

This section of the Draft Environmental Impact Report (Draft EIR; DEIR) addresses climate change and associated environmental effects. The reader is also referred to Section 4.12, Public Services and Utilities, for additional discussion regarding electrical and natural gas service.

4.13.1 EXISTING SETTING

GREENHOUSE GAS EMISSIONS AND CLIMATE CHANGE

To fully understand global climate change, it is important to recognize the naturally occurring “greenhouse effect” and to define the greenhouse gases (GHGs) that contribute to this phenomenon. The temperature on earth is regulated by this greenhouse effect, which is so named because the earth’s atmosphere acts like a greenhouse, warming the planet in much the same way that an ordinary greenhouse warms the air inside its glass walls. Like glass, the gases in the atmosphere let in light yet prevent heat from escaping.

Greenhouse gases are naturally occurring gases such as water vapor, carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O) that absorb heat radiated from the earth’s surface. GHGs — CO₂, CH₄, N₂O, and others — are transparent to certain wavelengths of the sun’s radiant energy, allowing them to penetrate deep into the atmosphere or all the way to the earth’s surface. Clouds, ice caps, and particles in the air reflect about 30 percent of this radiation, but oceans and land masses absorb the rest (70 percent of the radiation received from the sun) before releasing it back toward space as infrared radiation. GHG and clouds effectively prevent some of the infrared radiation from escaping; they trap the heat near the earth’s surface where it warms the lower atmosphere. If this natural barrier of atmospheric gases were not present, the heat would escape into space and earth’s average global temperatures could be as much as 61 degrees Fahrenheit (°F) cooler (NASA, 2009).

In addition to natural sources, human activities are exerting a major and growing influence on climate by changing the composition of the atmosphere and by modifying the land surface. Particularly, the increased consumption of fossil fuels (natural gas, coal, gasoline, etc.) has substantially increased atmospheric levels of greenhouse gases. Measured global GHG emissions resulting from human activities, especially the consumption of fossil fuels, have grown since pre-industrial times, with an increase of 70 percent between 1970 and 2004 (IPCC, 2007). This increase in atmospheric levels of GHG unnaturally enhances the greenhouse effect by trapping more infrared radiation as it rebounds from the earth’s surface and thus traps more heat near the earth’s surface. Prominent GHGs contributing to the greenhouse effect and climate change include carbon dioxide, methane, ozone (O₃), nitrous oxide, and chlorofluorocarbons (CFCs). Emissions of these gases are attributable to human activities associated with the industrial/manufacturing, utilities, transportation, residential, and agricultural sectors (CEC, 2006a).

According to the USEPA, the earth’s average surface temperature has increased by about 1.2°F to 1.4°F since 1900. The warmest global average temperatures on record have all occurred within the past 15 years, with the warmest two years being 1998 and 2005. Eleven of the years between 1995 and 2006 ranked among the hottest years on record since 1850, when reliable worldwide temperature measurements began (IPCC, 2007). Most of the warming in recent decades is likely the result of human activities. Other aspects of the climate are also changing, such as rainfall patterns, snow and ice cover, and sea level.

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Global Implications

Recognizing the problem of global climate change, the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP) established the Intergovernmental Panel on Climate Change (IPCC) in 1988. It is open to all members of the United Nations and WMO. The role of the IPCC is to assess on a comprehensive, objective, open, and transparent basis the scientific, technical, and socioeconomic information relevant to understanding the scientific basis of risk of human-induced climate change, its potential impacts, and options for adaptation and mitigation. IPCC projects that the earth's average surface temperature should rise 1.8°F to 6.3°F before the year 2100 (IPCC, 2007). At a more local level, the California Climate Action Team found that California-specific models estimate an average warming increase of 2.7 to 10.5°F throughout California before the year 2100 (CAT, 2009). This may not seem like a significant increase, yet even at the lowest projected global increase of 1.8 °F, the earth would be warmer than it has been for 10,000 years (Miller, 2000).

The IPCC Fourth Assessment Report's Working Group I Summary for Policymakers synthesizes current scientific understanding of global climate change and projects future climate change using the most comprehensive set of well-established global climate models. The report incorporates findings of the current effects of global climate change. These findings include:

- The intensity of tropical cyclones (hurricanes) in the North Atlantic has increased over the past 30 years, which correlates with increases in tropical sea surface temperatures.
- Droughts have become longer and more intense and have affected larger areas since the 1970s, especially in the tropics and subtropics.
- Since 1900 the Northern Hemisphere has lost 7 percent of the maximum area covered by seasonally frozen ground.
- Mountain glaciers and snow cover have declined worldwide.
- Satellite data since 1978 show that the extent of Arctic sea ice during the summer has shrunk by more than 20 percent.
- Since 1961, the world's oceans have been absorbing more than 80 percent of the heat added to the climate, causing ocean water to expand and contributing to rising sea levels. Between 1993 and 2003, ocean expansion was the largest contributor to sea level rise.
- Melting glaciers and losses from the Greenland and Antarctic ice sheets have also contributed to recent sea level rise.

An enhanced greenhouse effect will generate new patterns of microclimate and may have significant impacts on the economy, environment, and transportation infrastructure and operations due to increased temperatures, intensity of storms, sea level rise, and changes in precipitation. Impacts may include flooding of tunnels, coastal highways, runways, and railways, buckling of highways and railroad tracks, submersion of dock facilities, and a shift in agriculture to areas that are now cooler. Such prospects will have strategic, security, and transportation implications.

Climate change affects public health and the environment. Increased smog and emissions, respiratory disease, reduction in the state's water supply, extensive coastal damage, and

changes in vegetation and crop patterns have been identified as effects of climate change. The impacts of climate change are broad-ranging and interact with other market failures and economic dynamics, giving rise to many complex policy problems. The findings are the latest in a string of reports warning that the rate of carbon dioxide accumulating in the atmosphere is increasing at an alarming pace.

California Implications

Climate change and global warming could negatively affect agriculture, forestry, water resources, coastal areas, energy production, air quality, public health, public infrastructure, natural protections, sensitive species and habitats, public safety, and the economy (CAT, 2009; BCDC, 2009). The estimated economic value of shoreline development that could be impacted by a 55-inch rise in sea level is \$62 billion. As the existing climate throughout California changes over time, mass migration of species, or worse, failure of species to migrate in time to adapt to the perturbations in climate, could also result.

Agriculture

Potential impacts, such as reduced water supply, more severe droughts, more winter floods, and drier growing seasons, will affect California's agriculture. Many farms, especially in the fruit and nut business, require long-term investments, making fast adaptation difficult, and could thus experience serious losses if decisions continue to be made with no regard to expected climate changes.

Fishing

Studies found that as a result of changes in ocean conditions, the distribution and abundance of major fish stocks will change substantially. Impacts to fisheries related to El Niño/Southern Oscillation illustrate how climate directly impacts marine fisheries on short-term scales. Higher sea surface temperatures in 1997–1998 during the El Niño had a great impact on market squid, California's largest fishery by volume. The California Regional Assessment reports that landings fell to less than 1,000 metric tons in that season, down from 110,000 tons in the 1996–1997 season. Other unusual events also occurred such as poor salmon returns, a series of plankton blooms, and seabird die-offs.

Coastline

With climate changes, recreational facilities and developed coastlines will also be more vulnerable to hurricanes, storm surges, and flooding. Increasing population growth in coastal areas is a reason for further concern, since these areas could be more vulnerable to climate change impacts. Impacts of expected sea level rise and increased storm surges are numerous. Beachfront homes and harbors as well as wetlands may flood. Sewage systems may be overwhelmed by storm runoff and high tides.

Sea Level Rise

The San Francisco Bay Conservation and Development Commission (BCDC) issued a report on sea level rise in April 2009, which states that sea level along the west coast rises approximately 7.9 inches per century, or approximately 0.08 inches per year (BCDC, 2009). However, the rate of sea level rise is increasing. During the period of 1993–2003, the rate was approximately 0.12 inches per year, which could demonstrate the result of human-induced warming on sea level. The BCDC uses the same sea level rise estimates that are used by California Climate Action Team-funded

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assessments. These estimates anticipate the sea level in the Bay Area will rise 16 inches by mid-century and 55 inches by the end of the century. This data was used to make maps of projected flood areas but does not take into consideration existing shoreline protections; if an area is below sea level, it is shown as vulnerable on their maps despite any existing projections. By mid-century, approximately 180,000 acres of the Bay Area could be flooded, and 213,000 acres could be flooded by the end of the century. A large amount of development along the shoreline is vulnerable to flooding and erosion. Due to Bay Area topography, 100 percent of the development located in 100-year floodplain areas will likely flood by the year 2050. Also, different parts of the Bay Area are more vulnerable to flooding and erosion than others. In the vulnerable areas are several large commercial and industrial developments, including 93 percent of both the Oakland and the San Francisco airports that may be inundated by 2100. Half of the vulnerable development is residential and approximately 270,000 people would be at risk of flooding and problems with erosion. Approximately 4,300 acres of waterfront parks are expected to flood by 2100 (BCDC, 2009).

The Bay Area currently has approximately 300 miles of public access to and along the San Francisco Bay shoreline. Eighty-seven (87) percent of that access is located in areas vulnerable to flooding and erosion by 2100. It may be very hard to relocate or re-create access opportunities in areas further inland. Jetties and seawalls may have to be raised and strengthened to protect harbors that are used for shipping, recreation, and tourism. As discussed above, by the year 2050, 100 percent of 100-year floodplain areas are expected to be flooded, and by the year 2100 an estimated 213,000 acres of Bay Area land, much of which is in the central Bay Area, could be impacted. The City of Pinole is located in the eastern Bay Area. BCDC has produced a map showing the expected flooding that may occur in this area by the end of the century (see **Figure 4.13-1** for projected future sea level rise for 2050 and 2099). Much of the developed Bay Area shoreline will require enhanced shoreline protection, which will be developed regionally to maximize safety and minimize impacts on sensitive Bay resources including public access, visual resources, and soil stability. Structural shoreline protections common to the Bay Area include seawalls, riprap revetments, and levees. These protections are reliable but expensive to build and maintain and often cause significant impacts to resources. Incorporating ecosystem elements with engineering elements would provide balanced and long-term shoreline protection.

Forests

The California Regional Assessment notes an increase in the number and extent of areas burned by wildfires in recent years, and modeling results under changing climate conditions suggest that fires may be hotter, move faster, and be more difficult to contain under future climate conditions. The factors which contribute to the risk of catastrophic fires (fuel loads, high temperatures, dry conditions, and wind) are typically present already in summer and fall seasons in California, but can exist at other times of the year, especially in drought conditions. Public safety is an issue as home and tourism developments on coastal hills and mountains, and the foothills and higher elevations in the Sierra Nevada are highly susceptible to catastrophic wildfires.



SOURCE: Inundation data from Knowles, 2008. Additional salt pond elevation data by Siegel and Bachand, 2002. Aerial imagery is NAIP 2005 data.
 DISCLAIMER: Inundation data does not account for existing shoreline protection or wave activity. These maps are for informational purposes only. Users, by their use, agree to hold harmless and blameless the State of California and its representatives and its agents for any liability associated with its use in any form. The maps and data shall not be used to assess actual coastal hazards, insurance requirements, or property values or be used in lieu of Flood Insurance Rate Maps issued by the Federal Emergency Management Agency (FEMA).

Source: San Francisco Bay Conservation and Development Commission (BCDC). 2009. (April) Draft Staff Report. Living with a Rising Bay: Vulnerability and Adaptation in San Francisco Bay and on its Shoreline. http://www.bcdc.ca.gov/planning/climate_change/climate_change.shtml

Not to Scale



Figure 4.13-1
 Projected Future Sea Level Rise for 2050 and 2099

Ecosystems

The current distribution, abundance, and vitality of species and habitats are strongly dependent on climatic (and microclimatic) conditions. Climate change is expected to result in warmer temperatures year-round, accompanied by substantially wetter winters. Rising sea level will significantly affect coastal wetlands because they are mostly within a few feet of sea level. As the sea rises, these wetlands will move inland. The overall acreage of wetlands will be reduced due to constraints by existing urban development and steeper slopes immediately inland of existing wetlands. Tidal rivers, estuaries, and relatively flat shoreline habitats will be more subject to damage by flooding and erosion. More severe storm surges from the ocean, due to higher sea levels, combined with higher river runoff could significantly increase flood levels by more than the rise in sea level alone. Erosion of beaches would decrease habitat for beach-dependent species, such as seals, shorebirds, and endangered species (for example, snowy plover and least tern).

