

8 Air Quality and Greenhouse Gases

Good air quality is essential for protecting public health and ensuring a high quality of life, and a review of air pollution and strategies for improvement is an essential component of the General Plan. This Element complies with AB 170 (an update to Government Code Section 65302.1) by providing data on air quality attainment and standards for criteria air pollutants; local, district, state, and federal programs and regulations; and a comprehensive set of guiding and implementing policies.

The Element also describes climate change and its potential impacts on the city and region, providing an overview of climate change regulations, Turlock’s energy use and efforts to reduce greenhouse gas (GHG) emissions. Hazardous air pollutants and GHGs are generated by many of the same sources, and so efforts to reduce emissions of one type are also relevant to the other.

8.1 AIR QUALITY

CLIMATE AND ATMOSPHERIC CONDITIONS

San Joaquin Valley Air Basin

Turlock is located in the San Joaquin Valley Air Basin (SJVAB), a largely 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. The SJVAB is approximately 250 miles long and an average of 35 miles wide, making it the second-largest air basin in California. Marine air flows eastward through gaps in the Coast Range at the Golden Gate and Carquinez Strait. The mountain ranges ringing the San Joaquin Valley restrict air movement through and out of the air basin, making the region highly susceptible to pollutant accumulation over time.¹ Air quality in the Valley is compromised both by pollutants transported eastward from the urbanized Bay Area and by local emissions.

¹ San Joaquin Valley Air Pollution Control District, 2002.



Air pollutants in the Central Valley come from a variety of sources.

Wind Conditions and Air Pollutants

During winter, low wind speeds contribute to high concentrations of certain air pollutants. In the summer, winds usually originate from the north end of the basin and flow in a south-southeasterly direction through the valley, through the Tehachapi pass and into the neighboring Southeast Desert Air Basin. Persistent summertime inversions – when a layer of cool, marine air is trapped below a mass of warmer air above – prevent vertical dispersion of air pollutants.

Climate

The entire SJVAB has an “Inland Mediterranean” climate, characterized by hot, dry summers and cooler winters. The region averages over 260 sunny days a year, and around 12 inches of rainfall annually. High daily summer temperatures reach an average of 95 degrees Fahrenheit, while average daily lows in winter are around 45 degrees. Average high temperatures in the winter are in the 50s. In winter, temperatures are very rarely below freezing, but can be in the high 30s and 40s on days with particularly heavy fog or low cloud cover.

High temperatures in the summer contribute to ozone formation. In addition, temperature inversions in the valley air basin also affect pollutant dispersion. Vertical dispersion of pollutants is limited by persistent temperature inversions. Temperature inversions occur when a layer of warm air traps cooler air beneath it. Air above and below the inversion base does not mix because of differences in air density; warm air above the inversion is less dense than the cool air below, which prevents air exchange. Ozone and its precursors will mix and react to produce higher concentrations under an inversion, and inversions trap and hold directly emitted pollutants like carbon monoxide (CO). Concentrations of particulates are also directly related to inversion layers due to the limitation of mixing space. Temperature inversions are more persistent during the winter months.²

SOURCES OF AIR POLLUTION

In general, air pollutants in the Valley are generated by motor vehicles, farming operations, industrial activities, wood burning, and windblown dust. The San Joaquin Valley Air Pollution Control District (SJVAPCD or the Air District) maintains an Emissions Inventory, which estimates the

² San Joaquin Valley Air Pollution Control District, 2002.

total volume of air pollutants generated each day by approximately 100 “areawide” sources, point sources such as factories, gas stations and power plants, and mobile sources (vehicles).

Cars and trucks are responsible for most of the smog-producing pollutants (nitrogen oxides and reactive organic gases) in the air and two-thirds of the carbon monoxide. Farming is the major source of organic gases, including reactive organic gases that contribute to smog. Other areawide sources, especially dust from roads and construction, produce most of the particulate air pollutants. Fuel combustion in factories, food processing plants, electric utilities, and similar sources accounts for more than half of sulfur oxide production.

The following sections discuss the different types of air pollution, and the different types of monitoring and regulations that apply. They include:

- Criteria Air Pollutants
- Toxic Air Pollutants
- Regional Air Quality Management
- Air Quality and Transportation Planning
- Local Government Responsibilities

CRITERIA AIR POLLUTANTS

As required by the Federal Clean Air Act, US EPA has established National Ambient Air Quality Standards for several “criteria pollutants” 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) and regulates additional pollutants as well.

Federal Clean Air Act

The Federal Clean Air Act establishes the framework for federal air pollution control, including direction for the EPA to develop national emission standards for carbon monoxide (CO); ozone (O₃); respirable particulate matter (PM₁₀); fine particulate matter (PM_{2.5}); nitrogen dioxide (NO₂); sulfur dioxide (SO₂); and lead. If an area, defined as an air basin, does not meet the



Cars and trucks are responsible for most of the smog-producing pollutants in the air and two-thirds of the carbon monoxide (top). Farming is the major source of organic gases that contribute to smog, while factories and other stationary sources account for most sulfur oxides in the air (bottom).

federal standard for a pollutant, the state is required to prepare and adopt a State Implementation Plan (SIP) to show how the standards will be attained.

California Air Resources Board and the California Clean Air Act

The California Air Resources Board (CARB) is responsible for establishing and reviewing California ambient air quality standards, developing and managing the California SIP, and securing approval of this plan from US EPA. The California Clean Air Act of 1988 focuses on attainment of the state ambient air quality standards, which, for certain pollutants and averaging periods, are more stringent than the comparable federal standards. In addition, California has established State ambient air quality standards for sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particles.

TABLE 8-1: STATE AND NATIONAL CRITERIA AIR POLLUTANT STANDARDS, EFFECTS, AND SOURCES

POLLUTANT	AVERAGING TIME	CALIFORNIA STANDARD	NATIONAL PRIMARY STANDARD	MAJOR POLLUTANT SOURCES	POLLUTANT HEALTH AND ATMOSPHERIC EFFECTS
Ozone	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 hour	0.07 ppm	0.08 ppm		
Carbon Monoxide	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 hour	9.0 ppm	9.0 ppm		
Nitrogen Dioxide	1 hour	0.18 ppm	—	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	0.053 ppm		
Sulfur Dioxide	1 hour	0.25 ppm	—	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 hour	0.04 ppm	0.14 ppm		
	Annual Average	—	0.03 ppm		
Respirable Particulate Matter (PM10)	24 hour	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 (PM2.5)	24 hour	—	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 NO _x , 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 and recycling facilities. Past source: combustion of leaded gasoline.	Disturbs gastrointestinal system, and causes anemia, kidney disease, and neuro-muscular and neurologic dysfunction.
	Quarterly	—	1.5 µg/m ³		

Note: ppm=parts per million; and µg/m³=micrograms per cubic meter

Source: California Air Resource Board, available at www.arb.ca.gov/research/aaqs/aaqs2.pdf, Published April 2008. Accessed June 2, 2008.

Attainment of Air Quality Standards

The San Joaquin Valley Air Basin is considered in attainment for Federal and state standards for carbon monoxide, nitrogen dioxide, sulfur dioxide, and lead. The region is designated a “severe non-attainment” area for the state 1-hour standard for ozone. The valley is also in non-attainment of the state 8-hour ozone standard, and is an “extreme nonattainment” area for the federal eight-hour ozone standard. The Air Basin is in non-attainment of both state and federal standards for fine particulate matter (PM_{2.5}). It has recently achieved federal attainment status for respirable particulate matter (PM₁₀), but fails to attain California’s standards.

