4.16 Climate Change

4.16.1 Abstract

This section describes how development and other activities associated with 2007 General Plan would contribute to global climate change and the effect of climate change on the County.

Many of the policies identified in the 2007 General Plan for land use, circulation, and open space and conservation will help reduce greenhouse gas (GHG) emissions, in particular, Policy OS-10.11, which requires development of a detailed GHG inventory and adoption of a GHG Reduction Plan. Additional mitigation measures are described in this section to further inform the GHG Reduction Plan and to begin to implement reduction strategies. By 2012 the state's regulations will be fully enacted and the 2007 General Plan requires completion of the County's Greenhouse Gas Reduction Plan prior to that time (assuming General Plan adoption at the latest in 2009). At that time, the framework will be in place to achieve substantial GHG emission reductions by 2020 that will be consistent with the overall state goals for reductions called for in AB 32. As the state and the County's efforts proceed to reduce emissions, the County's contribution would be less than considerable in 2020. Mitigation identified in this chapter requires extension of the GHG Reduction Plan to 2030 along with a 2030 reduction goal, which, when enacted will make the County's contribution less than cumulatively considerable for the 2030 planning horizon as well.

For buildout within the County beyond the 2030 planning horizon, not all of the technology has been developed to implement reductions to meet the goals of Executive Order S-3-05, which requires reduction of GHG emissions to levels 80 percent below 1990 levels. Mitigation identified in this chapter requires continuation of the GHG Reduction Plan beyond 2030 as well as adoption of a new General Plan by 2030 that would examine options to focus growth for the period after 2030. These measures would identify feasible means along with state and federal actions that might be able to reduce emissions to 80 percent below 1990 levels, but given that the means to effect such emissions are not known at present, buildout within the County beyond 2030 is determined to make a considerably contribution to cumulative GHG emissions and global climate change.

A certain amount of environmental change is inevitable in Monterey County due to current and unavoidable future increases in GHG emissions worldwide. The extent of such change on a local basis to Monterey County agriculture, water supplies, flooding, natural ecosystems, and environmental health, and other areas is not fully understood at present. Mitigation identified in this section calls for the development and implementation of a Climate Change Preparedness Plan for the County starting within 5 years of adoption of this General Plan. As

adaptation to climate change is more fully integrated into County planning over time, new development will be more resilient to these inevitable changes and would avoid subjecting persons or property to otherwise avoidable additional physical harm.

4.16.2 Introduction

In this chapter, the potential impacts associated with GHG emissions from development under the 2007 General Plan are described at a program level and the impacts of climate change on Monterey County are described at a program level. The impact analysis is quantitative (where data are reasonably available) and qualitative (otherwise) and is not site-specific because of the wide geographical area covered.

4.16.3 Environmental Setting

This environmental setting provides a background on GHG emissions, climate change, and global, California, and County GHG emissions.

4.16.3.1 Greenhouse Gases

Activities such as fossil fuel combustion, deforestation, and other changes in land use result in the accumulation of GHGs such as carbon dioxide (CO_2) in our atmosphere. An increase in GHG emissions results in an increase in the Earth's average surface temperature, which is commonly referred to as *global warming.* Global warming is expected, in turn, to affect weather patterns, average sea level, ocean acidification, chemical reaction rates, precipitation rates, etc., in a manner commonly referred to as *climate change.*

Since the industrial revolution, concentrations of GHGs in the Earth's atmosphere have been gradually increasing. Recently recorded increases in the Earth's average temperature are the result of increased concentrations of GHG in the atmosphere. (Intergovernmental Panel on Climate Change 2007)

The Intergovernmental Panel on Climate Change (IPCC) has been established by the World Meteorological Organization and United Nations Environment Programme to assess scientific, technical, and socioeconomic information relevant to the understanding of climate change, its potential impacts, and options for adaptation and mitigation. The IPCC's best estimates are that the average global temperature rise between years 2000 and 2100 could range from 0.6°C (with no increase in GHG emissions above year 2000 levels) to 4.0°C (with substantial increase in GHG emissions) (Intergovernmental Panel on Climate Change 2007). Large increases in global temperatures could have massive deleterious impacts on the natural and human environments.