The timing and amounts of water released from reservoirs and diverted from streams are constrained by their effects on various native fish, especially those that are listed under the federal and state endangered species acts as threatened or endangered. Several potential hydrological changes associated with global climate change could influence the ecology of aquatic life in California and have several negative effects on cold-water fish (DWR, 2006). For example, if climate change raises air temperature by just a few degrees Celsius, this change could be enough to raise the water temperatures above the tolerance of salmon and trout in many streams, favoring instead non-native fishes such as sunfish and carp (DWR, 2006). Unsuitable summer temperatures would be particularly problematic for many of the threatened and endangered fish that spend summers in cold-water streams, either as adults or juveniles or both (DWR, 2006). In short, climate change could significantly affect threatened and endangered fish in California. It could also cause non-threatened and non-endangered fish to reach the point where they become designated as such (DWR, 2006).

Changes in temperature and precipitation patterns would also shift California's current climate zones, and thus habitats associated with these zones, northward by approximately 100 to 400 miles, as well as upwards in elevation by 500 to 1,500 feet. Global climate change would alter the composition, structure, and arrangement of the vegetation cover of the state (forest and wildland). Species distribution would move geographically as the climate changes, with forest stands, woodlands, and grassland species predicted to move northward and higher in elevation. The entire vegetative community may be affected if non-native invasive species occupy sites and replace native plants. Outbreaks of insects and diseases could compromise forest health and the capability of the forest stands to reproduce and to store carbon on a landscape basis. Forest fires are likely to become more frequent and severe if soils become drier. Changes in pest populations could further increase the stress on forests.

Wildfire Risk

With climate change, the potential for wildfires may increase due to changes in fuel conditions, such as forests transitioning to chaparral and grasslands; precipitation, including longer dry seasons and higher extreme temperatures; wind, which affects the spread of wildfire; and other variables. Wildfire intensity and frequency have increased in recent years across the western United States, with the total area burned increasing nearly seven times for the period between 1987 and 2003 as compared to the period between 1970 and 1986 (CEC, 2009a). The wildfire season in the western United States has increased by 78 days since 1979 (CEC, 2009a). Land management is often blamed for the increase in wildfire frequency. A century of fire suppression has led to increased forest densities and accumulation of fuel wood that can result in more

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severe fires when this excess buildup of fuel is ignited. Yet climate also plays an important role. Warmer temperatures and longer dry seasons are the main reasons for the increasing trend in forest wildfire risk (CEC, 2009a). Reduced winter precipitation and early spring snowmelt deplete the moisture in soils and vegetation, leading to longer growing seasons and drought. These increasingly dry conditions provide more favorable conditions for ignition. In addition, higher temperatures increase evaporative water loss from vegetation, increasing the risk of rapidly spreading and large fires.

Climate change research predicts increased numbers and acres of wildfire. Wildfire occurrence statewide could increase from 57 percent to 169 percent by 2085 and by more than 100 percent in most northern California forests (California Natural Resources Agency, 2009). Fire severity is also predicted to increase as a result of more frequent severe fire weather. The wildfire season already appears to be starting sooner, lasting longer, and increasing in intensity (California Natural Resources Agency, 2009). Burned wildland acreage has increased in the last several decades. Over 48 million acres, or nearly half of the state, is at a high to extreme level of fire threat (California Natural Resources Agency, 2009).

Increases in the frequency and intensity of wildfires will make forests more susceptible to vegetation conversions from trees to brush or grasslands (California Natural Resources Agency, 2009). In order for trees to reestablish after wildfires, patches of living trees must be left to provide seeds for the recruitment of new seedlings. As wildfires increase in size, they can result in "stand-replacing" burns that are too big for natural regeneration. More frequent fires may also result in vegetation conversion by repeatedly killing regeneration. Vegetation conversions of chaparral and forest vegetation will impact biodiversity, habitats, watershed conditions, timber resources, and other goods and services.

On rangelands, climate-change-induced wildfire increases are predicted to increase grassland acreage, while decreasing brush and oak woodlands (California Natural Resources Agency, 2009). Wildfires may increase invasion by annual and brush non-native species, which are generally less palatable to livestock and wildlife than native grass and brush species. Annual grasses also increase fire risk and hazard by producing "flashy fuels" that ignite easily and carry fire quickly across the landscape.

Larger and more frequent wildfires will impact California's economy by increasing fire suppression and emergency response costs, damages to homes and structures, interagency post-fire recovery costs, and damage to timber, water supplies, recreation use, and tourism. The California Department of Forestry and Fire Protection (Cal-Fire) spent over \$500 million on fire suppression during fiscal year 2007/2008. As climate change continues, these costs are expected to increase (California Natural Resources Agency, 2009).

Air Quality

Projected climate changes will impact the quality of California's air, public health, and environment. Higher temperatures increase the formation of O₃, PM₁₀, and PM_{2.5}, making it more difficult to meet the health-based air quality standards for these pollutants. Air pollution is also made worse by increases in natural hydrocarbon emissions and evaporative emissions of fuels and solvents which lead to higher levels of O₃, PM₁₀, and PM_{2.5} during hot weather. Warmer temperatures that cause increased use of air conditioners can cause increased air pollutants from power plants and from vehicle operation. In addition, warming, drying, and increased winds could mean hotter, harder-to-control wildfires. These wildfires could result in increased levels of fine particulate matter that could also exceed state and federal standards and harm public health.

Water Supply

While most climate model simulations project relatively moderate changes in precipitation over this century, rising global temperatures are expected to result in reductions in snowpack for the Sierra Nevada (i.e., precipitation changing in the form of rain from snow). By the 2035 to 2064 period, the Sierra Nevada snowpack could decrease from 12 percent to 40 percent as compared to historic levels (depending on the climate scenario) (Cal-EPA, 2007). The Sierra Nevada snowpack currently acts as natural water storage by holding winter precipitation and releasing it during the spring and early summer months as the snow melts. According to the California Natural Resources Agency (2009), nearly 75 percent of California's available water supply originates in the northern third of the state (north of Sacramento), mainly from water stored in the Sierra Nevada snowpack. Reduction of this natural water storage during the winter could mean water shortages in the future and would require the alteration of the management of existing reservoirs (while not losing flood control capacity or hydropower generation capacity) and/or the construction of additional human-made reservoirs to compensate for this storage loss.

The state's water supply system already faces challenges to provide water for California's growing population. Climate change is expected to exacerbate these challenges through increased temperatures and possible changes in precipitation patterns. The trends of the last century, especially increases in hydrologic variability, will likely intensify in this century (California Natural Resources Agency, 2009). Californians can expect to experience more frequent and larger floods and deeper droughts. Increasing average temperatures may have several impacts on water supply and demand, affecting California's farms, municipalities, and ecosystems.

Increasing winter and early spring temperatures will cause earlier melting of the Sierra Nevada snowpack, the most important seasonal surface reservoir of water in California. Historically this snowpack has released about 15 million acre-feet of water slowly over the warming spring and summer months (one acre-foot provides the annual water needs of one to two families) (California Natural Resources Agency, 2009). California's water storage and conveyance infrastructure gathers this melting snow in the spring and delivers it for use during the drier summer and fall months. This same infrastructure is also used for flood control in the winter and early spring by keeping lower reservoir levels. With earlier snowmelt and heavy winter/spring rains possibly coinciding, difficult tradeoffs may need to be made between water storage and flood protection.

The East Bay Municipal Utility District (EBMUD) is a public agency that provides drinking water to the City of Pinole. Historically, 90 percent of the water used by EBMUD comes from the 577 square mile protected Mokelumne River watershed located on the western slope of the Sierra Nevada range and the remaining 10 percent originates as runoff from protected watershed lands in the East Bay area (EBMUD, 2005). EBMUD has water rights for up to 325 million gallons per day (mgd) or a total of 364,000 acre-feet per year (af/y) from the Mokelumne River. However, this supply is subject to the availability of Mokelumne River runoff and senior rights of other water users. The availability of water from local runoff is dependent on two factors — hydrologic conditions and storage availability. In dry years, evaporation can exceed runoff, resulting in no net supply. In addition, storage for capturing local runoff is limited. On average, local runoff supply put to beneficial use is 15 to 25 mgd during normal years and close to zero during dry/drought years (EBMUD, 2005). Due to the above conditions, EBMUD relies on the storage capacity of the Pardee and Comanche reservoirs to make the Mokelumne River's yield more dependable.

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Concerns over the availability, quality, and distribution of water are not new to California, but these concerns are growing and solutions are becoming more complex as water managers navigate competing interests and regulations to reliably provide quality water to farms, businesses, and homes, while also protecting the environment and complying with legal and regulatory requirements. Water adaptation strategies are primarily driven by the possibility of reduced future water supplies and increased flood threat brought about by climate change.

Increased Flooding

Currently, there is no available information to accurately assess the impact of climate change for flood frequency or severity, because of the absence of detailed regional precipitation information from climate models and because water management choices can substantially influence overall flood risk. However, increased amounts of winter runoff could be accompanied by increases in flood event severity and warrant additional dedication of wet season storage space for flood control as opposed to water supply storage. This need to manage water storage facilities to handle increased runoff could in turn lead to water shortages during high water demand. It is recognized that these impacts would result in increased challenges for reservoir management and balancing the competing concerns of flood protection and water supply.

Sudden Climate Change

Most global climate models project that anthropogenic climate change will be a continuous and fairly gradual process through the end of this century (DWR, 2006). California is expected to be able to adapt to the water supply challenges posed by climate change, even in some of the warmer and drier projections for change. Sudden and unexpected changes in climate, however, could leave water managers unprepared and could, in extreme situations, have significant implications for California and its water supplies. For example, there is speculation that some of the recent droughts that occurred in California and the western United States could have been due, at least in part, to oscillating oceanic conditions resulting from climatic changes. The exact causes of these events are, however, unknown, and evidence suggests such events have occurred during at least the past 2,000 years (DWR, 2006).

Current Greenhouse Gas Emissions

The following is a summary of current estimates of greenhouse gas emissions for the state and the City of Pinole.

California Emissions

The California Energy Commission estimates that California is the second-largest state emitter of GHG emissions in the United States, behind Texas in absolute emissions (CEC, 2006a). However, the state has relatively low carbon intensity when considering GHG emissions per person or GHG emissions per unit gross state product. Worldwide, California is estimated to be the 12th to 16th largest emitter of CO₂ and is responsible for approximately 2 percent of the world's CO₂ emissions (CEC, 2006a). The California Air Resources Board (CARB) released estimates of California's 1990 emissions inventory, which amounted to 433.29 million gross metric tons of carbon dioxide equivalent (MMT CO₂e) (CARB, 2009). CARB has also estimated that 2006 emissions levels were 483.87 MMT CO₂e. Factoring in the reduction in GHG emissions due to the functioning of existing forests and rangeland as carbon sinks, California's GHG emissions in 2006 were 479.80 MMT CO₂e. Greenhouse gas emissions for California were apportioned to the following sectors in 2006: transportation (38.4 percent), electric power (21.9 percent), commercial and residential energy usage (9.2 percent), industrial (19.9 percent), recycling and

waste (1.3 percent), high global warming potential gases (3.1 percent), agriculture (6.2 percent), and forestry (0.04 percent) (CARB, 2009).

City of Pinole Emissions

The City of Pinole has recently completed a draft GHG inventory for baseline calendar year 2005 titled *Community-Wide and Government Operations 2005 Baseline Greenhouse Gas Emissions Inventory*. The inventory calculates GHGs from community-wide activities including City government operations, within the city's jurisdictional boundary in calendar year 2005.

The City of Pinole emitted approximately 157,619 metric tons of carbon dioxide equivalent (CO₂e) in the baseline year 2005 as shown in **Table 4.13-1** (City of Pinole, 2010). The transportation sector was by far the largest contributor to emissions (72 percent), producing approximately 113,452 metric tons of CO₂e in 2005. Emissions from the residential sector were the next largest contributor (16.8 percent), producing approximately 26,447 metric tons of CO₂e. The commercial and industrial sectors accounted for a combined 8.4 percent of the total and emissions from solid waste comprised 2.8 percent of the total. The majority of emissions from the transportation sector were the result of gasoline consumption in private vehicles traveling on local roads and on Interstate 80 (City of Pinole, 2010). The inventory methodology is consistent with the Bay Area Air Quality Management District (BAAQMD) *GHG Plan Level Quantification Guidance* dated April 15, 2010 (BAAQMD, 2010).

**TABLE 4.13-1
CITY OF PINOLE 2005 COMMUNITY-WIDE
GREENHOUSE GAS EMISSIONS BY SECTOR AND SOURCE**

2005 Community-Wide Emissions by Sector and Source	Source	Metric Tons Carbon Dioxide Equivalent (MTCO ₂ e)	Percentage of Total
Residential	Electricity	8,978	5.70%
	Natural Gas	17,469	11.08%
Commercial/Industrial	Electricity	8,488	5.39%
	Natural Gas	4,809	3.05%
Transportation	VMT	113,452	71.98%
Waste	Landfilled Waste	4,423	2.81%
Total		157,619	100.00%

Source: City of Pinole, 2010

Municipal Operations and Facilities Inventory

City government operations and facilities produced approximately 1,698 metric tons of greenhouse gas emissions in 2005 (City of Pinole, 2010). This quantity represents approximately 1.1 percent of total community-wide emissions in the city. City government emissions result from waste, energy consumption from water and wastewater facilities, buildings, streetlights and other facilities, and fuel consumption by the vehicle fleet and from employee commutes. Energy consumption in City buildings and facilities was the largest contributor to the City's emissions (27.4 percent), producing 465 metric tons of CO₂e. The second largest contributors (20.3 percent and 20.1 percent, respectively) were fuel consumption from employee commute patterns and fuel consumption by the City vehicle fleet (City of Pinole, 2010).