The San Joaquin Valley Air Pollution Control District operates a regional monitoring network to measure ambient concentrations of the six criteria pollutants identified above. One of the District’s monitoring stations is located on South Minaret Avenue in Turlock, providing a good gauge for air quality in the Study Area. Ozone levels in Turlock have exceeded state standards for both the one-hour and eight-hour periods in each of the past five years. Turlock’s air also violated state standards for respirable particulate matter (PM₁₀) and surpassed contemporary standards for PM_{2.5} in each of these years.

Table 8-2 shows the Study Area’s attainment status with respect to the national and State ambient air quality standards for criteria pollutants. A table showing measured pollutant concentrations from the Turlock monitoring station over the last five years and ambient air quality standards for these criteria pollutants is found in the General Plan EIR.

TABLE 8-2: ATTAINMENT STATUS FOR CRITERIA POLLUTANT STANDARDS, SAN JOAQUIN VALLEY AIR BASIN

POLLUTANT AND AVERAGING TIME	STANDARD	ATTAINMENT STATUS
OZONE (O3)		
1 Hour	State	Nonattainment/Severe
8 Hour	State	Nonattainment
	Federal	Nonattainment/Extreme
RESPIRABLE PARTICULATE MATTER (PM10)		
24 Hour	State	Nonattainment
	Federal	Attainment
Annual Mean	State	Nonattainment
FINE PARTICULATE MATTER (PM2.5)		
24 Hour	Federal and State	Nonattainment
Annual Mean	State	Nonattainment
	Federal	Nonattainment
CARBON MONOXIDE (CO)		
8 Hour	State	Attainment/Unclassified ¹
	Federal	Attainment/Unclassified ¹
1 Hour	State	Attainment/Unclassified ¹
	Federal	Attainment/Unclassified ¹
NITROGEN DIOXIDE (NO2)		
Annual Mean	State	Attainment
	Federal	Attainment/Unclassified ¹
1 Hour	State	Attainment
	Federal	Attainment/Unclassified ¹
SULFUR DIOXIDE (SO2)		
24 Hour	State	Attainment
1 Hour	State	Attainment
	Federal	Attainment/Unclassified ¹

TABLE 8-2: ATTAINMENT STATUS FOR CRITERIA POLLUTANT STANDARDS, SAN JOAQUIN VALLEY AIR BASIN		
POLLUTANT AND AVERAGING TIME	STANDARD	ATTAINMENT STATUS
LEAD		
30-Day Average	State	Attainment
Calendar Quarter	Federal	Attainment
Rolling 3-Month Average	Federal	Attainment
VISIBILITY REDUCING PARTICLES		
8 Hour	State	Unclassified ¹
SULFATES		
24 Hour	State	Attainment
HYDROGEN SULFIDE		
1 Hour	State	Unclassified ¹
VINYL CHLORIDE		
24 Hour	State	Attainment
Notes		
1. Attainment status is identified as "unclassified" when the concentration of a pollutant becomes so low that the Air District has determined measurement is no longer necessary.		
Bold indicates nonattainment of standards.		
<i>Source: California Air Resources Board, 2009.</i>		

TOXIC AIR POLLUTANTS

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. Toxic pollutants are regulated at the federal and State levels. The primary concern is risk of harm to public health.

Federal Clean Air Act

National Emission Standards for Hazardous Air Pollutants developed by EPA in accordance with Title III of the 1990 federal Clean Air Act Amendments regulate “major source” facilities that emit large quantities of toxic air contaminants (TACs). These rules require that emissions be reduced using the Maximum Achievable Control Technology (MACT).

State Regulations

AB 1807 (Tanner Bill)

As directed by AB 1807, the Tanner Bill, the California Air Resources Board (CARB) identifies the most important toxic pollutants by considering risk of harm to public health, amount or potential amount of emissions, manner of usage of the substance, persistence in the atmosphere, and concentration in the outdoor air. CARB regulates mobile emissions sources in California, such as construction equipment, trucks, and automobiles, and oversees the activities of air quality management districts, which are organized at the county or regional level. Air districts regulate toxic air contaminants from stationary sources through their permit processes. Mobile sources of toxic air contaminants are regulated indirectly by the State and EPA through vehicle emissions standards and 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.

AB 2588 (Air Toxics “Hot Spots” Act)

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 Air District implements this act through the local Air Toxics “Hot Spots” Program.

Hazardous Pollutants in the San Joaquin Valley

Both the Air District and the State monitor hazardous air pollutants and share emissions data through the California Toxics Inventory (CTI). According to the District’s 2007 Annual Report on the District’s Air Toxics Program, the toxic pollutants most prevalent in the Valley are diesel particulate matter (averaging 7,695 tons per year); formaldehyde (4,396 tons); benzene (1,789 tons); and acetaldehyde (1,761 tons).

Over half (52 percent) of hazardous air pollutants are emitted from mobile sources (cars, trucks, buses, farm and construction equipment). These sources are primarily regulated by the State and EPA, though the Air District also has incentive programs to reduce mobile source emissions.

About 30 percent of hazardous pollutants come from “areawide” sources such as roads. About one fifth of hazardous air pollutants come from point sources that are directly regulated by the Air District.

The Air District keeps detailed information on emissions from about 200 “point sources” in the San Joaquin Valley, including Turlock’s Walnut Energy Center; California Dairies; Purina Mills; Associated Feed; Evergreen Beverage Packaging; Foster Farms; Varco Pruden Buildings; West Coast Equipment; and Cargill. The District also estimates industry-wide emissions for sectors characterized by many small facilities such as dry cleaning operations. Facilities that are determined to pose a significant risk to the public are required to submit plans to bring emissions below significant levels. The Air District reports that all sixteen facilities determined to pose a health risk due to toxic emissions have reduced emissions so that risks to the public are no longer considered significant.³

Airborne Toxics Control Measures

The State Air Resources Board and the SJVAPCD have both made major efforts in recent years to reduce risks posed by air pollution by adopting control measures for airborne toxics. Since diesel particulate matter has been found to pose the greatest risk, control measures for diesel engines have been a major focus. State and District rules adopted since 2004 include requirements for Best Available Control Technology (BACT) in new or replaced stationary diesel engines; stringent standards for off-road diesel vehicles (tractors, construction equipment); stringent standards for diesel vehicles that are part of public or utility fleets; and a measure to limit idling by commercial diesel trucks.

REGIONAL AIR QUALITY MANAGEMENT

San Joaquin Valley Air Pollution Control District (SJVAPCD)

In 1991, the State Legislature determined that management of an air basin by a single agency would be more effective than management through each county within that basin. Most metropolitan areas in California now fall under the authority of multi-county air pollution control

³ San Joaquin Air Pollution Control District, 2005 Annual Report on the District’s Air Toxics Program.

districts. The SJVAPCD has jurisdiction over air quality matters in the eight counties that make up the San Joaquin Valley Air Basin.

Air districts are responsible for monitoring the concentration of pollutants, regulating stationary sources of pollution (industrial facilities), and developing air quality plans to demonstrate how the Air Basin will meet air quality standards. These plans are expected to feature transportation control measures (TCMs) and other programs to reduce mobile source emissions. As a result, it is important for air districts to work closely with cities, counties, and regional transportation planning agencies.

