municipal and community-wide emissions match the State's reduction target.

Executive Order S-3-05. California Governor Arnold Schwarzenegger announced on June 1, 2005, through Executive Order S 3-05, the following reduction targets for greenhouse gas emissions:

- By 2010, reduce greenhouse gas emissions to 2000 levels;
- By 2020, reduce greenhouse gas emissions to 1990 levels;
- By 2050, reduce greenhouse gas emissions to 80 percent below 1990 levels.

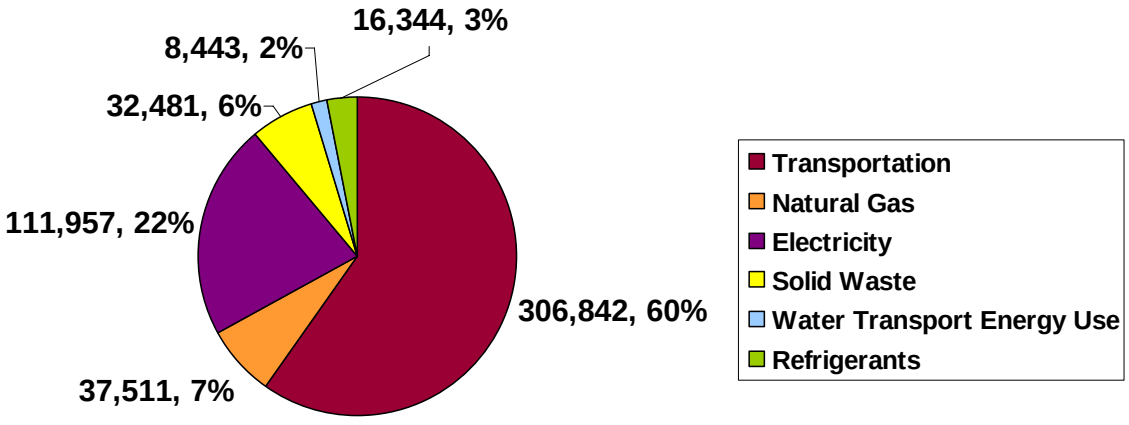
Executive Order S-13-08 directs the Governor's Office of Planning and Research, in cooperation with the California Resources Agency, to provide land use planning guidance related to sea level rise and other climate change impacts. The order also directs the California Resources Agency to develop a State Climate Adaptation Strategy by June 30, 2009 and to convene an independent panel to complete the first California Sea Level Rise Assessment Report.

Senate Bill (SB) 375. SB 375 aligns regional transportation planning efforts, regional greenhouse gas reduction targets, and affordable housing allocations. Metropolitan Planning Organizations are required to adopt a Sustainable Communities Strategy, which allocates land uses in the Metropolitan Planning Organization's Regional Transportation Plan. Qualified projects consistent with an approved Sustainable Communities Strategy or Alternative Planning Strategy and categorized as "transit priority projects" would receive incentives under new provisions of the California Environmental Quality Act (CEQA).

Greenhouse Gas Emissions inventory

The following chart illustrates the emissions inventory source categories and emission amounts, and inventory percentages for the City. The two largest source categories are transportation and electricity use with 60 percent and 22 percent of the inventory respectively. The total emissions are 513,579 metric tons of CO_2e per year.

Figure 5: City of Hanford Greenhouse Gas Emissions – 2007 Baseline Inventory



Inventory Total: 513,579 MTCO2e/Year

For additional information regarding greenhouse gases, climate change, and the current regulatory context for climate change, please refer to the Air Quality Element Background Report.

2.5 - Air Quality Public and Private Partnerships

Public and private partnerships are an important element of efforts to improve air quality. Voluntary programs that educate the public regarding air quality issues and promote change in personal behaviors are keys to achieving early results.

Healthy Air Living

Healthy Air Living is an SJVAPCD initiative that provides ways to make decisions, day to day, that take into consideration their effect on San Joaquin Valley air quality. Healthy Air Living is a "toolbox" of ideas and strategies that help people take voluntary, high-impact measures in their personal lives and workplace to reduce emissions. Healthy Air Living evolved from and expands upon the Spare the Air Program that the SJVAPCD operated in the San Joaquin Valley for many years. Businesses in the San Joaquin Valley are in a position to greatly influence our air quality through voluntary measures and by the example set for their workforce.

The goals of Healthy Air Living are to:

- Reduce the number of vehicle miles traveled through the Valley each day.
- Reduce emissions from equipment and processes.
- Reduce emissions during times when air quality is poor.

Healthy Air Living provides resources to incorporate clean-air strategies into daily life and to connect with other people who want to help us breathe healthier air.

SJVAPCD Grant and Incentive Programs

The SJVAPCD has operated incentive programs since 1992, including the Heavy-Duty Engine Incentive and REMOVE II programs that provide millions of dollars in incentive funding to private and public sector projects each year. Over the years, the SJVPACD has been willing to develop new programs such as the Clean Green Yard Machine Program that helped consumers purchase electric lawnmowers. Other programs include:

- On-Road Voucher Incentive Program (VIP) – On-road truck replacement
- Proposition 1B: Goods Movement Emission Program
- Burn Cleaner Program – Woodstove changeout
- Clean Green Yard Machine – Lawnmower replacement

- Great Basin Program – Off-road equipment replacement
- Lower-Emission School Bus Programs – School bus replacement and retrofits

Agricultural Industries Transportation Services (AITS)

The AITS program operated by Kings Area Rapid Transit (KART) provides a valuable service to agricultural workers and farmers while also providing significant air quality benefits by reducing vehicle trips. The program is designed to provide qualified agricultural workers in Kings, Kern, Tulare, Fresno, and Madera counties with safe, reliable, and affordable vans they can use and drive themselves and others to work. The AITS program exists where the demand for farm labor transportation is high and is not limited to Kings County. Each 15-passenger van is operated by volunteer farmworkers who must obtain a Class C drivers license, pass a physical, and provide a DMV printout of their driving record. Additional benefits derived from the program include increased worker attendance and performance, insured transportation, licensed drivers, and elimination of the potential for abuse of farmworkers who depend upon transport.