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ENERGY CONSUMPTION

Electricity

California

In 2008, California used over 285,574 gigawatts of electricity (CEC, 2009c) statewide.¹ California's electricity generation system currently generates over 290,000 gigawatt hours of electricity each year, which is transported over California's 32,000 miles of transmission lines (CEC, 2007). By 2020, electricity consumption in the state is projected to reach almost 320,000 gigawatts (CEC, 2009c). In 2008, this electricity was produced from power plants fueled by natural gas (45.7 percent), hydrologic sources (11.0 percent), coal (18.2 percent), nuclear (14.4 percent), and renewable methods (10.6 percent). Approximately 68.1 percent of the electricity was generated within California, with the balance imported from other states, such as Canada, and Mexico (CEC, 2009c). Overall electricity use in California is projected to grow by 1.2 percent annually (CEC, 2009c). However, peak demand is growing at a rate of 1.30 percent (850 megawatts) per year (CEC, 2009b). This increase in peak demand is the result of a population that is moving inland to the warmer areas of the state, prompting higher demand for electricity for air conditioning.

Electricity usage varies substantially by the type of uses, type of construction materials used, and the efficiency of all electricity-consuming devices within a building. The average annual usage of electricity is roughly 6,500 kilowatt hours (kWhr) per residence. The average annual usage of electricity is roughly 13 kWhr per square foot for all commercial buildings and roughly 18 kWhr per square foot for office/research and development buildings (CEC, 2007).

Electricity supply in California involves a complex grid of power plants and transmission lines located in the western United States, Canada, and Mexico. Almost 32 percent of the electricity used in California is imported from 11 other western states as well as from Canada and Mexico. The issue is complicated by market forces that have become prominent since 1998, when a new regulatory environment commonly referred to as "deregulation" took effect in California. Supply is further complicated by the fact that the peak demand for electricity is significantly higher than the off-peak demand. For example, in August 2004, peak electric demand — due in large part to hot weather — reached a record high of 44,497 megawatts, which is almost double the lowest demand period.

City of Pinole

Electric service within the city of Pinole is provided by Pacific Gas and Electric (PG&E). PG&E provides electric service to approximately 15 million people throughout a 70,000 square mile service area in northern and central California (PG&E, 2009). Electricity purchased from PG&E by local customers in Contra Costa County, including Pinole, is generated and transmitted to the area by a statewide network of power plants and transmission lines. Various transmission and distribution lines traverse the San Francisco Bay Area, serving to carry electrical power from power plants within and outside the Pinole area to electrical substations where power is converted to voltages suitable for distribution to end users. Please refer to Section 4.12, Public Services and Utilities, for an expanded discussion of electric services in Pinole.

¹ Energy usage is typically quantified using the British thermal unit (BTU). As points of reference, the approximate amount of energy contained in a gallon of gasoline, a cubic foot of natural gas, and a kilowatt hour (kWhr) of electricity are 124,884 BTUs, 1,000 BTUs, and 3,400 BTUs, respectively.

In 2010, the city of Pinole released the *Community-Wide and Government Operations 2005 Baseline Greenhouse Gas Emissions Inventory*, which provides an estimate of GHG emissions produced within Pinole. Data used to determine the amount of GHG emissions for the residential, commercial, and industrial sectors within Pinole was electrical and natural gas consumption information obtained through PG&E. In 2005, Pinole residential, commercial, and industrial uses consumed a combined 78,153,265 kilowatt hours of electricity (City of Pinole, 2010).

Natural Gas

California

In 2007, California consumed about 12,494 million (MM) therms of natural gas. The California natural gas demand for 2010 is projected to be just slightly less than this (CEC, 2009c). As a state, California is the second largest natural gas consumer in the United States, representing more than 10 percent of national natural gas consumption. Customers in the residential and commercial sectors, referred to as "core" customers, accounted for 29 percent of the state's natural gas demand in 2008 (CEC, 2009c). Large consumers such as electricity generators and the industrial sector, referred to as "noncore" customers, accounted for about 71 percent of demand in the same year. California remains heavily dependent on natural gas to generate electricity, which accounted for more than 40 percent of natural gas demand in 2008 (CEC, 2009c). Approximately 13.5 percent of the natural gas produced in 2006 was within California, with the balance imported via pipeline from other states and Canada (CEC, 2007). California is at the farthest end of those pipelines, forcing it to compete with other states that are located closer to generation plants in Canada for supplies.

As with electricity, natural gas usage in California for different land uses varies substantially by the type of use, type of construction materials, and the efficiency of all gas-consuming devices in a given building. The average annual usage of natural gas is roughly 45,000 cubic feet per residence. The average annual usage of natural gas is roughly 37 cubic feet per square foot for commercial buildings and roughly 29 cubic feet per square foot for office buildings.

According to the California Energy Commission's 2009 Integrated Energy Policy Report, natural gas has become an increasingly important source of energy since more of the state's power plants rely heavily on this fuel. While California's successful efficiency programs and its reliance on renewable sources of electricity should slow the demand of natural gas, competition for the state's imported supply is increasing. This reliance on imported gas leaves the state vulnerable to price shocks and supply disruptions.

The annual forecast of North American natural gas production has decreased each year since 2002, a difference of about eight trillion cubic feet a year (CEC, 2007). PG&E has publicly commented that it believes that western Canadian natural gas production will be less than predicted while another energy company, Sempra/SoCalGas, believes that several supply basins throughout North America will produce less than forecast.

Natural gas is critical in meeting the state's energy demand. California's growing population requires more natural gas for residential heating and cooking, industrial processing, and most importantly, electricity production. Natural gas, like petroleum, has become a global commodity and California competes not just with other U.S. states for access to less abundant natural gas supplies, but also with Western Europe and Asia Pacific consumers in a world market for natural gas. The result is that prices are likely to continue increasing (CEC, 2007).

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Peak electricity demand in California is expected to grow at about 1.30 percent each year through 2017 and will be the sector with the largest natural gas increase over the next decade. Before 1997, natural gas consumption for electricity averaged 500 billion cubic feet each year (1,400 million cubic feet per day); however, future demand is anticipated to average 2,500 million cubic feet each day (CEC, 2007).

City of Pinole

Natural gas service in Pinole is also provided by PG&E. Much of PG&E's natural gas supply comes from Canada. Please refer to Section 4.12, Public Services and Utilities, for an expanded discussion of natural gas services in Pinole.

In 2010, the city of Pinole released the *Community-Wide and Government Operations 2005 Baseline Greenhouse Gas Emissions Inventory*, which provides an estimate of GHG emissions produced within Pinole. Data used to determine the amount of GHG emissions for the residential, commercial, and industrial sectors within Pinole was electrical and natural gas consumption information obtained through PG&E. In 2005, Pinole residential, commercial, and industrial uses consumed a combined 122,071,432 kilowatt hours of natural gas (416,525 million BTU) (City of Pinole, 2010).

Vehicle Energy Consumption

California

California's transportation system includes 33.5 million registered vehicles (cars, trucks, trailers, and motorcycles) and almost 170,000 miles of roads maintained by local, state, and federal governments. A total of 2,453 miles are U.S. interstate freeways. The state's motor vehicle fleet includes private passenger cars as well as buses, motorcycles, and light- and heavy-duty trucks, which are used for passenger and freight movement respectively (CEC, 2007). In 2007, taxable gasoline sales (including aviation gasoline) in California accounted for 15,672,334,029 gallons of gasoline (CEC, 2007). For more information regarding state transportation energy, go to the CEC website at <http://energyalmanac.ca.gov/transportation/summary.html#fuel>

City of Pinole

The City's transportation system is made up of roadways, transit services, bicycle and pedestrian facilities, and related facilities such as parking and freight service.

About 71 percent of the City's residents commute to work by driving alone and another 17.5 percent carpool. Around 6.4 percent of the residents use transit services including bus (2 percent), subway (4 percent), rail (0.09 percent) and ferry (0.05 percent).

The street network is the backbone of the City's transportation system. The street system design and classifications were generally developed to be consistent with the General Plan policies. Major arterials avoid aligning through residential neighborhoods, but provide neighborhood boundaries. Interior street patterns are designed using cul-de-sacs, loop streets, and neighborhood collectors to discourage through traffic. Because the City contains hills and elevated areas, the street system does not conform to a traditional grid pattern. According to the *Community-Wide and Government Operations 2005 Baseline Greenhouse Gas Emissions Inventory*, the City of Pinole consumed 3,335,285 gallons of automotive gasoline and diesel fuel in 2005 (City of Pinole, 2010).

4.13.2 REGULATORY FRAMEWORK

FEDERAL

Greenhouse Gases

The U.S. Environmental Protection Agency (USEPA) is the federal agency responsible for implementing the federal Clean Air Act (CAA). Previous to 2007, the USEPA did not have regulations addressing greenhouse gases. The U.S. Supreme Court ruled on April 2, 2007, that CO₂ is an air pollutant as defined under the CAA and that the USEPA has the authority to regulate emissions of GHGs. However, there are no federal regulations or policies regarding GHG emissions applicable at the time of this writing.

STATE

Assembly Bill 1493

Assembly Bill (AB) 1493 (Pavley) of 2002 requires CARB to develop and adopt the nation's first GHG emission standards for automobiles. These standards are also known as "Pavley I." The California Legislature declared in AB 1493 that global warming is a matter of increasing concern for public health and the environment. It cites several risks that California faces from climate change, including a reduction in the state's water supply, an increase in air pollution caused by higher temperatures, harm to agriculture, an increase in wildfires, damage to the coastline, and economic losses caused by higher food, water, energy, and insurance prices. The bill also states that technological solutions to reduce GHG emissions would stimulate California's economy and provide jobs. In 2004, the State of California submitted a request for a waiver from federal clean air regulations, as the State is authorized to do under the CAA, to allow the State to require reduced tailpipe emissions of CO₂. In late 2007, the USEPA denied California's waiver request and declined to promulgate adequate federal regulations limiting GHG emissions. In early 2008, the State brought suit against the USEPA related to this denial.

In January 2009, President Obama instructed the USEPA to reconsider the Bush Administration's denial of California's and 13 other states' requests to implement global warming pollution standards for cars and trucks. In June 2009, the USEPA granted California's waiver request, enabling the State to enforce its GHG emissions standards for new motor vehicles beginning with the current model year.

Also in 2009, President Obama announced a national policy aimed at both increasing fuel economy and reducing GHG pollution for all new cars and trucks sold in the United States. The new standards would cover model years 2012 to 2016 and would raise passenger vehicle fuel economy to a fleet average of 35.5 miles per gallon (mpg) by 2016. When the national program takes effect, California has committed to allowing automakers who show compliance with the national program to also be deemed in compliance with state requirements. California is committed to further strengthening these standards beginning in 2017 to obtain a 45 percent GHG reduction from the 2020 model year vehicles.

Executive Order S-3-05

Executive Order S-3-05 proclaims that California is vulnerable to the impacts of climate change. It declares that increased temperatures could reduce the Sierra's snowpack, further exacerbate California's air quality problems, and potentially cause a rise in sea levels. To combat those

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concerns, the Executive Order established total greenhouse gas emission targets. Specifically, emissions are to be reduced to the 2000 level by 2010, the 1990 level by 2020, and to 80 percent below the 1990 level by 2050.

The Executive Order directed the Secretary of the California Environmental Protection Agency (Cal-EPA) to coordinate a multi-agency effort to reduce greenhouse gas emissions to the target levels. The Secretary will also submit biannual reports to the governor and state legislature describing (1) progress made toward reaching the emission targets, (2) impacts of global warming on California's resources, and (3) mitigation and adaptation plans to combat these impacts. To comply with the Executive Order, the Secretary of Cal-EPA created a Climate Action Team (CAT) made up of members from various state agencies and commissions. CAT released its first report in March 2006. The report proposed to achieve the targets by building on voluntary actions of California businesses, local government and community actions, as well as through state incentive and regulatory programs.