Senate Bill (SB) 709 - State of California

SB 709 amends the Health and Safety Code to give the San Joaquin Valley Air Pollution Control District more responsibility in terms of permitting, fee implementation, and agricultural assistance. It gives the District the authority to require the use of best available control technology for existing emissions sources, promote cleaner-burning alternative fuels, and encourage and facilitate ridesharing. The Bill also amends the Vehicle Code to allow the District to adopt a surcharge on motor vehicle registration fees.

Regional Air Quality Plans

As noted above, if an air basin does not meet federal or state standards for a pollutant, the Air District is required to prepare and adopt air quality attainment plans demonstrating how standards will be attained. Attainment plans must be approved by CARB, and by the US EPA if federal standards are involved.

Ozone

2007 Ozone Plan

The Air District adopted the 2007 Ozone Plan to address the Valley's nonattainment of 8-hour standards for ozone. This plan was approved by CARB in June of 2007. It aims to reduce nitrogen oxides (NO_x), precursors to both ozone and particulate matter (PM), by 75 percent by 2023 to achieve the federal health-based standard for ozone. This would come on top of the 42 percent reduction in NO_x in the Valley between 1990 and 2005, largely attributable to effective District rules.

The 2007 Ozone Plan relies on a combination of regulatory measures and incentives, to be carried out by the Air District, the State, and local jurisdictions. The Plan commits to new rules for stationary sources, which already face strict emissions regulations in the San Joaquin Valley. Larger reductions must come from mobile sources, which are responsible for 80 percent of NO_x in the Valley air. Here, State and Federal controls are critical for the success of the Plan. These include annual inspections for older vehicles and high-mileage vehicles, and cleaner heavy-duty trucks. District incentives are expected to speed the turnover of the vehicle fleet and the presence of vehicles built according to new, stringent tail-pipe standards.

Particulate Matter

2007 PM₁₀ Plan

The Air District has produced a series of plans to bring the Valley into attainment of federal standards for respirable particulate matter (PM₁₀). In 2006 the District's monitoring data showed that the Valley had attained national standards for PM₁₀, and the following year it submitted the 2007 Maintenance Plan and Request for Redesignation as an attainment area. EPA approved the maintenance plan in September 2008, and redesignated the San Joaquin Valley as an attainment area for PM₁₀.

As part of the *2003 PM₁₀ Plan*, the eight metropolitan planning organizations (MPOs) in the San Joaquin Valley adopted a set of Reasonably Available Control Measures (RACM) to reduce emissions from vehicles. These measures remain in effect in the State Implementation Plan (SIP), because analysis of RACM for subsequent plans has determined that additional control measures would not substantially advance attainment of air quality standards.

2008 PM_{2.5} Plan

Also in 2008, the District adopted the 2008 PM_{2.5} Plan and submitted it to EPA. The Plan sets a course for the Air Basin to achieve both federal and state standards for fine particulate matter (2.5 micron diameter or smaller.) It builds on the strategy and control measures developed for the 2007 Ozone Plan, placing a similar emphasis on reducing nitrogen oxide emissions. The Plan notes that fine particulate matter emissions in the Valley have been decreasing due to successful regulatory efforts, and concludes that the Valley can attain the national standard for annual PM_{2.5} exposure by 2014.

AIR QUALITY, TRANSPORTATION AND LAND USE PLANNING

Federal Regulations

Federal Clean Air Act

The federal Clean Air Act outlines requirements for ensuring that federal transportation plans, programs, and projects conform to the State Implementation Plan's purpose of eliminating or reducing the severity and number of violations of the national ambient air quality standards. Transportation planning agencies must demonstrate that Regional Transportation Plans (RTPs) conform with air quality plans, and RTPs and Transportation Improvement Programs (TIPs) that require federal funding or approval must be included in the SIP emissions budget.

Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU)

SAFETEA-LU, building on previous federal transportation funding acts, has guided federal transportation investment since 2005. SAFETEA-LU incorporates the Congestion Mitigation and Air Quality Improvement (CMAQ) program, which provides funding to State and local governments for projects and programs that support air quality improvements. Funds are targeted to areas that are or have been in nonattainment of federal air quality standards. SAFETEA-LU also continues funding for the Transportation Enhancements (TE) program, which provides a funding source for pedestrian and bicycle infrastructure and other non-traditional roadway improvements which may advance air quality goals.

State Regulations

Assembly Bill (AB) 32: California Global Warming Solutions Act of 2006

AB 32 requires the reduction of statewide greenhouse gas (GHG) emissions to 1990 levels by the year 2020. Reduced GHG emissions will go hand in hand with reduced emission of criteria air pollutants. See Section 8.2 for more information on AB 32.

Senate Bill (SB) 375: Sustainable Communities and Climate Protection Act of 2008

SB 375, the Sustainable Communities and Climate Protection Act of 2008, requires regional transportation planning agencies to develop a Sustainable Communities Strategy to reduce vehicle miles travelled and to achieve greenhouse gas reduction targets for cars and light trucks. By reducing vehicle-miles travelled, the Sustainable Communities Strategy also affects a major source of criteria air pollutants. See Section 8.2 for more information on SB 375.

Regional Plans

Regional Transportation Plan

Stanislaus Council of Governments (StanCOG) is responsible for regional transportation planning for the Study Area. The 2011 Regional Transportation Plan, adopted in July 2010, guides the allocation of Federal and State funds to transportation projects in Stanislaus County. The RTP is a long-term strategy for accommodating growth with transportation investments.

The Plan is required to evaluate regional environmental effects, and to demonstrate conformity with the transportation emissions “budgets” in San Joaquin Valley air quality plans. Since 1992, the eight regional transportation agencies in the San Joaquin Valley have had a memorandum of understanding (MOU) with the Air District which is meant to ensure a coordinated approach throughout the Valley, and to help comply with State and federal Clean Air Acts.

The 2011 RTP observes the guiding principles established for the San Joaquin Valley Blueprint in its selection of Tier I projects, and places increased emphasis on alternate transportation modes. With the passage of SB 375 (see above), the next RTP also must include a “Sustainable Communities Strategy” that would allow the region to meet its greenhouse gas emission reduction targets.

San Joaquin Valley Blueprint

The San Joaquin Valley Blueprint Plan is a region-wide effort to develop a land use and transportation plan based on “smart growth” principles. Funded by the State of California and the San Joaquin Valley Air Pollution Control District, the process brings together eight metropolitan planning organizations (MPOs) to develop a comprehensive growth management strategy meant to guide local jurisdictions as they update their general plans.

LOCAL GOVERNMENT RESPONSIBILITIES

As discussed above, air quality management districts are responsible for regulating stationary emissions sources at facilities within their geographic areas, monitoring ambient air quality, and preparing the air quality plans required under the Federal Clean Air Act and California Clean Air Act. Implementation of many of the Transportation Control Measures (TCMs) and other strategies in these plans is the responsibility of cities, counties, and Councils of Government.