According to the Federal Environmental Protection Agency (EPA), a GHG is any gas that absorbs infrared radiation in the atmosphere. This absorption traps heat within the atmosphere creating a "greenhouse" effect that is slowly raising global temperatures. GHGs include water vapor, CO_2, methane (CH_4), nitrous oxide (N_2O), halogenated chlorofluorocarbons (HCFCs), ozone (O_3), perfluorinated carbons (PFCs), and hydrofluorocarbons (HFCs). Naturally occurring GHGs include water vapor, CO_2, CH_4, N_2O, and O_3. Many human activities add to the levels of most of these naturally occurring gases. CO_2 is released to the atmosphere when solid waste, fossil fuels (oil, natural gas, and coal), and wood and wood products are burned. N_2O is emitted during agricultural and industrial activities, as well as during combustion of solid waste and fossil fuels. CO_2 and N_2O are the two GHGs released in greatest quantities from mobile sources burning gasoline and diesel fuel. Methane, a highly potent GHG, results from off-gassing associated with agricultural practices and landfills, among other sources.

Sinks of CO_2[1] (which absorb, rather than produce, CO_2), include uptake by vegetation and dissolution into the ocean. Worldwide GHG production greatly exceeds the absorption capacity of natural sinks. As a result, concentrations of GHG in the atmosphere are on the increase. (California Energy Commission 2006)

Climate change is a global problem, and GHGs are global pollutants, unlike criteria air pollutants (such as ozone precursors) and toxic air contaminants (TACs), which are pollutants of regional and local concern.

4.16.3.2 Climate Change Impacts in California

Climate change could impact the natural environment in California in the following ways, among others:

- Rising sea levels along the California coastline, particularly in San Francisco and the San Joaquin Delta due to ocean expansion;
- Extreme-heat conditions, such as heat waves and very high temperatures, which could last longer and become more frequent;
- An increase in heat-related human deaths, infection diseases and a higher risk of respiratory problems caused by deteriorating air quality;
- Reduced snow pack and stream flow in the Sierra Nevada mountains, affecting winter recreation and water supplies;
- Potential increase in the severity of winter storms, affecting peak stream flows and flooding;
- Changes in growing season conditions that could affect California agriculture, causing variations in crop quality and yield;

[1] A carbon dioxide sink is a resource that absorbs carbon dioxide from the atmosphere. The classic example of a sink is a forest in which vegetation absorbs carbon dioxide and produces oxygen through photosynthesis.

- Changes in distribution of plant and wildlife species due to changes in temperature, competition from colonizing species, changes in hydrologic cycles, changes in sea levels, and other climate-related effects.

These changes in California's climate and ecosystems are occurring at a time when California's population is expected to increase from 34 million to 59 million by the year 2040 (California Energy Commission [CEC] 2005). As such, the number of people potentially affected by climate change, as well as the amount of anthropogenic GHG emissions is expected to significantly increase. Similar changes as those noted above for California also would occur in other parts of the world, with regional variations in resources affected and vulnerability to adverse effects.

4.16.3.3 Emissions Summary

California Emissions

Worldwide, California is estimated to be the 12th to 16th largest emitter of CO_2 (California Energy Commission 2006) and is responsible for approximately 2 percent of the world's CO_2 emissions (California Energy Commission 2006).

The California Energy Commission's *Inventory of California Greenhouse Gas Emissions and Sinks: 1990 to 2004* estimates that California is the second largest emitter of GHG emissions of the United States (only Texas emits more GHG). The CEC estimates that in 2004, California's gross GHG emissions were 492 million metric tons (MMT) of CO_2 equivalent (CO2E)[2]. The transportation sector produced approximately 41 percent of California's GHG emissions in 2004. Electric power production accounted for approximately 22 percent of emissions (including estimated emissions from out-of-state coal-fired power plants), the industrial sector contributed 21 percent of the total; agriculture and forestry contributed 8 percent, and other sectors contributed 8 percent (California Energy Commission 2006).

Transportation is responsible for 41 percent of the state's GHG emissions, followed by the industrial sector (23%), electricity generation (20%), agriculture and forestry (8%) and other sources (8%). California GHG emissions in 2004 (exclusive of land use changes and forestry) totaled approximately 484 MMT of CO2E (CARB 2007).