Assembly Bill 32, the California Global Warming Solutions Act of 2006

Assembly Bill (AB) 32 requires that statewide GHG emissions be reduced to 1990 levels by the year 2020. The gases that are regulated by AB 32 include CO₂, CH₄, N₂O, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. The reduction to 1990 levels will be accomplished through an enforceable statewide cap on GHG emissions that will be phased in starting in 2012. To effectively implement the cap, AB 32 directs CARB to develop and implement regulations to reduce statewide GHG emissions from stationary sources. AB 32 specifies that regulations adopted in response to AB 1493 should be used to address GHG emissions from vehicles. However, AB 32 also includes language stating that if the AB 1493 regulations cannot be implemented, then CARB should develop new regulations to control vehicle GHG emissions under the authorization of AB 32.

AB 32 requires that CARB adopt a quantified cap on GHG emissions representing 1990 emissions levels and disclose how it arrives at the cap, institute a schedule to meet the emissions cap, and develop tracking, reporting, and enforcement mechanisms to ensure that the state achieves reductions in GHG emissions necessary to meet the cap. AB 32 also includes guidance to institute emissions reductions in an economically efficient manner and conditions to ensure that businesses and consumers are not unfairly affected by the reductions.

Climate Change Proposed Scoping Plan

In October of 2008, CARB published its Climate Change Proposed Scoping Plan, which is the State's plan to achieve GHG reductions in California required by AB 32. The scoping plan contains the main strategies California will implement to achieve reduction of 169 million metric tons (MMT) of CO₂e, or approximately 30 percent from the state's projected 2020 emission level of 596 MMT of CO₂e under a business-as-usual scenario (this is a reduction of 42 MMT CO₂e, or almost 10 percent, from 2002–2004 average emissions). The scoping plan also includes CARB-recommended GHG reductions for each emissions sector of the state's GHG inventory. The largest proposed GHG reduction recommendations are from improving emission standards for light-duty vehicles (estimated reductions of 31.7 MMT CO₂e), implementation of the Low-Carbon Fuel Standard (15.0 MMT CO₂e), energy efficiency measures in buildings and appliances and the widespread development of combined heat and power systems (26.3 MMT CO₂e), and a renewable portfolio standard for electricity production (21.3 MMT CO₂e). CARB has not yet determined what amount of GHG reductions it recommends from local government operations; however, the proposed scoping plan does state that land use planning and urban growth decisions will play an important role in the state's GHG reductions because local governments

have primary authority to plan, zone, approve, and permit how land is developed to accommodate population growth and the changing needs of their jurisdictions. (Meanwhile, CARB is also developing an additional protocol for community emissions.) CARB further acknowledges that decisions on how land is used will have large impacts on the GHG emissions that will result from the transportation, housing, industry, forestry, water, agriculture, electricity, and natural gas emission sectors. The proposed scoping plan states that the ultimate GHG reduction assignment to local government operations is to be determined. With regard to land use planning, the proposed scoping plan expects approximately 5.0 MMT CO₂e will be achieved associated with implementation of SB 375, which is discussed further below. The Climate Change Proposed Scoping Plan was approved by CARB on December 11, 2008.

California Climate Action Registry

The California Climate Action Registry (CCAR) was established in 2000 by Senate Bill 1771 and modified in 2001 by Senate Bill 527 as a nonprofit voluntary registry for GHG emissions. The purpose of CCAR is to help companies and organizations with operations in the state to establish GHG emissions baselines against which any future GHG emissions reduction requirements may be applied. CCAR has developed a general protocol and additional industry-specific protocols that provide guidance on how to inventory GHG emissions for participation in the registry. The California Climate Action Registry has now merged its GHG emissions registry with the climate registry and is primarily focused on offset projects and research.

Senate Bill 375

Senate Bill (SB) 375, signed in September 2008, aligns regional transportation planning efforts, regional GHG reduction targets, and land use and housing allocation. SB 375 requires Metropolitan Planning Organizations (MPOs) to adopt a Sustainable Communities Strategy (SCS) or Alternative Planning Strategy (APS), which will prescribe land use allocation in that MPO's Regional Transportation Plan (RTP). CARB, in consultation with MPOs, will provide each affected region with reduction targets for GHGs emitted by passenger cars and light trucks in the region for the years 2020 and 2035. These reduction targets will be updated every eight years, but can be updated every four years if advancements in emissions technologies affect the reduction strategies to achieve the targets. CARB is also charged with reviewing each MPO's SCS or APS for consistency with its assigned targets. If MPOs do not meet the GHG reduction targets, transportation projects would not be eligible for funding programmed after January 1, 2012.

This bill also extends the minimum time period for the Regional Housing Needs Allocation (RNHA) cycle from five years to eight years for local governments located within an MPO that meets certain requirements. City or county land use policies (including general plans) are not required to be consistent with the RTP (and associated SCS or APS). However, new provisions of the California Environmental Quality Act (CEQA) would incentivize qualified projects that are consistent with an approved SCS or APS, categorized as "transit priority projects."

Executive Order S-13-08: The Climate Adaptation and Sea Level Rise Planning Directive

On November 14, 2008, Governor Schwarzenegger issued Executive Order S-13-08 in order to reduce and assess California's vulnerability to climate change and sea level rise. The Executive Order initiated four major actions:

- 1) Initiate California's first statewide climate change adaptation strategy that will assess the state's expected climate change impacts, identify where California is most vulnerable and recommend climate adaptation policies by early 2009;

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- 2) Request the National Academy of Science establish an expert panel to report on sea level rise impacts in California to inform state planning and development efforts;
- 3) Issue interim guidance to state agencies for how to plan for sea level rise in designated coastal and floodplain areas for new projects; and
- 4) Initiate a report on critical existing and planned infrastructure projects vulnerable to sea level rise.

The Executive Order will provide consistency and clarify to state agencies on how to address sea level rise in current planning efforts.

California Building Energy Efficiency Standards

Title 24, Part 6 of the California Code of Regulations, known as the Building Energy Efficiency Standards, was established in 1978 in response to a legislative mandate to reduce California's energy consumption. The standards are updated periodically to allow consideration and possible incorporation of new energy efficiency technologies and methods. The Energy Commission adopted the 2008 Standards on April 23, 2008, and the Building Standards Commission approved them for publication on September 11, 2008. The new standards went into effect on July 1, 2009 (CEC, 2008).

Bay Area Air Quality Management District

The Bay Area Air Quality Management District has developed new CEQA guidelines which provide strong guidance on regulating GHG emissions. These guidelines received final approval by the BAAQMD Board on June 2, 2010. BAAQMD's approach to developing a *Threshold of Significance* for GHG emissions is to identify the emissions level for which a project would not be expected to substantially conflict with existing California legislation adopted to reduce statewide GHG emissions. If a project would generate GHG emissions above the threshold level, it would be considered to contribute substantially to a cumulative impact.

LOCAL

City of Pinole

In 2007, the City Council adopted a resolution to join the Local Governments for Sustainability (ICLEI) and to authorize the preparation of a greenhouse gas (GHG) emissions baseline inventory. In committing to the project, the City of Pinole embarked on an ongoing, coordinated effort to reduce GHG emissions, to improve air quality, and to reduce costs. The City of Pinole recently completed a draft GHG inventory for baseline calendar year 2005 titled *Community-Wide and Government Operations 2005 Baseline Greenhouse Gas Emissions Inventory*. This inventory represents completion of the first step in the city's climate protection process. As advised by ICLEI, quantifying recent-year emissions is essential to establish (1) a baseline against which to measure future emission levels, and (2) an understanding of where the highest percentages of emissions are coming from and therefore the greatest opportunities for emissions reductions. The *Community-Wide and Government Operations 2005 Baseline Greenhouse Gas Emissions Inventory* presents estimates of greenhouse gas emissions in 2005 resulting from the community as a whole. By adopting a resolution to join ICLEI, the City of Pinole is now part of an international movement of local governments. More than 1,000 local governments, including over 500 in the United States, have joined ICLEI's Cities for Climate Protection (CCP) campaign.

4.13.3 IMPACTS AND MITIGATION MEASURES

STANDARDS OF SIGNIFICANCE

Per Appendix G and Appendix F of the California Environmental Quality Act (CEQA) Guidelines and Bay Area Air Quality Management District (BAAQMD) recommendations, the City considers impacts related to energy use and climate change significant if implementation of the proposed project would result in any of the following:

1. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.
2. Conflict with any applicable plan, policy, or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases.
3. Inefficient, wasteful, and unnecessary consumption of energy.

METHODOLOGY

The BAAQMD has developed new CEQA guidelines which provide strong guidance on the analysis protocols for the assessment of GHG emissions and climate change. These guidelines are received final approval by the BAAQMD Board on June 2, 2010. The BAAQMD guidelines were used as a guide for a significance threshold.

The City of Pinole's greenhouse gas inventory, completed in 2010 using a 2005 baseline year, projected emissions out to 2030 and beyond to 2035. These projected emissions were compared to the BAAQMD threshold guidance. The City chose a baseline year of 2005 in the development of the GHG baseline inventory because of the reliability of data and to maintain consistency with neighboring jurisdictions. It should also be noted that the 2030 buildout forecast is a business-as-usual estimate, meaning it does not take into account state initiatives or currently planned reduction measures of the City.

The Pinole GHG inventory relied upon a 2005 baseline, with the result of 157,619 metric tons (MT) CO_{2e} being released in 2005 and projected emissions out to 2030, showing 154,374 MT CO_{2e}. The BAAQMD threshold is 6.6 MT CO_{2e} per year per service population, which in 2030 equates to 31,435 (23,875 residents + 7,560 jobs). This results in a threshold of 207,471 MT CO_{2e} per year. With the City's existing sustainability efforts and minimal additional emissions as a result of the proposed project, the City would not need mitigation for the purposes of CEQA since the projected GHG emissions for Pinole in 2020 and 2030 are 157,398 MT CO_{2e} and 154,374 MT CO_{2e}, respectively (see **Table 4.13-2** below).

IMPACTS AND MITIGATION MEASURES

Generate Greenhouse Gas Emissions that May Have a Significant Impact on the Environment or Conflict with Applicable Adopted Reduction Measures (Standards of Significance 1 and 2)

Impact 4.13.1 Implementation of the proposed project (General Plan Update, Three Corridors Specific Plan, and Zoning Code Update) would result in greenhouse gas emissions that would not be anticipated to conflict with the goals of AB 32 nor result in a significant impact on the environment. This is considered a **less than cumulatively considerable** impact.

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Subsequent development activity anticipated with buildout of the proposed project would result in direct emission of GHGs from area and mobile sources and indirect GHG emissions associated with electricity consumption, natural gas consumption, and landfilled waste. As shown in **Table 4.13-1**, under baseline conditions (2005), the City of Pinole generates 157,619 metric tons of CO_{2e} annually. With buildout of the proposed project, GHG emissions are calculated to be reduced to 154,374 metric tons per year (**Table 4.13-2**).

The data in **Table 4.13-2** is based upon 2020, 2030, and 2035 growth projections for Pinole. The growth projections calculate emissions growth under project buildout consistent with the proposed BAAQMD guidelines for plan-level GHG quantification. Residential, commercial, and waste emissions growth is based on population, job, and household growth rates from Association of Bay Area Governments (ABAG) Projections 2007. Transportation emissions growth is derived from Metropolitan Transportation Commission VMT growth estimates for Contra Costa County (MTC, 2008).

Consistent with BAAQMD guidance, the forecast includes estimated emissions savings from the Pavley I (AB 1493) standards and the Renewable Portfolio Standard (RPS), as described under the Regulatory Framework subsection above. Pavley I savings were calculated based on California Air Resources Board guidance using an EMFAC2007 post-processing tool. RPS savings were calculated from an RPS implementation analysis completed by the California Public Utilities Commission (CPUC, 2009). The analysis takes into consideration the barriers and constraints to California's 33 percent renewable energy goal by 2020 and presents a realistic estimate of California's future renewable mix.

TABLE 4.13-2
CITY OF PINOLE 2020, 2030, AND 2035 GREENHOUSE GAS
EMISSIONS UNDER PROJECT BUILDOUT

Sector	Source	2005 (Pre-Project Conditions)	2020 (AB 32 Consistency)	2030 (General Plan Buildout)	2035
Residential (MTCO _{2e})	Electricity	8,978	8,442	8,160	8,191
	Natural Gas	17,469	19,578	20,900	21,626
Commercial/ Industrial (MTCO _{2e})	Electricity	8,488	8,353	8,347	8,644
	Natural Gas	4,809	5,641	6,225	6,645
Transportation (MTCO _{2e})	VMT	113,452	110,234	105,318	102,297
Waste (MTCO _{2e})	Landfilled Waste	4,423	5,150	5,424	5,573
TOTAL (MTCO_{2e})		157,619	157,398	154,374	152,977
% Change from 2005		0.00%	-0.14%	-2.06%	-2.95%

Source: City of Pinole, 2010

Based on the population and employment figures listed in **Table 4.13-3** below, the 2005 service population was 25,309 and the buildout service population is anticipated to be 31,435 under the proposed project. Dividing the GHG emissions for each time period yields a metric ton per service population ratio of 6.22 and 4.91 for existing conditions and buildout conditions, respectively (see **Table 4.13-3**). Therefore, the proposed project would improve GHG emissions per service population and would not result in a net increase in GHG emissions.