Kings Area Rapid Transit (KART) Vanpool

The KART Vanpool program provides vanpool services in a public/private partnership supporting the needs of employers and employees. This successful program reduces vehicle trips and increases average vehicle ridership to provide significant air quality benefits. The program uses eight- and 15-passenger vans for groups that wish to carpool to and from work. The cost is based upon the number of passengers and the distance traveled each month. The driver qualifications are similar to the AITS drivers. Ridership and participation has progressively increased as travel expenses rise and commuters seek more affordable means of dependable and direct modes of transport to and from work. Currently, the KART Vanpool program provides vans for employees of 10 correctional facilities, and as an incentive to state employees, who receive a rebate of up to $65/month.

2.6 - Land Use, Transportation, and Air Quality Connections

The concept of a land use, transportation, and air quality connection is based on the idea that the design, density, and pattern of land uses impacts the transportation system that serves those land uses, and the transportation system in turn influences the amount people drive and options for using less polluting modes of transportation such as walking, bicycling, and transit.

The City of Hanford has maintained its traditional downtown and has many older neighborhoods that incorporate design principles that encourage walking, bicycling, and transit use. Most recent development has emphasized suburban designs with single-family homes on relatively large yards, limited multi-family housing, and strictly separated uses. Commercial shopping areas serving new development areas have also been designed in a fashion similar to those found in most California communities in recent decades.

This mix of suburban development with traditional and historic development has made Hanford a very comfortable place to live with a strong sense of civic pride. The General Plan and San Joaquin Valley Blueprint and now the Air Quality Element attempt to preserve and enhance the features of Hanford that its citizens find most attractive, while meeting other goals such as preserving surrounding farmland, making the community more walkable, increasing safety for pedestrians and bicyclists, improving air quality, and reducing greenhouse gas emissions.

As Hanford grows, traffic congestion will become worse unless massive investments are made in expanding

roadways and intersections. Wider, busier roadways will likely change the small town feel that most Hanford citizens cherish, but there are ways to reduce the need for wider roads and the noise and pollution that they create:

- Reduce the need to drive for every shopping trip by improving pedestrian access to shopping centers.
- Make bicycling a safe and attractive option for work and school trips by providing bike lanes and paths.
- Locate new multifamily development in areas that can be served by transit and have services and shopping within walking distance.
- Use traffic calming techniques to smooth traffic flow, reduce speeds, but often improve travel time.

Policies that promote development that meets these objectives can be categorized as follows:

Compact Development

- Higher development densities to reduce travel distances and increase the feasibility of transit service
- Farmland and Open Space preservation to encourage infill development and higher densities
- Incremental development to minimize travel distances, improve pedestrian orientation, and increase the potential for transit service

Transit and Pedestrian Oriented Design

- Locate high-density development close to commercial and service destinations that are within walking distance.
- Provide direct pedestrian connections between uses.
- Locate transit stops and infrastructure near to high-density development to maximize the number of people within walking distance.
- Provide transit infrastructure such as benches and shelters at locations that maximize accessibility.
- Construct narrow streets to slow traffic and allow room for pedestrian infrastructure.
- Install traffic calming measures such as roundabouts, and pedestrian bulb outs.
- Use a grid street system to provide direct routes to many destinations.
- Require tree-lined streets with drought tolerant trees to shade pedestrian routes.
- Allow storefronts near the street to create an interesting pedestrian orientation.
- Minimize windowless walls facing the street.
- Use shared parking lots to minimize land devoted to parking.
- Provide parking lots in the back or in public lots to allow storefronts to be close to the street.

Mixed Use Development

- Allow second story residential mixed use in downtown commercial areas and large mixed-use projects to increase activity and improve walkability.

Pedestrian and Bicycle Infrastructure

- Provide sidewalks and pedestrian paths for a safer and more convenient pedestrian environment.
- Provide bicycle paths and lanes to encourage bicycle use.
- Require secure bicycle parking for employment sites and apartment complexes to prevent bicycle theft.
- Require bike racks for commercial development to provide convenient bike parking while shopping.

Preventing land use conflicts

- Provide adequate separation between residential and industrial uses having the potential to emit hazardous pollutants or odors.
- Provide adequate separation between sensitive land uses and major highways to minimize exposure to hazardous pollutant emissions.
- Protect agricultural development from premature development to reduce unnecessary conflicts between residential uses and farming activities.

These policy concepts also reduce adverse public health effects of air pollutants such as ozone, carbon monoxide, and particulate matter and pollutants responsible for climate change (primarily carbon dioxide). The air quality benefits derived are roughly proportional to the reduction in motor vehicle trips and miles traveled achieved with development that implements the concepts described above. The reduced travel results in less fuel consumed and fewer emissions produced.