[2] Greenhouse gas emissions other than carbon dioxide are commonly converted into carbon dioxide equivalents which take into account the differing global warming potential (310) of different gases. For example, the IPCC finds that nitrous oxide has a GWP of 310 and methane has a GWP of 21. Thus emission of one ton of nitrous oxide and one ton of methane is represented as the emission of 310 tons of CO_2e and 21 tons of CO_2e respectively. This allows for the summation of different greenhouse gas emissions into a single total.

Monterey County

Existing direct emissions from vehicles and stationary sources in Monterey County are related to various residential, commercial, industrial, institutional and agricultural uses. Indirect emissions result from electricity consumption and landfill activity.

An inventory of current Monterey County GHG emissions was prepared estimated on the basis of estimated vehicle miles traveled, natural gas consumption, electricity use, industrial process activity, landfill activity, and agricultural equipment use and is presented in Table 4.16-1. The methodology for preparation of the current GHG inventory is presented in Appendix B. The inventory methodology for the local government operations is consistent with the California Climate Action Registry (CCAR) General Protocol (CCAR 2008) and The Climate Registry General Protocol (The Climate Registry 2008).

The geographic scope of the inventory was limited to emissions that occur within Monterey County with the exception of indirect emissions related to electricity. Per CCAR protocol, indirect electricity GHG emissions were estimated based on the mix of energy emissions related to PG&E generation sources on a regional basis.

Table 4.16-1. Monterey County Greenhouse Gas Emissions Estimate, 2006

Source	GHG Emissions	% of Total	Notes
Vehicle Emissions	647,175	46%	Includes miles on County roads and 25% of state highway miles.
Natural Gas Consumption	190,848	14%	Residential, commercial, and industrial consumption from PG&E.
Electricity Consumption	209,103	15%	Residential, commercial, and industrial consumption from PG&E.
Industrial Processes	201,290	14%	Based on MBUAPCD inventory data.
Landfill Emissions	32,829	2%	Based on CIWMB data.
Agricultural Equipment Fuel Use	113,159	8%	Based on farm acreage and state averages.
Total	**1,394,404**	**100%**	

Source: See Appendix B

The inventory does not include estimates of GHG emissions related to transportation outside the County, such as the transportation of goods to and from the County or tourist traffic when it occurs outside of the County. GHG "lifecycle" emissions are also not included in the inventory, such as the extraction and refining of fuel and the manufacture of vehicles, or the manufacture of construction building materials when they occur outside the county, which are also significant sources of domestic and international GHG emissions.

Comparing Monterey County to California, the 2006 emissions related to unincorporated Monterey County represent approximately 0.3 % of 2004 California emissions (CARB has not yet released a 2006 emissions estimate).

4.16.4 Regulatory Framework

The current regulatory setting related to climate change and GHG emissions is summarized below.

4.16.4.1 Federal Regulations

Twelve U.S. states and cities (including California), in conjunction with several environmental organizations, sued to force the U.S. Environmental Protection Agency (EPA) to regulate GHGs as a pollutant pursuant to the Clean Air Act (*Massachusetts vs. Environmental Protection Agency et al*. 549 U.S. 497 (2007). The court ruled that the plaintiffs had standing to sue, that GHGs fit within the CAA's definition of a pollutant, and that the EPA's reasons for not regulating GHGs were insufficiently grounded in the CAA.

In November 2007 and August 2008, the Ninth Circuit U.S. Court of Appeals ruled that a NEPA document must contain a detailed GHG analysis. (*Center for Biological Diversity v. National Highway Safety Administration* 508 F. 3d 508 (2007) was vacated and replaced by *Center for Biological Diversity v. National Highway Safety Administration* 2008 DJDAR 12954 (August 18, 2008)). Despite the Supreme Court and circuit court rulings, there are no promulgated federal regulations to date limiting GHG emissions.

4.16.4.2 State Regulations

SB 1078/SB 107—Renewable Portfolio Standard (RPS)

Established in 2002 under Senate Bill 1078 and accelerated in 2006 under Senate Bill 107, California's RPS obligates investor-owned utilities (IOUs), energy service providers (ESPs) and community choice aggregators (CCAs) to procure an additional 1% of retail sales per year from eligible renewable sources until 20% is reached, no later than 2010. The California Public Utilities Commission (CPUC) and California Energy Commission (CEC) are jointly responsible for implementing the program.