**TABLE 4.13-3
CITY OF PINOLE GREENHOUSE GAS
EMISSIONS PER SERVICE POPULATION**

Per Capita Emissions	Emissions	Jobs	Population	Service Population (SP)	MTCO _{2e} /SP
2005	157,619	5,840	19,469	25,309	6.22
2020	157,398	6,850	22,670	29,520	5.33
2030	154,374	7,560	23,875	31,435	4.91

Source: City of Pinole, 2010

Proposed General Plan Policies and Action Items that Address Greenhouse Gas Emissions

The proposed General Plan Update includes a number of policies and actions designed to reduce GHG emissions. The proposed General Plan Update policies and actions are intended to be consistent with the California Attorney General's Office recommended policies and are intended to be indicative of the proposed General Plan Update's self-mitigating capabilities with respect to GHG emissions. The separate and subsequent development of the *Community-Wide and Government Operations 2005 Baseline Greenhouse Gas Emissions Inventory* by the city would also likely provide for additional city activities designed to reduce GHG emissions. The table also does not take into account other actions by the City to reduce GHG emissions that are not explicitly documented in policies and actions for the proposed General Plan Update.

Action GM.3.2.3 Alternative Modes of Transportation. Work with regional transportation agencies to develop circulation standards that:

1. Emphasize the movement of people, not solely automobiles, as the performance objective.
2. Adjust service standards to include trips accommodated by bicycle routes and facilities, pedestrian connections and transit service.

Policy GM.3.3 Provide Adequate Transportation Facilities and Services. Provide adequate transportation facilities while maintaining neighborhood integrity. The following considerations are aimed at reducing traffic on residential streets and improving available transportation alternatives:

1. Through-traffic should be discouraged as much as possible from residential streets.
2. New commercial development should be focused along arterial corridors.
3. Transit services that are accessible to children, adults, senior citizens and people with disabilities should be located within half a mile of schools, public facilities and shops.
4. Commuters should have easy access to the BART system.
5. A shuttle bus, especially for seniors, at regular intervals throughout the city, as well as hiking and biking trails, is desirable.

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6. Maintenance of AC Transit, BART feeder and WestCAT services.
- Action GM.3.3.1 Bus Service. Coordinate with WestCAT and AC Transit to strategically expand commute and local bus services in Pinole. Transit service planning should consider the following:
1. Loop service along primary circulation corridors.
 2. Enhanced access to major employment centers or transit hubs to minimize the number of transfers associated with trips.
- Action GM.3.3.2 Carpools and Transit. The City will develop a plan to make more efficient use of the regional and subregional transportation system that includes the following considerations.
1. Improved access to commuter bus service by enhancing access to nearby park-and-ride facilities or by providing a park-and-ride facility in Pinole to support commuter bus service.
 2. Promoting the use of carpools and vanpools.
- Action LU.8.1.1 Utilize the Three Corridors Specific Plan to encourage attractive mixed-use development along San Pablo Avenue while retaining Pinole's important view corridors; providing a safe circulation plan that includes traffic calming measures, enhanced transit, bicycle, and pedestrian facilities as well as to encourage sustainable and green building environment.
- Action LU.8.3.3 Initiate a transit study to determine how best to maximize potential opportunities to improve transit facilities and options in this area.
- Action LU.8.3.4 Require any new development to provide improved pedestrian facilities and to design their development to be as walkable as possible.
- Policy CE.1.2 Coordinate development of the circulation system with sustainable land use planning.
- Action CE.1.2.1 Give priority to projects that will contribute to a reduction in vehicle miles traveled per capita, while maintaining economic vitality and sustainability.
- Action CE.1.2.2 Require development to provide bus, bicycle, pedestrian and alternative fuel vehicle facilities, as appropriate.
- Action CE.1.2.3 Provide safe and convenient access for pedestrians and bicyclists, wherever feasible.
- Policy CE.1.3 Encourage development that is sensitive to both local and regional transit measures and that promotes the use of alternative modes of transportation.
- Action CE.1.3.1 Consult with transit providers during review of development proposals.
- Action CE.1.3.2 Include facilities that support alternative modes of transportation (pedestrian, bicycles, public transit, electric vehicles, etc.) where feasible.

- Policy CE.1.4 Encourage maximum utilization of the existing public transit system and alternate modes of transportation in Pinole.
- Action CE.1.4.1 Study the feasibility of increasing public transit frequency in areas currently served, and continue evaluating the possibility of expanding service to areas currently without service.
- Action CE.1.4.2 Include links to public transit resources, bike trails maps, pedestrian trails maps and carpool/van pool information on the City's website.
- Action CE.1.4.3 Pursue extension of rapid bus service to Pinole and enhance transit facilities that serve Pinole users.
- Action CE.1.5.1 Enhance existing and provide additional bus shelters and other amenities that support transit use, where feasible and appropriate.
- Policy CE.4.4 Prioritize transportation funding to support public transit and other non-auto modes of transportation.
- Action CE.4.4.1 Before funding transportation improvements that increase roadway capacity and vehicle miles traveled, the City will evaluate the feasibility and effectiveness of funding projects that support alternative modes of transportation and reduced vehicle miles traveled, including transit and bicycle and pedestrian access.
- Policy CE.5.1 Provide off-street parking to employees; however preferential parking at several locations in the city shall be made available to vanpools, carpools, alternative fuel vehicles and other transit users, where feasible and appropriate.
- Action CE.6.2.6 Establish and apply minimum carpool requirements for all nonresidential developments.
- Policy CE.7.1 Enhance the city's bikeway network through the use of Class I, II and III bikeways.
- Action CE.7.1.1 Develop street design and bikeway design standards to address all street users, autos, public transit, bicycles and pedestrians of all ages and abilities.
- Action CE.7.1.2 Prepare and regularly update a Pinole bikeways map and make it available on the City's website.
- Action CE.7.1.3 Provide safe access to public transportation and other non-motorized uses through construction of dedicated bicycle paths.
- Policy CE.7.2 Establish standards for new development and redevelopment projects to support bicycle use.
- Policy CE.8.1 Require development to provide pedestrian walkways that are safe, interconnected and accessible by all members of the community

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- Action CE.8.1.1 As feasible, ensure that all intersections in areas with pedestrian usage are signalized with curb ramps, bulbouts, high-contrast crosswalks and pedestrian actuation, and other safety measures.
- Action CE.8.1.2 Where feasible, use landscaping or physical barriers on high-capacity arterials to separate vehicles and pedestrians.
- Action CS.3.4.2 Future park sites should be planned for neighborhoods that do not currently have a park within walking or bicycling distance.
- Action CS.5.2.1 The City shall investigate establishing new guidelines requiring water use restrictions for irrigation systems and use of drought-resistant and native plants in landscaping.
- Policy CS.8.1 The City will continue to encourage efforts to reduce, recycle and compost as many materials as possible to minimize demand for future waste disposal facilities.
- Action CS.8.1.1 Continue to meet or exceed the waste diversion requirements of 50 percent, and develop and implement a program to reduce waste entering the landfill by attaining a 75 percent diversion rate by January 2020.
- Policy CS.10.2 The City will update, where possible, the existing roadway network to enhance pedestrian, bicycle and transit circulation while maintaining safe vehicular circulation.
- Action CS.10.2.2 The City will prepare a citywide sidewalk conditions inventory and incorporate necessary improvements in the Capital Improvement Program to ensure safe pedestrian access throughout the community.
- Policy HS.5.1 Promote strategic land use patterns for businesses that reduce the number and length of motor vehicle trips and that encourage multiple forms of transportation for employees and patrons.
- Action HS.5.1.1 Support the location of ancillary employee services, including child care, restaurants, banking facilities and convenience markets, at major employment centers for the purpose of reducing mid-day vehicle trips.
- Policy HS.5.2 Encourage mixed-use developments that put residences in close proximity to services, employment, transit, schools and civic facilities/services.
- Action HS.5.2.1 Encourage compact, transit-oriented development within one-quarter to one-half mile of transit stations and transit service stops along transit corridors.
- Action HS.5.2.2 Continue to work with transportation and transit agencies and organizations to improve transit service and encourage increased ridership.
- Action HS.5.2.3 Adopt and implement the Three Corridors Specific Plan for commercial corridors along San Pablo Avenue, Pinole Valley Road and Appian Way, establishing mixed-use development land use designations and design guidelines that encourage walkable communities, improved bicycle facilities and improved public transit facilities.

Policy HS.6.1	Promote and encourage walking and bicycling as viable forms of transportation to services, shopping and employment.
Action HS.6.1.1	Include street design features that facilitate biking and walking trips in both new and established areas.
Action HS.6.1.2	Require all new development to be designed to enable easy pedestrian and bicycle access and circulation.
Policy HS.6.2	Reduce greenhouse gas emissions.
Action HS.6.2.1	Create partnerships of community groups, businesses and agencies to develop strategies to reduce air and water pollution.
Action HS.6.2.2	<p>The City of Pinole should create a model for other large employers in the city that makes use of programs to reduce single-occupant vehicle trips, support the use of alternative fuels and encourage alternative modes of transportation. Such programs could include:</p> <ul style="list-style-type: none">• Creating rideshare/carpooling incentives for employees who commute together.• Replacing City-owned vehicles with alternative fuel vehicles.• Ensuring that necessary infrastructure is in place (e.g., showers, bike racks, shared automobile leasing stations) and available to employees and visitors who rely on such facilities to support alternative modes of transportation.
Action SE.1.1.5	Establish baselines of City operations such as the City's energy use, trash export, recycling, local food production, etc. in order to evaluate the City's progress toward reducing energy consumption and waste and set goals for future waste reduction targets.
Policy SE.1.2	Conduct public outreach to Pinole businesses to inform them about rebates and other financial incentives for using ENERGY STAR® or equivalent energy-efficient appliances, lighting, and heating equipment.
Action SE.1.3.1	Conduct energy audits for all public facilities, as feasible.
Action SE.1.3.2	Retrofit facilities for energy efficiency where feasible. Include items such as increased insulation, green or reflective roofs, and low-emissive window glass.
Action SE.1.3.3	Implement an energy tracking and management system for City departments and public facilities.
Action SE.1.3.4	Work with Public Works to install energy-efficient lighting retrofits and occupancy sensors on public facilities.
Policy SE.1.4	Require all newly constructed, purchased, or leased municipal buildings or facilities meet minimum standards for green building as appropriate.

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- Policy SE.1.5 Provide adequate resources to all City staff, including appropriate training, education, and support, to implement objectives and policies to reduce GHG emissions from City operations.
- Policy SE.1.5.1 Provide energy efficiency training, including opportunities to obtain LEED certification for relevant staff.
- Policy SE.1.5.2 Provide information on energy use and management to managers and others making decisions that influence energy use.
- Policy SE.1.5.3 Provide energy design review services to departments undertaking new construction or renovation projects to facilitate compliance with LEED standards.
- Policy SE.3.1 Reduce greenhouse gas emissions from City operations and community sources by a minimum of 15 percent below current or baseline levels by the year 2020.
- Action SE.3.1.1 Complete the in-progress Greenhouse Gas Emissions Inventory for Government Operations and the community (or Planning Area) consistent with State or other accepted protocol. The Inventory shall provide a business-as-usual forecast for GHG emissions for 2020 and 2030.
- Policy SE.3.3 Pinole will mitigate climate change by decreasing heat gain from pavement and other hard surfaces associated with infrastructure (i.e., heat island effect).
- Action SE.3.3.1 Reduce heating and cooling loads by promoting light-colored roofs and paving materials, planting trees, and increasing vegetative cover.
- Action SE.3.3.2 Where possible, use parkway strips to allow shading of streets by trees.
- Action SE.3.3.3 Require the use of shade trees on south- and west-facing sides of structures, where possible.
- Action SE.3.3.4 Include low-water landscaping in place of hardscaping around transportation infrastructure and in parking areas.
- Action SE.3.3.5 Where feasible, require the use of pervious pavement options.
- Action SE.3.3.6 Where feasible, require the use of edible landscaping and low-water landscaping.
- Policy SE.3.4 Reduce GHG emissions by reducing vehicle miles traveled and by increasing or encouraging the use of alternative fuels and transportation technologies.
- Action SE.3.4.1 Over time, replace the City's vehicle fleet with alternative fuel vehicles.
- Action SE.3.4.6 The City will give priority to projects that will result in reduction of vehicle miles traveled per capita while maintaining sustainability and economic vitality.