Local government responsibilities for air quality include:

- Land Use Planning: carrying out policies in this General Plan that support air quality improvement, including higher housing densities and mixed uses
- Environmental Review: reviewing and mitigating the environmental impacts of development projects
- Transportation: developing and maintaining the transportation infrastructure in the community, including transit systems and bicycle and pedestrian networks
- Local Programs: implementing local air quality programs such as commute-based trip reduction, ridesharing, and promotion of fuel-efficient vehicles

Land Use Planning

Local governments have jurisdiction over local land use, and are required to prepare general plans that set forth long-range goals for development, infrastructure investment, resource protection, and other subjects. The success of the sustainable regional planning efforts will depend on land use planning that supports shorter vehicle trips and alternative travel modes. Reducing air pollutants from vehicles will require that cities undertake more compact development patterns. Among the primary goals of this General Plan is to establish a compact land use pattern and walkable new neighborhoods.

Smart Valley Places Program and the Sustainable Communities Partnership

The General Plan Update is funded in part by Smart Valley Places, a program of the California Partnership for the San Joaquin Valley. The program brings together 14 cities, 4 non-profit organizations, CSU-Fresno, and the San Joaquin Valley Policy Council to implement the smart growth principles of the San Joaquin Valley Blueprint.

Smart Valley Places was awarded a competitive Sustainable Communities Regional Planning Grant from the U.S. Department of Housing and Urban Development (HUD). Grants are specifically targeted to support regional planning efforts that take on the interrelated challenges of economic competitiveness; access to opportunity; energy use and climate change; and public health and environmental impact.

The grants are part of an initiative, the Partnership for Sustainable Communities, that brings together the three agencies whose programs most directly impact the physical form of communities—HUD, the Department of Transportation, and the Environmental Protection Agency. It recognizes the following “Livability Principles:”

- Provide more transportation choices
- Promote equitable, affordable housing
- Enhance economic competitiveness
- Support existing communities
- Coordinate and leverage federal policies and investment
- Value communities and neighborhoods

This General Plan update intends to establish a compact land use pattern and walkable new neighborhoods, while reinforcing downtown and facilitating economic development. As recognized by the Partnership for Sustainable Communities, there are critical linkages between compact and walkable land use patterns; a transportation system that enables short trips and travel by other means; and improved air quality.

Assembly Bill (AB) 170 - State of California

In 2003, the State adopted Assembly Bill (AB) 170, which requires cities and counties in the San Joaquin Valley to address air quality in their general plans. Specifically, general plans should describe local air quality conditions and attainment status; summarize applicable air quality regulations; and include policies and implementation measures to achieve air quality improvements. This General Plan is intended to fulfill the requirements of AB 170.

Environmental Review

The Air District has prepared guidance documents to aid local governments in performing environmental reviews, including:

- Air Quality Guidelines for General Plans
- Guideline for Assessing and Mitigating Air Quality Impacts
- Environmental Review Guidelines

Transportation Infrastructure

Regional transportation plans are required to conform to the air quality goals of the State Implementation Plan (SIP). It is the responsibility of regional transportation planning agencies to make this conformity finding. Local governments in turn must ensure that their own investments in transportation infrastructure, and the transportation policies in the General Plan, do not undermine the RTP.

Air Quality Programs

The California Clean Air Act allows air districts to delegate the implementation of transportation control measures in air quality plans to local agencies, as long as the following conditions are met: (1) the agency must submit an implementation plan to the district for approval; (2) the agency must adopt and implement measures at least as stringent as those in the District’s plan; and (3) the District must adopt procedures for reviewing the performance of the local agency in implementing the measures.



General Plan policies aim to make the City more accessible for pedestrians, bicycles, and buses (top). The City should transition to a clean fuel vehicle fleet and encourage contractors and the general public to do the same (bottom).

POLICIES

See also Chapter 2: Land Use and Economic Development; Chapter 3: New Growth Areas and Infrastructure; Chapter 5: Circulation; and Chapter 6: City Design for related policies that seek to improve air quality and reduce emissions through land use, transportation, and urban design strategies. See the next section in this chapter for related policies that seek to improve air quality through energy conservation and clean energy.

Guiding Policies

- 8.1-a Prioritize Air Quality in Local Planning.** Continue efforts to improve air quality in Turlock by integrating air quality analysis and mitigation in land use and transportation planning, environmental review, public facilities and operations, and special programs.
- 8.1-b Participate in Regional Efforts.** Cooperate with the San Joaquin Valley Air Pollution Control District and Stanislaus Council of Governments in developing and implementing air quality regulations and incentives.

Implementing Policies

Coordination

- 8.1-c Coordination with Other Agencies.** Work with neighboring jurisdictions and affected agencies to address cross-jurisdictional and regional transportation and air quality issues.

Transportation and Land Use

See also policies in Section 5.2: Roadway Network, Standards and Improvements; Section 6.1: City Form; and Section 6.3: Street Design and Connectivity.

- 8.1-d Transportation and Residential Density.** Designate residential land uses to be higher density than in the past in order to meet population demand and reduce total vehicle miles travelled.
- 8.1-e Establish Land Use Pattern That Supports Trip Reduction.** Establish land use pattern that enables alternatives to automobile use and reduces trip lengths, including transit-oriented, mixed use development and neighborhood commercial areas.

8.1-f Plant and Maintain Trees in Streets and Parks. Adopt a comprehensive tree-planting and maintenance program that recognizes the effect of air pollutants on trees and the role trees can play in removing particulate matter and gaseous pollutants. Provide a viable financing program, particularly in older neighborhoods that are not in a landscape and lighting assessment district.

See also policies in Sections 5.2: Roadway Network, Standards and Improvements and 6.3: Street Design and Connectivity relating to street trees.

Studies have shown that immediately adjacent to arterial streets, the lead content of air can be about 15 times as high as “normal.” Hardy trees, or those adapted to such conditions, are likely to do much better over time with less care than trees that are unsuited.

Rows of trees planted close together and selected and spaced to provide a buffer between the streets and the surrounding areas (such as by a combination of low and high branching trees planted in alternate rows) can be effective in filtering fumes and particulate matter.

The update of the street tree ordinance should also consider reducing existing spacing standards between trees. Spacing standards vary from 40 to 60 feet for all streets on the list; in older areas, such as along Sycamore Street, tall trees are planted as close as 20 feet apart.

Shade trees also reduce radiation heating (the “heat island effect,”) helping to cool the urban environment and reduce peak energy use, and consequently reduce both ozone formation and greenhouse gas production.

8.1-g Reduce Roadway Dust. Improve City roads to reduce dust to the greatest extent feasible by planting shoulders and medians. Dust from roadways contributes to PM10 pollution.

8.1-h Protect Sensitive Receptors from Toxic Air Emissions. For all new development, maintain a minimum 300-foot overlay zone on either side of Highway 99 within the Study Area to protect sensitive receptors from toxic air emissions, with the goal of providing a 500-foot buffer. Within this overlay, avoid approval of new sensitive land uses, and 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.



Street trees filter fumes and particulate matter, and reduce the urban heat island effect.

Sensitive receptors are those segments of the population most susceptible to poor air quality, such as children, the elderly, and those with pre-existing serious health problems affected by air quality. Land uses where sensitive receptors are most likely to spend time include, but are not limited to, hospitals and other medical facilities, schools and school yards, senior centers, child care centers, parks and playgrounds, and residential communities. In traffic related studies, additional non-cancer health risk attributable to proximity was seen within 1,000 feet and was strongest within 300 feet. California freeway studies show about a 70 percent drop-off in particulate pollution levels at 500 feet.⁴

- 8.1-i Protect Residential Uses from Noxious Odors.** Continue the present policy of not permitting any residential uses within a one-half mile radius of the Turlock Regional Water Quality Control Facility. Require that any new potential odor source locating within project screening trigger levels of sensitive receptors, as established by the SJVAPCD, undertake a detailed odor analysis.