- Action SE.4.1.1 Utilize, where feasible, renewable energy and clean generation technologies such as solar, wind, biogas, tidal, cogeneration, and fuel cells to power City facilities using tax-free low-interest loans and other available financial options.
- Action SE.4.1.3 Designate suitable sites to prioritize their development for renewable energy generation.
- Action SE.4.2.4 Provide technical assistance to builders and developers to encourage sustainable and energy efficient building design.
- Policy SE.4.3 Pinole will promote and require renewable energy generation and co-generation where feasible and appropriate.
- Action SE. 4.3.1 Require that new office/retail/commercial or industrial development, or major rehabilitation (e.g. additions of 25,000 square feet commercial, or 100,000 square feet industrial) incorporate renewable energy generation either on- or off-site to provide 15% or more of the project's energy needs.
- Action SE.4.4.2 Continue to conduct energy audits of Pinole facilities and implement energy efficiency and retrofitting recommendations from those audits. Seek funding from available state sources and grant opportunities, as well as the CIP.
- Action SE.4.4.3 Where feasible and appropriate, transition to LED/energy efficient lights in all City facilities and equipment.
- Action SE.4.4.4 Set a target to meet a majority of the City's energy needs via renewable energy.
- Action SE.4.5.1 Require that, where feasible, all new buildings be constructed for easy, cost-effective installation of solar energy systems. This should include requiring such features as optimal roof orientation, clear access without obstructions, and appropriate roof framing and wiring.
- Action SE.4.5.3 Require that any building constructed in whole or in part with City funds incorporate passive solar design features such as daylighting and passive solar heating, where feasible.
- Action SE.4.6.2 Pinole will provide, where feasible, creative financing for renewable energy projects, including subsidized or other low-interest loans, and the option to pay for system installation through long-term assessments on individual property tax bills.
- Action SE.5.1.6 Develop an ordinance reducing construction-generated waste.
- Action SE.5.1.7 Develop and implement a plan for City communications and facilities to eventually become primarily paperless.
- Action SE.5.4.1 Pinole will adopt a Construction and Demolition Waste Recovery Ordinance, requiring building projects to recycle or reuse a minimum percentage of unused or leftover building materials.

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- Action SE.5.4.2 Require all new development and major rehabilitation projects to recycle or salvage a majority of the non-hazardous construction and demolition debris.
- Policy SE.6.1 Develop local green building and energy efficiency standards.
- Action SE.6.1.3 Develop a Green Streets program to encourage designs that enhance the City's ecological function, reduce stormwater discharge through the use of pervious surfaces where appropriate, add infiltration enhancements (e.g. planters, swales, and channels), and increase sidewalk planting areas to reduce the heat island effect in developed areas and provide room for additional trees and shrubs within public right-of-way areas.
- Action SE.6.2.1 Reduce energy consumption in buildings by balancing energy-efficient design with land use compatibility during the design review process.
- Policy SE.7.1 Continue working with the Bay Area Air Quality Management District and other regional agencies to:
1. Improve air quality through pollution prevention methods.
 2. Ensure enforcement of air emission standards.
 3. Reduce local and regional traffic (the single largest source of air pollution in the city) and support public transit improvements.
 4. Promote regional air pollution prevention plans for business and industry.
 5. Promote strategies to reduce particulate pollution from residential fireplaces and wood-burning stoves.
 6. Locate parking appropriately and provide adequate signage to reduce unnecessary "circling" and searching for parking.
 7. Promote anti-idling policies and programs.
- Action SE.7.2.3 Establish and maintain a Pinole tree planting guide to encourage tree planting, reduce long-term maintenance costs, reduce fire hazards, improve energy efficiency, and enhance the quality of the community over time.
- Action SE.7.2.4 Develop landscape standards that require minimum planting and maintenance requirements for new and retrofit development and the use of native or drought-tolerant vegetation.
- Action SE.7.3.2 Reduce methane emissions released from waste disposal. Encourage recycling, decrease waste sent to landfills, require landfill methane recovery and promote methane recovery for energy production from other sources.
- Policy SE.7.4 In order to reduce vehicle miles traveled and traffic congestion, new development within 1,000 feet of an existing or planned transit stops should be designed to encourage the usage of public transit and minimize the dependence on the automobile through the application of site design guidelines.

- Policy SE.8.6 Establish parking policies and requirements that capture the true costs of private vehicle use and support alternative modes of transportation.
- Action SE.8.6.5 Require that new and fully renovated commercial and retail development provide preferential parking for electric vehicles and vehicles using alternative fuels.
- Policy SE.8.7 Work to improve Pinole's pedestrian and bicycle infrastructure and to meet the needs of all pedestrians and bicyclists.
- Action SE.8.7.1 Implement public transit-, bicycle- and pedestrian-oriented land use and design strategies in new development, as described in the Land Use and Circulation Elements of the General Plan to reduce the number of single-occupant trips in fossil-fueled vehicles.
- Action SE.8.7.5 Establish and implement standards that meet or exceed state law for "complete streets" that foster equal access by all users in the roadway system. Include standards that address connection of bicycle and pedestrian access to other areas, safe road crossings, adequate and secure bike parking at public and private facilities, and street standards as is feasible for bicycle infrastructure.
- Action SE.8.10.1 Develop the necessary infrastructure to encourage the use of zero-emission vehicles and clean alternative fuels, such as development of electric vehicles charging facilities and alternative fueling stations.
- Action SE.8.10.3 Establish incentives for use of alternative fuel, electric, or gas-electric hybrid vehicles.
- Policy SE.9.1 Encourage policies to prudently manage water resources to sustain plant and animal life, support urban activities and protect public health and safety.
- Action SE.9.1.1 Where feasible, institute a water conservation program for City of Pinole facilities; for example, installation of waterless urinals and low-flow sinks and showers.
- Action SE.9.1.2 Encourage the use of recycled water and drought-resistant landscaping in Pinole facilities, public roadway landscape, and new development.
- Action SE.9.1.3 Establish incentives for development projects that achieve a 20% reduction in water use over baseline of 1995.
- Policy SE.9.4 Establish programs and policies to increase water conservation and the use of recycled water.
- Policy SE.9.5 Establish new policies that continue to encourage the maintenance and growth of Pinole's urban forest.
- Action SE.9.5.1 Minimize removal of mature, healthy trees in conjunction with new development, as required by the tree protection ordinance.

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- Action SE.9.5.2 Establish programs and policies to ensure landscaping and forests are installed and managed to optimize their climate benefits.
- Action SE.9.5.3 Pinole will install water-efficient landscapes and irrigation, including planting drought-tolerant plants and native species, covering exposed dirt with moisture-retaining mulch, using advanced technology such as moisture-sensing irrigation controls, and promoting urban agriculture by installing edible landscapes that provide local food.

In addition, Chapter 7.0, *Private Realm Standards and Design Guidelines*, of the Three Corridors Specific Plan encourages the incorporation of building siting and design techniques that increase energy efficiency including orienting buildings to maximize solar access and the use of solar power systems, green roofs, and green building practices. Chapter 8.0, *Public Realm Standards and Design Guidelines*, encourages energy efficiency in public facilities and public lighting. Furthermore, Chapter 17.94 of the Zoning Code Update allows for the use of wind energy conversion systems in all zoning districts with the issuance of a use permit and provides specific performance standards for such systems. Chapter 5.0, *Circulation*, of the proposed Three Corridor Specific Plan contains goals and policies (Circulation Policies 2, 3, 7, and 8) that support the development and safety of bicycle and pedestrian facilities and Chapter 7.0, *Private Realm Standards and Design Guidelines*, of the Specific Plan encourages numerous site design techniques to create clearly identifiable, well-connected, and safe pedestrian paths as well as easily accessible transit stops that are sited close to commercial uses. Furthermore, Section 17.48.110 of the proposed Zoning Code Update which contains minimum bicycle parking requirements by land use category. These policies, standards and design guidelines help to implement the proposed General Plan policy provisions listed above and would further reduce this impact.

Mitigation Measures

Implementation of relevant policies and actions from the proposed General Plan Update and associated adoption and implementation of the City GHG Inventory is anticipated to mitigate GHG emissions projected for buildout conditions consistent with state efforts to reduce GHG emissions. Furthermore, the proposed project would not surpass the BAAQMD threshold of 6.6 MT CO_{2e} per year per service population and would not result in a net increase in GHG emissions over existing conditions. As a matter of fact, the metric ton per service population ratio of 4.91 for buildout conditions (see **Table 4.13-3**) would improve GHG emissions per service population over existing conditions. Additionally policies, standards and strategies specified in the Three Corridors Specific Plans and discussed above further address GHG emissions. Therefore this impact is considered to be **less than cumulatively considerable**.

Climate Change Environmental Effects on the City (Standard of Significance 1)

- Impact 4.13.2** Environmental effects of climate change are not currently expected to result in adverse impacts to the General Plan Update Planning Area. This impact is considered to be **less than cumulatively considerable**.

As identified in the above discussion, there are many technical studies available regarding the environmental effects of climate change on the earth as a whole as well as in California specifically. However, the extents of these environmental effects are still being defined as climate modeling tools become more refined. Potential environmental effects of climate change that could impact the GPU Planning Area could include the following (which were previously noted above):

- Adverse impacts on water supply availability;
- Increased severity of flooding events;
- Increased fire hazards;
- Alteration of natural habitats for special-status plant and animal species; and
- Air quality impacts.

These potential impacts are real, given the general concurrence in the scientific community about the potential impacts of climate change on the environment. However, the extent and severity of such impacts to the GPU Planning Area specifically is still speculative at this time. Nevertheless, a number of proposed General Plan Update policies are intended to help the City reduce potential exposure of people and projects to future impacts of climate change.

Proposed General Plan Policies and Action Items that Address Environmental Effects of Climate Change

The proposed GPU contains policies and actions that include specific, enforceable requirements and/or restrictions and corresponding performance standards that address this impact:

- | | |
|-----------------|---|
| Policy CS.5.1 | The City will make improvements to the water supply system to maintain system capability and reliability. |
| Policy CS.5.2 | The City will continue to promote the conservation of water by all users. |
| Action CS.5.2.1 | The City shall investigate establishing new guidelines requiring water use restrictions for irrigation systems and use of drought-resistant and native plants in landscaping. |
| Policy CS.7.1 | The City will ensure that the storm drain system has adequate capacity to minimize street flooding and, where feasible, shall expand the capacity of the system to control storm flows. |
| Policy CS.7.2 | The City will require new developments to minimize the amount of off-site drainage by retaining stormwater for on-site percolation, provide adequate drainage facilities for remaining off-site flows, maintain natural drainage channels, and avoid alteration of off-site drainage courses. |
| Policy CS.7.3 | The City will work with the East Bay Municipal Utility District to create a flood water diversion area to reduce the potential for downstream flooding. |
| Policy CS.7.4 | The City will continue implementing the Pinole Creek Vision Plan and Pinole Creek Greenway Master Plan to optimize resource protection and recreation opportunities while reducing the potential for flooding. |
| Action CS.7.4.1 | The City will continue to work with the Contra Costa Flood Control District and other regional partners to establish a long-term funding source for Pinole Creek flood control maintenance and habitat restoration efforts. |
| Action HS.1.1.2 | Maintain and implement the Emergency Operations Plan (EOP), including necessary training, emergency preparedness drills and community education. |
| Action HS.1.1.3 | Adopt a Very High Fire Hazard Severity Zone (VHFHSZ) ordinance to implement regulations. |

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- Action HS.2.1.3 Establish land use controls for properties that abut Pinole Creek in order to minimize potential conflicts between flood, resource protection and recreational goals. This action could be accomplished by adopting a creek ordinance.
- Policy HS.2.2 Work with the Contra Costa County Flood Control District and other property owners in the Pinole Creek watershed, particularly the East Bay Municipal Utility District (EBMUD), to establish a diversion basin that could reduce stormwater flows during severe storm conditions.
- Action HS.2.2.1 Establish a land use designation for land to be set aside for detention basin purposes and seek out opportunities to establish detention basins to better protect the community from flooding hazards.
- Policy HS.2.4 Continue to monitor studies that identify anticipated changes in sea level and create appropriate standards and improvements to minimize flood risks.
- Action HS.2.4.1 Create a long-range plan to govern the San Pablo Bay waterfront and any other areas that may be impacted by changes in sea level.
- Policy HS.4.1 Continue to provide essential emergency public services during natural catastrophes.
- Action HS.4.1.1 Maintain and implement the Emergency Operations Plan (EOP), including periodic training exercises.
- Action HS.4.1.2 Continue working with Contra Costa County and other concerned agencies to adopt a regional Emergency Response Plan (ERP).
- Action HS.4.1.5 Establish an emergency warning/notification system in Pinole to notify the public during a natural or man-made disaster. Provide a public communication system to help advise the public about how best to respond during the recovery phase of a disaster and notify the community when safety has been restored.
- Action HS.4.1.6 The City shall increase the number of individuals that receive Citizen Emergency Response Training to increase emergency preparedness within the city and encourage greater self-reliance during and after a natural or man-made hazard event.
- Policy HS.4.2 Undertake disaster preparedness planning in cooperation with other public agencies and appropriate public interest organizations.
- Policy OS.1.1 Habitat Preservation. The City shall protect and preserve open space and natural areas. Preserve oak/woodland, riparian vegetation, creeks, fisheries, saltwater and freshwater marsh, native bunchgrass grasslands, wildlife corridors and sensitive nesting sites. Loss of these habitats should be fully offset through creation of habitat of equal value. Compensation rate for habitat re-creation shall be determined by a qualified biologist in consultation with resource agencies.