Development Review and Environmental Assessment

- 8.1-j Support Indirect Source Review Program.** Support the San Joaquin Valley Air Pollution Control District in implementing its indirect source review program to reduce emissions of NOx and PM10 from new development projects. Under ISR, projects will be required to estimate off-site emissions and to pay a fee to the District to mitigate these emissions. Other General Plan policies encourage or require new development to have qualities that mitigate air quality impacts and consequently lower Indirect Source fees. These include bicycle lanes, mixed uses, cleaner construction vehicles, and superior energy efficiency.

City Staff reviews new development projects for air quality impacts and refers projects to the San Joaquin Valley Air Pollution Control District for comments.

- 8.1-k Air Quality Improvement Fee.** In the Capital Facilities Fee (CFF) program, establish a fund to collect a fee to be paid by all new development to assist in the funding of local projects that contribute to the enhancement of air quality.

The City of Turlock's Air Quality Trust Fund, adopted in 1993, was applied to the Northwest Triangle Specific Plan Area; the new fund should collect fees citywide.

⁴ California Environmental Protection Agency, California Air Resources Board, "Air Quality and Land Use Handbook: A Community Health Perspective", April 2005.

- 8.1-l Use Air District Guidance in Environmental Review.** Continue to use the San Joaquin Valley Air Pollution Control District’s Guide for Assessing and Mitigating Air Quality Impacts for determining and mitigating project air quality impacts and related thresholds of significance for use in environmental documents. Coordinate with the Air District, project applicants, and other interested parties, during pre-development consultation and negotiation over CEQA preparation.
- 8.1-m Minimize Roadway Dust.** Require all access roads, driveways, and parking areas serving new development to be constructed with materials that minimize particulate emissions and are appropriate to the scale and intensity of use. To balance the goals of dust reduction and water infiltration, encourage the use of permeable paving or well-maintained gravel for parking spaces.
- 8.1-n Construction-Related Air Emissions Impacts.** Continue to require mitigation measures as a condition of obtaining permits to minimize dust and air emissions impacts from construction. Require contractors to implement dust suppression measures during excavation, grading, and site preparation activities. Techniques may include, but are not limited to:
- Site watering or application of dust suppressants;
 - Phasing or extension of grading operations;
 - Covering of stockpiles;
 - Suspension of grading activities during high wind periods (typically winds greater than 25 miles per hour); and
 - Revegetation of graded areas.

Public Facilities and Operations

- 8.1-o Reduce Trips by City Government.** Take the lead in implementing a trip-reduction program for City employees. The program may include carpooling and ridesharing; reimbursement of transit costs; encouragement of flexible work schedules, telecommuting, and teleconferencing.
- 8.1-p Transition to Clean City Fleet.** Ensure through its long-range capital expenditure plans that the City deploys cutting-edge technologies and available incentives to minimize emissions from the City’s fleet.
- 8.1-q Institute Green Contracting.** Using the Air District’s model ordinance as a guide, establish and follow a “green contracting” rule, awarding points in the bidding process to companies that use low-emission vehicles and equipment.

Special Programs

- 8.1-r Promote Public Awareness.** Support the Air District’s efforts to promote public awareness about air pollution and its relationship to land use and transportation.
- 8.1-s Expand Spare-the-Air Efforts.** 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.
- 8.1-t Implement REMOVE II Program.** Support the Air District in implementing its REMOVE II incentive program to reduce mobile source emissions. Seek funding for City projects, publicize the availability of incentive funding, and identify potentially eligible projects. As defined by the Air District, the following projects may be eligible:
- Public transportation and commuter vanpool passenger subsidies;
 - Telecommunications, including videoconferencing, distance learning, and internet-based business transactions;
 - Bike path construction;
 - Alternative-fuel mechanic training.
- 8.1-u Support Employer-Based Trip Reduction.** Support the Air District’s requirement that companies and organizations with 100 or more employees establish ride-sharing programs, and provide incentives to companies with 25 to 100 employees that do the same. Ridesharing programs may include market-based incentives such as cash for ridesharing, preferential parking for carpools, transit subsidies, cash allowances in lieu of parking spaces, telecommuting and flexible work schedules.

8.2 ENERGY AND CLIMATE CHANGE

GLOBAL CLIMATE CHANGE

Global climate change is currently one of the most important and widely debated scientific, economic, and political issues in the United States. The term 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 industrial revolution.

Potential Impacts in California

According to the California Climate Action Team (CCAT), accelerating global climate change has the potential to cause a number of adverse impacts in California, including:

- 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; and
- Increased wildfire risk; and increased electricity demand.⁵

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

⁵ California Climate Action Team, April 2006.

Greenhouse Gases

Gases 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 (CO₂)**, emitted as a result of fossil fuel combustion, with contributions from cement manufacture;
- **Methane (CH₄)**, 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 (N₂O)**, 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;
- **Perfluorocarbons (PFCs)**, originally introduced as alternatives to ozone depleting substances and typically emitted as by-products of industrial and manufacturing processes; and
- **Sulfur hexafluoride (SF₆)**, 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, utility, transportation, residential, and agricultural sectors. Major sources in California include fossil fuel consumption from transportation (38 percent), industry (20 percent), electricity production (25 percent), residential (6 percent), and agricultural (6 percent) sectors.⁶

⁶ California Climate Action Registry, 2009.

Counteracting Climate Change

These trends call for significant changes over the coming five, ten, and twenty years in the way we produce and consume energy. The City of Turlock can do its part by shifting to renewable energy use and energy conservation in its municipal operations, and by promoting and incentivizing smart energy choices by Turlock residents and businesses. Such actions as installing solar panels and shifting to fuel-efficient vehicles make economic as well as environmental sense. This economic angle must not be overlooked.

REGULATORY CONTEXT

Federal and State regulations have established a framework for responding to climate change, and a context for local planning. Some key regulations are described below by theme. A comprehensive listing of climate change measures is provided in the Environmental Impact Report.

Federal Role in Regulating Greenhouse Gases

In 2007, the U.S. Supreme Court ruled on *Massachusetts v. EPA*, finding that the EPA has a statutory authority to formulate standards and regulations to address greenhouse gases, which it historically has not done. In 2009, the EPA officially found that the six greenhouse gases identified above threaten the public health and welfare, and that the combined emissions of these gases from motor vehicles contribute to greenhouse gas pollution.

The EPA acted on this mandate in 2010, updating the Corporate Average Fuel Efficiency (CAFE) standards. The new “Clean Car Rule” standards require passenger cars, light-duty trucks, and medium-duty passenger vehicles, to meet an estimated combined average emissions level of 250 grams of CO₂ per mile and 34.1 miles per gallon in model year 2016.⁷

Statewide Greenhouse Gas Reduction Goal

Assembly Bill (AB) 32: California Global Warming Solutions Act of 2006

In 2006, Governor Schwarzenegger signed AB 32, requiring the reduction of statewide GHG emissions to 1990 levels by the year 2020. This is equivalent to an estimated 29 percent reduction

⁷ U.S. EPA, 2010 (c)

from “business as usual” levels, in absolute terms, and an even larger reduction per capita, when growth is considered. This change will be accomplished through an enforceable statewide cap on GHG emissions that will be phased in starting in 2012. AB 32 directs CARB to develop and implement regulations to reduce statewide GHG emissions from stationary sources and address GHG emissions from vehicles.