- Policy OS.1.7 Transitional Zones. The City will condition or modify development approvals to ensure that natural transitions along the edges of different habitat types are preserved and enhanced because of their importance to wildlife. Maintain proper buffers between sensitive habitat and conflicting land uses. Habitat types of particular concern are those along the margins of riparian corridors, marshlands, and oak woodlands. Preserves and areas with special conservation status must have compatible surrounding land uses.
- Policy OS.1.8 Habitat Restoration. The City shall implement a re-vegetation plan which aims to identify and prioritize areas planned for habitat restoration. Areas planned for restoration may provide special-status species habitat, connectivity of wildlife corridors, transitional zones in between natural areas and incompatible land uses, or expansion of ecological functions such as flood management and water quality.
- Policy OS.2.1 Protection of Native Vegetation. Protect, preserve and create the conditions that will promote the preservation of significant trees and other vegetation, particularly native to California and the region.
- Policy SE.9.1 Encourage policies to prudently manage water resources to sustain plant and animal life, support urban activities and protect public health and safety.
- Action SE.9.1.1 Where feasible, institute a water conservation program for City of Pinole facilities; for example, installation of waterless urinals and low-flow sinks and showers.
- Action SE.9.1.2 Encourage the use of recycled water and drought-resistant landscaping in Pinole facilities, public roadway landscape, and new development.
- Action SE.9.1.3 Establish incentives for development projects that achieve a 20% reduction in water use over baseline of 1995.
- Policy SE.9.3 Protect environmentally sensitive habitats, conserve natural habitat lands and preserve habitat connectivity.
- Action SE.9.3.1 Designate environmentally sensitive natural resource areas as Open Space, Parks and Recreation, Rural, or San Pablo Bay Conservation Areas appropriate in the City's Land Use Element Map to help ensure long-term protection of natural resources within the City.
- Action SE.9.3.2 Require biological studies in conjunction with development proposals within or near natural habitat lands, including land designated as Rural in the General Plan Land Use Map (**Figure 5-5**).
- Action SE.9.3.3 Avoid disturbance of sensitive biological resources in conjunction with new development, redevelopment, or other construction activities.

Because considerable uncertainty remains with respect to the overall impact of global climate change on California and the GPU Planning Area, it is unknown whether these impacts would be significant. This also includes the uncertainty surrounding to what degree global climate change may adversely impact future water supply and availability in the GPU Planning Area. However, based on consideration of the recent regional and local climate change studies, and in combination with the City's existing standards and proposed General Plan Update policy

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provisions, it is expected that the environmental effects of global climate change on the city of Pinole would be **less than cumulatively considerable**.

Mitigation Measures

None required.

Inefficient, Wasteful, and Unnecessary Consumption of Energy (Standard of Significance 3)

Impact 4.13.3 Development under the proposed project (General Plan Update, Three Corridors Specific Plan, and Zoning Code Update) would increase the consumption of energy associated with electrical, natural gas, and vehicle fuel. This is considered to be a **less than cumulatively considerable** impact.

Residential and Nonresidential Energy Use

The proposed General Plan Update policy document and Land Use Map accommodates some modification of existing land uses and encourages infill development that could increase population, housing, and employment in the city. An inventory of vacant lands in Pinole demonstrates that there are an estimated dwelling unit potential of 230 housing units and a potential population of 665 persons outside of the Three Corridors Specific Plan area and an additional 1,076 housing units and 3,110 persons inside the Three Corridors Specific Plan boundaries by 2030. Therefore, the GPU Planning Area could potentially accommodate an additional 1,306 housing units and 3,775 people. As previously mentioned, in 2005, Pinole residential, commercial, and industrial uses consumed a 78,153,265 kilowatt hours of electricity and 122,071,432 kilowatt hours of natural gas (200,224,697 kilowatt hours combined)(City of Pinole, 2010).²

The Energy Efficiency Standards for Residential and Nonresidential Buildings (Title 24) were established in 1978 in response to a legislative mandate to reduce California's energy consumption. The standards are updated periodically to allow consideration and possible incorporation of new energy efficiency technologies and methods. The most recent update of these standards is contained in the *2008 Building Energy Efficiency Standards for Residential and Nonresidential Buildings*. According to the U.S. Department of Energy, California's building efficiency standards (along with those for energy-efficient appliances) have saved more than \$56 billion in electricity and natural gas costs since 1978. The updated standards contained in these 2008 Building Energy Efficiency Standards are expected to save an additional \$23 billion by 2013 (USDE, 2009). These projections are based on the standards' provisions to:

- Respond to Assembly Bill 32, the Global Warming Solutions Act of 2006, which mandates that California must reduce its greenhouse gas emissions to 1990 levels by 2020.
- Pursue California energy policy that energy efficiency is the resource of first choice for meeting California's energy needs.
- Act on the findings of California's Integrated Energy Policy Report (IEPR) that standards are the most cost-effective means to achieve energy efficiency, expects the Building

² Natural gas, typically measured in therms or BTUs, has been converted to kilowatt hours in order to achieve consistency between electricity and natural gas units.

Energy Efficiency Standards to continue to be upgraded over time to reduce electricity and peak demand, and recognizes the role of the standards in reducing energy related to meeting California's water needs and in reducing greenhouse gas emissions.

- Meet the West Coast Governors' Global Warming Initiative commitment to include aggressive energy efficiency measures into updates of state building codes.
- Meet the Executive Order in the Green Building Initiative to improve the energy efficiency of nonresidential buildings through aggressive standards (CEC, 2008).

The *2008 Building Energy Efficiency Standards for Residential and Nonresidential Buildings* include code regulations for lighting; windows; roofing; skylights; swimming pool and spa equipment; heating, ventilation, and air conditioning equipment and controls; and the New Solar Homes Partnership (NSHP). Part of the California Solar Initiative, NSHP provides financial incentives and other support to home builders to encourage construction of energy-efficient solar homes. High-performance windows that are more resistant to heat and better insulated will now be required in new homes. Heating, ventilating, and air conditioning systems for homes and businesses must now be more efficient. "Cool roof" standards have also been upgraded to include residential and nonresidential buildings. Cool roofs are made of highly reflective, insulated roofing materials that stay up to 40 degrees cooler than normal roofing materials under a hot summer sun. Cool roof standards are designed to reduce air conditioner demand, save money, and reduce the urban heat island effect. A cool roof can reduce a homeowner's electricity consumption by as much as 20 percent (USDE, 2008).

The new standards also require energy-efficient lighting, including expanded use of skylights in large nonresidential buildings. For example, the old requirement to install skylights in commercial warehouses larger than 25,000 square feet has been changed to include warehouses starting at 8,000 square feet. As a result, businesses will use more natural daylight and save on electricity costs.

Many of the changes in the standards are tailored to help reduce not only overall energy use, but peak energy use (electricity demand on hot summer days when air conditioning loads can nearly double California's need for power). The latest efficiency standards are expected to cut the state's peak energy demand by 129 megawatts the first year the standards are in effect and increase cumulatively in subsequent years (USDE, 2008). By some estimates, the new standards will save as much as 500 megawatts by 2013 (USDE, 2008).

The proposed project would result in an increase of residential and commercial land uses and therefore an increase of energy consumed over existing conditions. However, future residential and nonresidential development under the proposed General Plan Update would be required to adhere to the energy efficiency requirements of the *2008 Building Energy Efficiency Standards for Residential and Nonresidential Buildings*. New development will be more energy efficient per square foot than existing energy use modeling data can quantify.

Transportation Energy Use

An increase in population as anticipated under the proposed project would result in an increase in vehicle trips, these trips would be reduced in length due to the increased density proposed under the proposed General Plan Update, thus reducing the amount of automobile fuel consumed. Strategies in the proposed General Plan Update include promoting compact, walkable, infill, and mixed-use development and focusing redevelopment along the San Pablo Avenue, Pinole Valley Road, and Appian Way corridors.

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According to a fuel consumption analysis conducted for the proposed project (**Appendix G**), the city of Pinole consumed approximately 35,464 gallons of automotive fuel (diesel and gasoline) per day in 2010. As a consequence of the fuel efficiency requirements of AB 1493, automobile use in the city of Pinole is projected to result in the consumption of 28,930 gallons of automotive fuel per day at buildout under the proposed project. This is a reduction of 6,534 gallons of automotive fuel used per day over existing conditions (refer to **Appendix G** for detailed assumptions and modeling output files).

Proposed General Plan Update Policies and Actions that Address Energy Consumption

The proposed General Plan Update contains policies and actions that include specific, enforceable requirements and/or restrictions and corresponding performance standards that address this impact.

- Action GM.3.2.3 Alternative Modes of Transportation. Work with regional transportation agencies to develop circulation standards that:
1. Emphasize the movement of people, not solely automobiles, as the performance objective.
 2. Adjust service standards to include trips accommodated by bicycle routes and facilities, pedestrian connections and transit service.
- Action GM.3.3.1 Bus Service. Coordinate with WestCAT and AC Transit to strategically expand commute and local bus services in Pinole. Transit service planning should consider the following:
1. Loop service along primary circulation corridors.
 2. Enhanced access to major employment centers or transit hubs to minimize the number of transfers associated with trips.
- Action GM.3.3.2 Carpools and Transit. The City will develop a plan to make more efficient use of the regional and subregional transportation system that includes the following considerations.
1. Improved access to commuter bus service by enhancing access to nearby park-and-ride facilities or by providing a park-and-ride facility in Pinole to support commuter bus service.
 2. Promoting the use of carpools and vanpools.
- Action LU.8.1.1 Utilize the Three Corridors Specific Plan to encourage attractive mixed-use development along San Pablo Avenue while retaining Pinole's important view corridors; providing a safe circulation plan that includes traffic calming measures, enhanced transit, bicycle, and pedestrian facilities as well as to encourage sustainable and green building environment.
- Action LU.8.3.3 Initiate a transit study to determine how best to maximize potential opportunities to improve transit facilities and options in this area.

- Action LU.8.3.4 Require any new development to provide improved pedestrian facilities and to design their development to be as walkable as possible.
- Policy CE.1.2 Coordinate development of the circulation system with sustainable land use planning.
- Action CE.1.2.1 Give priority to projects that will contribute to a reduction in vehicle miles traveled per capita, while maintaining economic vitality and sustainability.
- Action CE.1.2.2 Require development to provide bus, bicycle, pedestrian and alternative fuel vehicle facilities, as appropriate.
- Policy CE.1.3 Encourage development that is sensitive to both local and regional transit measures and that promotes the use of alternative modes of transportation.
- Action CE.1.3.2 Include facilities that support alternative modes of transportation (pedestrian, bicycles, public transit, electric vehicles, etc.) where feasible.
- Policy CE.1.4 Encourage maximum utilization of the existing public transit system and alternate modes of transportation in Pinole.
- Action CE.1.4.1 Study the feasibility of increasing public transit frequency in areas currently served, and continue evaluating the possibility of expanding service to areas currently without service.
- Action CE.1.4.2 Include links to public transit resources, bike trails maps, pedestrian trails maps and carpool/van pool information on the City's website.
- Action CE.1.4.3 Pursue extension of rapid bus service to Pinole and enhance transit facilities that serve Pinole users.
- Policy CE.4.4 Prioritize transportation funding to support public transit and other non-auto modes of transportation.
- Action CE.4.4.1 Before funding transportation improvements that increase roadway capacity and vehicle miles traveled, the City will evaluate the feasibility and effectiveness of funding projects that support alternative modes of transportation and reduced vehicle miles traveled, including transit and bicycle and pedestrian access.
- Action CE.6.2.6 Establish and apply minimum carpool requirements for all nonresidential developments.
- Policy CE.7.1 Enhance the city's bikeway network through the use of Class I, II and III bikeways.
- Policy HS.5.1 Promote strategic land use patterns for businesses that reduce the number and length of motor vehicle trips and that encourage multiple forms of transportation for employees and patrons.

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- Action HS.5.1.1 Support the location of ancillary employee services, including child care, restaurants, banking facilities and convenience markets, at major employment centers for the purpose of reducing mid-day vehicle trips.
- Policy HS.5.2 Encourage mixed-use developments that put residences in close proximity to services, employment, transit, schools and civic facilities/services.
- Action HS.5.2.1 Encourage compact, transit-oriented development within one-quarter to one-half mile of transit stations and transit service stops along transit corridors.
- Action HS.5.2.2 Continue to work with transportation and transit agencies and organizations to improve transit service and encourage increased ridership.
- Action HS.5.2.3 Adopt and implement the Three Corridors Specific Plan for commercial corridors along San Pablo Avenue, Pinole Valley Road and Appian Way, establishing mixed-use development land use designations and design guidelines that encourage walkable communities, improved bicycle facilities and improved public transit facilities.
- Policy HS.6.1 Promote and encourage walking and bicycling as viable forms of transportation to services, shopping and employment.
- Action HS.6.1.2 Require all new development to be designed to enable easy pedestrian and bicycle access and circulation.
- Action HS.6.2.2 The City of Pinole should create a model for other large employers in the city that makes use of programs to reduce single-occupant vehicle trips, support the use of alternative fuels and encourage alternative modes of transportation. Such programs could include:
- Creating rideshare/carpooling incentives for employees who commute together.
 - Replacing City-owned vehicles with alternative fuel vehicles.
 - Ensuring that necessary infrastructure is in place (e.g., showers, bike racks, shared automobile leasing stations) and available to employees and visitors who rely on such facilities to support alternative modes of transportation.
- Action SE.1.1.5 Establish baselines of City operations such as the City's energy use, trash export, recycling, local food production, etc. in order to evaluate the City's progress toward reducing energy consumption and waste and set goals for future waste reduction targets.
- Policy SE.1.2 Conduct public outreach to Pinole businesses to inform them about rebates and other financial incentives for using ENERGY STAR® or equivalent energy-efficient appliances, lighting, and heating equipment.
- Action SE.1.3.1 Conduct energy audits for all public facilities, as feasible.
- Action SE.1.3.2 Retrofit facilities for energy efficiency where feasible. Include items such as increased insulation, green or reflective roofs, and low-emissive window glass.

- Action SE.1.3.3 Implement an energy tracking and management system for City departments and public facilities.
- Action SE.1.3.4 Work with Public Works to install energy-efficient lighting retrofits and occupancy sensors on public facilities.
- Policy SE.1.4 Require all newly constructed, purchased, or leased municipal buildings or facilities meet minimum standards for green building as appropriate.
- Policy SE.1.5.1 Provide energy efficiency training, including opportunities to obtain LEED certification for relevant staff.
- Policy SE.1.5.2 Provide information on energy use and management to managers and others making decisions that influence energy use.
- Policy SE.1.5.3 Provide energy design review services to departments undertaking new construction or renovation projects to facilitate compliance with LEED standards.
- Action SE.3.4.1 Over time, replace the City's vehicle fleet with alternative fuel vehicles.
- Action SE.3.4.6 The City will give priority to projects that will result in reduction of vehicle miles traveled per capita while maintaining sustainability and economic vitality.
- Action SE.4.1.1 Utilize, where feasible, renewable energy and clean generation technologies such as solar, wind, biogas, tidal, cogeneration, and fuel cells to power City facilities using tax-free low-interest loans and other available financial options.
- Action SE.4.1.3 Designate suitable sites to prioritize their development for renewable energy generation.
- Action SE.4.2.4 Provide technical assistance to builders and developers to encourage sustainable and energy efficient building design.
- Policy SE.4.3 Pinole will promote and require renewable energy generation and co-generation where feasible and appropriate.
- Action SE. 4.3.1 Require that new office/retail/commercial or industrial development, or major rehabilitation (e.g. additions of 25,000 square feet commercial, or 100,000 square feet industrial) incorporate renewable energy generation either on- or off-site to provide 15% or more of the project's energy needs.
- Action SE.4.4.2 Continue to conduct energy audits of Pinole facilities and implement energy efficiency and retrofiting recommendations from those audits. Seek funding from available state sources and grant opportunities, as well as the CIP.
- Action SE.4.4.3 Where feasible and appropriate, transition to LED/energy efficient lights in all City facilities and equipment.
- Action SE.4.4.4 Set a target to meet a majority of the City's energy needs via renewable energy.

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- Action SE.4.5.1 Require that, where feasible, all new buildings be constructed for easy, cost-effective installation of solar energy systems. This should include requiring such features as optimal roof orientation, clear access without obstructions, and appropriate roof framing and wiring.
- Action SE.4.5.3 Require that any building constructed in whole or in part with City funds incorporate passive solar design features such as daylighting and passive solar heating, where feasible.
- Action SE.6.1.3 Develop a Green Streets program to encourage designs that enhance the City's ecological function, reduce stormwater discharge through the use of pervious surfaces where appropriate, add infiltration enhancements (e.g. planters, swales, and channels), and increase sidewalk planting areas to reduce the heat island effect in developed areas and provide room for additional trees and shrubs within public right-of-way areas.
- Action SE.6.2.1 Reduce energy consumption in buildings by balancing energy-efficient design with land use compatibility during the design review process.
- Policy SE.7.4 In order to reduce vehicle miles traveled and traffic congestion, new development within 1,000 feet of an existing or planned transit stops should be designed to encourage the usage of public transit and minimize the dependence on the automobile through the application of site design guidelines.
- Action SE.8.6.5 Require that new and fully renovated commercial and retail development provide preferential parking for electric vehicles and vehicles using alternative fuels.
- Policy SE.8.7 Work to improve Pinole's pedestrian and bicycle infrastructure and to meet the needs of all pedestrians and bicyclists.
- Action SE.8.7.1 Implement public transit-, bicycle- and pedestrian-oriented land use and design strategies in new development, as described in the Land Use and Circulation Elements of the General Plan to reduce the number of single-occupant trips in fossil-fueled vehicles.
- Action SE.8.7.5 Establish and implement standards that meet or exceed state law for "complete streets" that foster equal access by all users in the roadway system. Include standards that address connection of bicycle and pedestrian access to other areas, safe road crossings, adequate and secure bike parking at public and private facilities, and street standards as is feasible for bicycle infrastructure.
- Action SE.8.10.1 Develop the necessary infrastructure to encourage the use of zero-emission vehicles and clean alternative fuels, such as development of electric vehicles charging facilities and alternative fueling stations.
- Action SE.8.10.3 Establish incentives for use of alternative fuel, electric, or gas-electric hybrid vehicles.

In addition, Chapter 7.0, *Private Realm Standards and Design Guidelines*, of the Three Corridors Specific Plan encourages the incorporation of building siting and design techniques that increase energy efficiency including orienting buildings to maximize solar access and the use of solar power systems, green roofs, and green building practices. Chapter 8.0, *Public Realm Standards and Design Guidelines*, encourages energy efficiency in public facilities and public lighting. Furthermore, Chapter 17.94 of the Zoning Code Update allows for the use of wind energy conversion systems in all zoning districts with the issuance of a use permit and provides specific performance standards for such systems.

Implementation of the proposed General Plan Update policies and actions listed above would result in efficient energy usage in both public and private development, while subsequent development would also be required to comply with energy efficiency standards in Title 24 of the California Code of Regulations. Additionally policies, standards and strategies specified in the Three Corridors Specific Plans and discussed above further address energy consumption. In addition, transportation fuel use would be reduced under buildout of the proposed project as a result of implementation of AB 1493. Therefore, impacts would be considered **less than cumulatively considerable**.

Mitigation Measures

None required.

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REFERENCES

- Bay Area Air Quality Management District (BAAQMD). 2009. *California Environmental Quality Act Guidelines Update: Proposed Thresholds of Significance*. <http://www.baaqmd.gov/~media/Files/Planning%20and%20Research/CEQA/Proposed%20Thresholds%20of%20Significance%20Dec%207%2009.ashx> (accessed January 2010).
- Bay Area Air Quality Management District (BAAQMD). 2010. *GHG Plan Level Quantification Guidance*. http://www.baaqmd.gov/~media/Files/Planning%20and%20Research/CEQA/GHG%20Quantification%20Guidance_5_3_10.ashx (accessed May 21, 2010).
- Brekke, L. D., N. L. Miller, K. E. Bashford, et al. 2004. Climate change impacts uncertainty for water resources in the San Joaquin River Basin, California. *Journal of the American Water Resources Association* 40 (1):149–164.
- California Air Pollution Control Officers Association (CAPCOA). 2008. *CEQA and Climate Change: Evaluating and Addressing Greenhouse Gas Emissions from Projects Subject to the California Environmental Quality Act*.
- California Air Pollution Control Officers Association (CAPCOA). 2009. *Model Policies for Greenhouse Gases in General Plans: A Resource for Local Government to Incorporate General Plan Policies to Reduce Greenhouse Gas Emissions*.
- California Air Resources Board (CARB). 2009. *California Greenhouse Gas Inventory Data 2000 to 2006*. Last Reviewed on December 10, 2009. <http://www.arb.ca.gov/cc/inventory/data/data.htm> (accessed April 2010).
- California Climate Action Team (CAT). 2009. *Draft Climate Action Team Biennial Report to the Governor and Legislature*.
- California Department of Water Resources (DWR). 2006. *Progress on Incorporating Climate Change Into Management of California Water Resources*.
- California Energy Commission (CEC). 2006a. *Inventory of California Greenhouse Gas Emissions and Sinks: 1990 to 2004*. Publication CEC-600-2006-013-D. <http://www.energy.ca.gov/2006publications/CEC-600-2006-013/CEC-600-2006-013-SF.PDF> (accessed March 2010).
- California Energy Commission (CEC). 2006b. *Our Changing Climate: Assessing the Risks to California*. Publication CEC-500-2006-077.
- California Energy Commission (CEC). 2007. Website: *Energy Almanac*. <http://energyalmanac.ca.gov/transportation/summary.html#fuel> (accessed April 13, 2010).
- California Energy Commission (CEC). 2008. *2008 Building Energy Efficiency Standards for Residential and Nonresidential Buildings*. December 2008. <http://www.energy.ca.gov/title24/> (accessed May 2010).
- California Energy Commission (CEC). 2009a. *The Future is Now: An Update on Climate Change Science Impacts and Response for California*.

- California Energy Commission (CEC). 2009b. *Climate Change Portal*. Last update December 22, 2006. <http://www.climatechange.ca.gov> (accessed March 2010).
- California Energy Commission (CEC). 2009c. *2009 Integrated Energy Policy Report, Final Committee Report*. December 2009.
- California Environmental Protection Agency (Cal-EPA). 2007. *FAQS Frequently Asked Questions About Global Climate Change*. <http://www.climatechange.ca.gov/publications/faqs.html>
- California Natural Resources Agency. 2009. *California Adaption Strategy Discussion Draft: A Report to the Governor of the State of California in Response to Executive Order S-13-2008*.
- California Public Utilities Commission (CPUC). 2009. *33% Renewables Portfolio Standard: Implementation Analysis Preliminary Results*.
- East Bay Municipal Utility District (EBMUD), Water Resources Planning Division. 2005. *Urban Water Management Plan 2005*.
- Gleick, Peter. 1997. American Water Works Association (AWWA). Climate change and water resources. *Journal of the American Water Works Association*, Vol. 89, No. 11, pp. 107–110.
- Intergovernmental Panel of Climate Change (IPCC). 2007. *National Greenhouse Gas Inventories Programme*. <http://www.ipcc-nggip.iges.or.jp> (accessed March 2010).
- Kiparsky, 2003. op. cit; DWR, 2005. op. cit.; Cayan, D., et al. 2006. *Scenarios of Climate Change in California: An Overview* (White Paper, CEC-500-2005-203-SF), Sacramento, CA. February.
- Kiparsky, M. and P. H. Gleick. 2003. *Climate Change and California Water Resources: A Survey and Summary of the Literature*. Oakland, CA: Pacific Institute for Studies in Development.
- Metropolitan Transportation Commission (MTC). 2008. *Travel Forecasts Data Summary: Transportation 2035 Plan for the San Francisco Bay Area*.
- Miller, Tyler G. 2000. *Living In the Environment*. 11th ed. Thomson Learning.
- National Aeronautical and Space Administration (NASA). 2009. *NASA Facts Online*. http://www.gsfc.nasa.gov/gsfc/service/gallery/fact_sheets/earthsci/green.htm (accessed April 2010).
- Pacific Gas and Electric (PG&E). 2009. <http://www.pge.com/> (accessed May, 2010).
- Pinole, City of. 2010. *Community-Wide and Government Operations 2005 Baseline Greenhouse Gas Emissions Inventory* (Administrative Draft).
- San Francisco Bay Conservation and Development Commission (BCDC). 2009. (April) Draft Staff Report. *Living with a Rising Bay: Vulnerability and Adaptation in San Francisco Bay and on its Shoreline*. http://www.bcdc.ca.gov/planning/climate_change/climate_change.shtml (accessed April 2010).

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Western Region Climate Center (WRCC). 2009. <http://www.wrcc.dri.edu>.

United States Department of Energy (USDE). 2008. *California Energy Commission Updates Building Energy Standards*. May 2008. http://apps1.eere.energy.gov/state_energy_program/update/project_detail.cfm/pb_id=1285(accessed May 12, 2010).