CARB’s Scoping Plan outlines the combination of policies, programs, and measures necessary to reduce statewide GHG emissions to achieve AB 32’s statewide reduction goals. Many of the measures would, when implemented, contribute to emission reductions statewide as well as in local communities. CARB continues to adopt measures outlined in the Scoping Plan and is in the process of preparing rules to implement these measures. Turlock’s General Plan responds to CARB’s implementation strategy as it pertains to cities’ general planning efforts.

Executive Order S-3-05 (Gov. Schwarzenegger, June 2005)

This Order recognizes California’s vulnerability to climate change, and set greenhouse gas reduction targets for California. It calls on the State to reduce GHG emissions to 2000 levels by 2010; to 1990 levels by 2020; and by 80 percent below 1990 levels by 2050.

Regional GHG Reduction Targets and Plans

Senate Bill (SB) 375: Sustainable Communities and Climate Protection Act of 2008

SB 375, the Sustainable Communities and Climate Protection Act of 2008, promotes better integration of transportation and land use planning throughout California. The statute was intended to complement efforts under AB 32 by requiring CARB to develop regional GHG emissions reduction targets. CARB was tasked with establishing targets for the years 2020 and 2035 for each region covered by the state’s 18 federally-designated metropolitan planning organizations (MPOs), which in turn would be required to meet that target by considering the impacts of land use and transportation on GHG emissions. Based on targets adopted in September 2010, StanCOG is expected to achieve a 5 percent reduction in per capita CO₂ emissions due to passenger vehicles by 2020, and a 10 percent reduction by 2035.

Second, SB 375 requires each MPO to develop a Sustainable Communities Strategy (SCS) outlining how the region will meet its GHG reduction target by integrating land use planning, transportation planning and funding, and housing needs. The SCS will be incorporated into

the Regional Transportation Plan, typically prepared by each MPO every 4 to 5 years. CARB is required to review each SCS to determine whether it would achieve the necessary GHG emission reduction for each region.

Regional Transportation Plan

Stanislaus Council of Governments (StanCOG) is responsible for regional transportation planning for the Study Area. Pursuant to SB 375, the next RTP also must include a Sustainable Communities Strategy (see above) that would enable the region to meet its greenhouse gas emission reduction targets. See Section 8.1 for more detail on the RTP.

Regional Climate Change Action Plan

The San Joaquin Valley Air Pollution Control District adopted a Climate Change Action Plan (CCAP) in August 2008. The Plan directs the Air District to develop guidance to assist District staff, valley businesses, land-use agencies, and others in addressing GHG emissions as part of the CEQA process. The Air District has since published Best Performance Standards (BPS) for stationary sources and development projects, and guidance for valley land-use agencies.

State Green Building Standards Code

The California Building Code (Title 24 of the State Code of Regulations) includes the country's first Green Building Standards. The Green Building Standards were introduced in 2008 as a set of voluntary measures. With the 2010 update of the Building Code, parts of the Green Building Standards became mandatory as of January 2011. Among these are requirements to reduce water consumption, divert construction waste from landfills, and install low pollutant-emitting finish materials. Requirements vary for residential and nonresidential buildings.

The Green Building Standards are a key part of the State's efforts to achieve the AB 32 goal of reducing greenhouse gas emissions to 1990 levels by 2020. Future updates are expected to continue to strengthen environmentally responsible building requirements as these practices become mainstream. Local jurisdictions are responsible for ensuring that State standards are met, at a minimum. The 2010 Green Building Standards Code also establishes a system designed to give cities and counties the option of adopting local codes that go beyond the minimum standards.⁸

⁸ California Building Standards Commission, 2010.

SOURCES OF GREENHOUSE GASES IN THE STUDY AREA

Greenhouse gases in the Study Area are generated by residential, commercial, and industrial energy use from both natural gas and electricity; by vehicle emissions; by industrial sources; by High Global Warming Potential (GWP) substances used in refrigerants and other common applications; by waste and recycling; and by agricultural processes. Table 8-3 lists current and projected GHG emissions in the Study Area by source, for three top sources analyzed in the General Plan. The General Plan is designed to help Turlock contribute to statewide and regional emissions reduction goals. For more detail on greenhouse gas inventory and projections, refer to the EIR.

TABLE 8-3: CURRENT AND PROJECTED GREENHOUSE GAS EMISSIONS BY SOURCE				
	2008	2030 AT BUILDOUT	CHANGE	CHANGE (%)
<i>Service Population</i>				
Residents	71,100	104,500	33,400	47%
Jobs	28,260	53,800	25,540	90%
Total	99,360	158,300	58,940	59%
<i>GHG Emissions from 3 Top Sources (metric tons CO2e per year)</i>				
Electricity and Natural Gas ¹	376,200	524,700	148,500	39%
Transportation	263,800	299,700	35,900	14%
Solid Waste	108,400	196,900	88,500	82%
Total	748,400	1,021,300	272,900	36%
CO2e per Service Population	7.53	6.45	-1.08	-14%
Target for 2020	NA	6.6	-0.93	-12%
Target for 2030	NA	3.8	-3.73	-50%

¹ Residential and commercial emissions reflect a 7.7% reduction in 2030 compared to overall Business-as-Usual emissions as a result of State mandates.

² Transportation emissions reflect Pavley 1 and 2 and the Low Carbon Fuel Standard, estimated to result in a 16.0% reduction in 2030 compared to Business-as-Usual emissions.

³ Target for 2020 based on AB32; 2030 target based on meeting State emissions reduction goal for 2050 under EO-S-05.

Sources: California Air Resources Board (CARB), 2012, 2008; California Climate Action Registry (CCAR), 2007; California Department of Finance (DOF), 2008; California EDD, 2008; Dyett & Bhatia, 2012; EPA, 2004; Intergovernmental Panel on Climate Change (IPCC), 2006, 1996; Omni Means, 2012; PG&E, 2010; Stanislaus County Department of Environmental Resources, 2010; Turlock Irrigation District, 2010.

Stationary Source Emissions

Turlock Irrigation District (TID), the publicly-owned supplier of electricity in the Study Area, operates two natural gas-fired power plants in Turlock: the 250-megawatt-capacity Walnut Energy Center and the adjacent 49-megawatt-capacity Walnut plant used only for peak period use or emergencies. According to TID estimates, these plants produced 696,000 metric tons of CO₂ in 2008, contributing almost all of the natural gas-generated power generated by the utility. Because these plants supply customers not only in the Study Area but also in other parts of TID's service area and beyond, it is more appropriate to consider the impact of indirect emissions due to energy used in the Study Area. CARB is responsible for regulating GHG emissions from these and other stationary sources under AB 32.

Electricity and Natural Gas Use in Buildings

Electricity and natural gas consumption in buildings are the Study Area's principal source of greenhouse gas emissions. TID estimates that its approximately 29,000 retail customers in Turlock used 733 million kilowatt-hours (kwh) of energy in 2008.⁹ PG&E provides natural gas to customers in the Study Area, and estimates that approximately 25 million therms of natural gas were used in the latest year data were available.¹⁰ Applying California Climate Action Registry (CCAR) emission rate factors, energy to light, power, heat and cool buildings, machinery, swimming pools, and other parts of the built environment currently produces about 376,000 metric tons of CO₂ equivalent greenhouse gases annually in the Study Area.

If per capita emissions are adjusted for State-mandated energy efficiency improvements, GHG emissions from energy use in buildings would rise to approximately 525,000 metric tons at General Plan buildout, an increase of 39 percent over current levels.

Transportation Energy

Transportation represents the next largest source of greenhouse gas emissions in the Study Area. According to the General Plan's traffic model, the Study Area now experiences an estimated 1,330,000 daily vehicle-miles travelled, using approximately 76,000 gallons of fuel, assuming 17.5

⁹ California Climate Action Registry, 2008 Annual Emissions Report, Turlock Irrigation District, 2010; Turlock Irrigation District, 2009.

¹⁰ Pacific Gas & Electric, 2010.



Turlock Irrigation District and the City of Turlock have developed a fuel cell at the Regional Water Quality Control Facility which generates renewable energy from methane gas (top).

Energy audits can identify improvements needed to make existing buildings more energy-efficient. In many cases these improvements can be done at relatively low cost, and TID provides rebates for retrofitting with energy-efficient lighting, ventilation, refrigeration, and other systems (bottom).

miles per gallon.¹¹ Applying a set of factors accepted by the California Climate Action Registry (CCAR), approximately 264,000 metric tons of CO₂-equivalent emissions are released annually in the Study Area from vehicles.

This is projected to grow to 300,000 metric tons by 2030, assuming the vehicle-miles-travelled per service population rises slightly based on traffic modeling, fuel efficiency improves to 27.3 miles per gallon, and the other state measures take effect. This translates to a 14 percent increase over current emissions, but a 23 percent reduction per capita.¹² The California Air Resources Board, in consultation with local agencies and the public, has established a target for San Joaquin Valley areas to achieve a further 10 percent per capita GHG reduction by 2035 by changing land use and transportation patterns and developing transportation measures at the local and regional level, under SB 375 (see above.)

Solid Waste Stream

When waste decomposes, methane, a greenhouse gas, is released into the atmosphere along with carbon dioxide. In 2008, the Study Area generated approximately 49,000 tons of solid waste, which were transported to the Fink landfill in western Stanislaus County. Based on data from Stanislaus County Department of Environmental Resources and the emissions calculation model, the Study Area's solid waste produced about 108,000 metric tons of CO₂-equivalent greenhouse gases in 2008. Based on modeling, this would increase to about 197,000 metric tons by 2030.

Agriculture

Agricultural processes produce greenhouse gases as well: nitrogen-based fertilizer applied to crops releases carbon dioxide, while cattle digestion and waste produce methane. The Study Area includes about 6,700 acres of cropland and 27 acres of livestock. Assuming an average of 140 pounds of synthetic fertilizer are applied per acre of cropland, and following IPCC assumptions for greenhouse gas emissions from fertilizer, cropland in the Study Area currently produces an estimated 2,750 metric tons of CO₂-equivalent greenhouse gases. The impact of livestock was

¹¹ OMNI MEANS, 2009; Metropolitan Transportation Commission, 2009.

¹² OMNI MEANS, 2009; California Climate Action Registry General Reporting Protocol Version 3.1, 2009, Dyett & Bhatia, 2012.

not calculated due to the relatively small amount of land (27 acres) used for raising livestock in the Study Area. GHG emissions from agriculture are projected to fall as some agricultural land is converted to urban uses.

CLEAN ENERGY AND ENERGY CONSERVATION

Energy use in buildings and energy used for transportation are by far the largest sources of heat-trapping gases in the Study Area. The greatest potential greenhouse gas reductions can be made by lowering the carbon content of energy, and by lowering per-capita energy use. Current efforts and potential programs are outlined below.

Renewable Energy

Turlock Irrigation District (TID) operates eight hydroelectric power plants, as well as three natural gas-fired power plants, including the 250-megawatt Walnut Energy Center completed in 2006 in Turlock's TRIP. The District sells a portion of the power it generates and buys from other sources a portion of the power it sells to its customers.

TID is investing in renewable energy production, including a 136-megawatt wind energy facility and a geothermal plant, as well as increasing its purchasing of renewable energy. The utility aims to achieve compliance with the State Renewables Portfolio Standard (RPS) for 33 percent of power deliveries to be from renewable sources by 2020. The City can support a shift toward renewable energy through its own purchasing decisions; by facilitating distributed energy production such as small rooftop solar arrays; and other means outlined in the Policies section.

Meanwhile gasoline refiners selling in California will be required to achieve the State's Low Carbon Fuel Standard (LCFS), reducing the carbon intensity of transportation fuels by 10 percent by 2020, as well as the federal Renewable Fuels Standard (RFS) requiring 36 billion gallons of biofuels to be sold annually in the U.S. by 2022, a fivefold increase from 2007.

Energy Conservation

It is possible to improve energy efficiency associated with transportation, industrial buildings, and homes and still maintain a high standard of living and a competitive local economy. By reducing the amount of energy consumed across land uses and transportation choices, as well as using more renewable sources of energy, residents and businesses in Turlock can see many



Turlock's General Plan plays an important role in establishing urban design standards that facilitate travel by foot and by bike, for example this park/pedestrian route between school and homes (top).

Compact and mixed use development patterns enable shorter trips and more trips by means other than driving, reducing dependency on fossil fuels (bottom).

benefits: better protection of the environment, improved public health, and ultimately reduced cost of infrastructure and energy delivery.

Energy Efficiency in Buildings

Site planning that takes advantage of shade and solar orientation, along with building design standards that recommend use of better materials and insulation, reduce the need for fuel for heating and cooling in buildings (see Section 6.4, Sustainable Site Planning). As described above, the California Building Code includes Green Building Standards, some of which became mandatory in January 2011. These standards are intended to help the State achieve the AB 32 goal of reducing GHG emissions to 1990 levels by 2020. Local jurisdictions have the option of adopting procedures by ordinance to improve the level of construction beyond this minimum standard, and may base their building codes on CalGreen Tier 1 or Tier 2 thresholds.¹³ This General Plan sets targets for new development in Master Plan Areas to achieve or surpass the CalGreen Tier 1 standards, with incentives for performance above the State's minimum requirements.

At the same time, the energy efficiency of existing buildings can be significantly improved. Subsidized energy audits can identify needed improvements, which in many cases can be done free or at low cost. Energy rebates awarded to homeowners and businesses for retrofitting with energy-efficient lighting, ventilation, refrigeration, and other systems helped TID conserve 10.9 megawatt-hours of electricity in 2008, and this will continue to be an important strategy.

Land Use and Transportation Patterns

Energy efficiency can also be achieved through good urban design. Compact and mixed use development patterns enable walking and bicycling and shorter automobile trips, reducing dependency on fossil fuels for transportation. California's SB 375 requires the State Air Resources Board to adopt regional greenhouse gas emission reduction targets, and requires regional agencies to aim to reach these targets by reducing vehicle-miles-travelled through their transportation plans. Based on targets adopted in September 2010, StanCOG is expected to achieve a 5 percent reduction in per capita CO₂ emissions due to passenger vehicles by 2020, and a 10 percent reduction by 2035.

¹³ California Building Standards Commission, 2010.

Turlock’s General Plan plays an integral role in establishing land use and development patterns that support walking, biking, the use of public transportation, and the ability to satisfy many needs with short trips. At the same time it lays out a future circulation system that is functional for all modes of travel. Policies related to reducing overall and per capita energy use in this Element and in the Land Use, City Design, and Transportation elements combine to help Turlock achieve a more sustainable energy future.

POLICIES

See also policies in the preceding section on Air Quality, and note that many of the policies that follow also provide air quality benefits.

Guiding Policies

- 8.2-a Reduce Greenhouse Gas Emissions.** Reduce greenhouse gas emissions to support statewide GHG reduction goals under the California Global Warming Solutions Act (AB 32).
- 8.2-b Decrease Vehicle-Miles Travelled.** Promote a broad range of transportation, land use, and site design measures that result in a decrease in the number of automobile trips and vehicle-miles traveled per capita.
- 8.2-c Facilitate Energy-Efficient Buildings.** Encourage energy efficiency through good urban design and site-planning practices, as well as through building design, maintenance and retrofit.
- 8.2-d Promote Energy Conservation.** Support understanding of the relationship between energy consumption, air quality, and greenhouse gases, and promote energy-saving practices.
- 8.2-e Reduce Waste.** Reduce per capita landfill waste generation by promoting reuse, recycling, and composting.

Implementing Policies

Planning for Climate Change

- 8.2-f GHG Emissions Reduction Implementation.** Within three years of General Plan adoption, prepare a strategic plan for reducing greenhouse gas emissions, focusing on technically and financially feasible implementation measures that can be taken by the City. The Plan will guide the City to lower emissions from its buildings, fleet, and operations.

A Stanislaus County greenhouse gas inventory will be funded by a Proposition 84 grant from the State. The next Regional Transportation Plan is due in 2013 and will include a Sustainable Communities Strategy to meet the requirements of Senate Bill 375. Data and programs from these sources will be incorporated in the GHG Emissions Reduction Plan.

Transportation

- 8.2-g Develop Circulation System That Facilitates Alternative Transportation Modes.** Promote alternatives to automobile use by establishing a Circulation Plan and street design standards that enable safe, comfortable, and attractive access and travel for pedestrians, bicyclists, motorists, and transit users of all ages and abilities. Plan Elements include a citywide bike network and traffic calming street design. See Chapter 5, Circulation.
- 8.2-h Establish Connective Street Network to Minimize Trip Length.** Minimize vehicle-miles travelled by establishing a connective circulation network providing multiple, direct paths. See Chapter 5, Circulation.
- 8.2-i Provide Bicycle Facilities.** Require minimum bike parking for multi-family residential and commercial development, and encourage provision of additional end-of-trip facilities.
- 8.2-j Minimize Parking.** Encourage the provision of minimum parking required to support uses.
- 8.2-k Support Alternative Fuel Vehicles.** Provide incentives for the provision of priority parking for alternative fuel vehicles and electronic vehicle charging stations as individual project measures for new development.

Land Use

8.2-l Establish Land Use Pattern That Supports Trip Reduction. Establish a land-use pattern that enables alternatives to automobile use and reduces trip-lengths, including increased residential density, transit-oriented and mixed-use development, neighborhood commercial areas, and pedestrian realm enhancements.

8.2-m Pedestrian-Oriented Site Design. Orient development to encourage pedestrian and transit accessibility. Strategies include locating buildings and primary entrances adjacent to public streets; placing parking at the rear of sites or in structures above retail; and providing clear and direct pedestrian paths across parking areas.

The Land Use and Economic Development, City Design, and Circulation elements outline detailed measures pertaining to these policies.

Energy Efficiency and Conservation

8.2-n Wastewater and Water System Efficiency. Maximize the efficiency of City-operated wastewater treatment, water treatment, pumping, and distribution equipment. This measure may be part of the GHG Emissions Reduction Plan described in 8.2-f.

8.2-o Outdoor Lighting. Establish outdoor lighting standards to minimize energy use while ensuring appropriate light levels. Standards could include:

- Photocells or astronomical time switches;
- Directional and shielded LED lights
- Security lights with motion detectors;
- Prohibition against continuous all-night outdoor lighting unless required for security reasons.

New outdoor lighting standards should apply to municipal operations, including traffic signals, as well as to new private development.

8.2-p Improve Energy Efficiency in Public Buildings. Prepare and implement a plan to increase energy efficiency in public buildings, as part of the GHG Emissions Reduction Plan described in 8.2-f. Measures may include but not be limited to the following:

- Conduct energy audits for all municipal facilities;
- Retrofit municipal facilities for energy efficiency where feasible and when remodeling or replacing components, including increased insulation, installing green or

reflective roofs, installing automated lighting controls, and retrofitting heating and cooling systems.

- Require that any newly constructed, purchased, or leased municipal space meet minimum standards, such as exceeding Title 24 energy efficiency by 20 percent;
- Educate employees on energy conservation.

8.2-q Promote Energy Conservation Programs. Promote and support State and TID energy conservation programs for housing construction and rehabilitation, including energy audits, weatherization assistance, and energy rebates for energy-efficient appliances and lighting, ventilation, and other systems.

- For participants in the Home Rehabilitation Loan program, provide information and technical support regarding available rebate and incentive programs (through TID and PG&E) for energy efficient appliances and weatherization tools.
- Require Energy Star electrical appliances when replacing appliances in City-funded Home Rehabilitation projects.

A sizable portion of the residential structures in Turlock were constructed before energy efficiency standards were established, and should be improved.

8.2-r Encourage Greater Energy Efficiency in New Development. For new Master Plan Areas, seek to expedite permit processing for new buildings that meet or exceed the Tier 1 optional standards in the California Green Building Standards Code.

Achievement of at least 20 percent greater energy efficiency than the Title 24 standards is among the Best Performance Standards (BPS) for Development Projects proposed by the Air District, for credit toward the assignment of “less than significant” environmental impact.

See Section 6.4 for policies on solar orientation and other aspects of sustainable site planning.

8.2-s Require Energy Efficiency for Projects Receiving Public Assistance. Require that projects receiving assistance from the City of Turlock, including but not limited to infrastructure projects and affordable housing, include energy efficiency measures beyond the minimum standards of Title 24.

Clean Energy Production

- 8.2-t Encourage Solar Power Generation.** Encourage the use of passive and active solar devices such as solar collectors, solar cells, and solar heating systems into the design of buildings and parking areas by participating in existing incentive programs and considering new incentives for Turlock property owners.
- 8.2-u Encourage Other Onsite Renewable Energy Systems.** Encourage the installation of other renewable energy systems in new or existing development. Renewable power generation may count toward the Air District’s proposed BPS for projects with systems capable of generating at least 2.5 percent of their energy need.
- 8.2-v Methane Capture.** Produce energy through methane capture at the Regional Water Quality Control Facility. Explore opportunities to enhance waste-to-energy generation if feasible.

Solid Waste

- 8.2-w Reduce Solid Waste.** Maintain the City’s long-standing commitment to innovative solutions that reduce solid waste and increase diversion rates. Waste reduction and diversion can contribute significantly to reducing greenhouse gas emissions. waste reduction.

See Section 3.3, Infrastructure for waste reduction and diversion policies.

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