AB 1493—Greenhouse Gas Emission Standards for Automobiles

California Assembly Bill (AB) 1493 in 2002 required the California Air Resources Board (CARB) to develop and adopt the nation's first GHG emission standards for automobiles. The legislature declared in AB 1493 that global warming was a matter of increasing concern for public health and environment in the state. It cited several risks that California faces from climate change, including reduction in the state's water supply, increased air pollution creation by higher temperatures, harm to agriculture, and increase in wildfires, damage to the coastline, and economic losses caused by higher food, water energy, and insurance prices. Further the legislature stated that technological solutions to reduce GHG emissions would stimulate California economy and provide jobs.

The State of California in 2004 submitted a request for a waiver from federal clean air regulations (as the State is authorized to do under the Clean Air Act) to allow the State to require reduced tailpipe emissions of CO_2. In late 2007, the EPA denied California's waiver request and declined to promulgate adequate federal regulations limiting GHG emissions. In early 2008, the State brought suit against EPA related to this denial.

A recent CARB study (CARB 2008a) showed that in calendar year 2016, AB 1493 (also referred to as the Pavley standard or the Pavley rules) would reduce California's GHG annual emissions by 16.4 million metric tons (MMT) of carbon dioxide equivalents (CO2E). This is almost 50% more than the 11.1 MMT reduction produced by currently proposed federal fleet average standards for model years 2011 – 2015.

Further, by 2020, California is committed to implement revised, more stringent GHG emission limits, the Pavley Phase 2 rules (See discussion of scoping plan below). California's requirements would reduce California GHG emissions by 31.7 MMTCO2E in calendar year 2020, 45 percent more than the 21.9 MMTs reductions under the proposed federal rules in that year. Since the California rules are significantly more effective at reducing GHGs than the federal CAFE (fuel economy) program, they also result in better fuel efficiency – roughly 43 miles per gallon (mpg) in 2020 for the California vehicle fleet as compared to the new CAFE standard of 35 mpg.

Executive Order S-3-05—Greenhouse Gas Emission Reduction Targets

In 2005, Governor Schwarzenegger issued California Executive Order S-3-05 establishing the following GHG emission reduction targets for California:

- reduce GHG emissions to 2000 levels by 2010;
- reduce GHG emissions to 1990 levels by 2020; and
- reduce GHG emissions to 80 percent below 1990 levels by 2050.

Executive Orders are binding only on State agencies. Accordingly, S-3-05 will guide state agencies' efforts to control and regulate GHG emissions, but have no direct binding effect on local efforts.

AB 32—The Global Warming Solutions Act of 2006

California AB 32, the "Global Warming Solutions Act of 2006," codifies the State's GHG emissions target by directing the CARB to reduce the State's global warming emissions to 1990 levels by 2020. CARB regulations are required to begin phasing in by 2012. AB 32 was signed and passed into law by Governor Arnold Schwarzenegger on September 27, 2006. Since that time, CARB, CEC, the Public Utilities Commission, and the Building Standards Commission have all been at work on regulations that will help meet the goals of AB 32 and S-3-05.

Key AB 32 milestones are as follows:

- June 30, 2007—Identification of "discrete early action GHG emissions reduction measures. *This has been completed and is discussed below*
- January 1, 2008—Identification of the 1990 baseline GHG emissions level and approval of a statewide limit equivalent to that level. Adoption of reporting and verification requirements concerning GHG emissions. *This has been completed. In December of 2007, CARB approved the 2020 emission limit of 427 million metric tons of carbon dioxide (CO2) equivalents (MMTCO2E) of GHGs.*
- January 1, 2009—Adoption of a scoping plan for achieving GHG emission reductions. *A draft scoping plan was released in June 2008 and is summarized below.*
- January 1, 2010—Adoption and enforcement of regulations to implement the "discrete" actions.
- January 1 1011—Adoption of GHG emission limits and reduction measures by regulation.
- January 1, 2012—GHG emission limits and reduction measures adopted in 2011 become enforceable.

AB 32 Early Actions Adopted in 2007

CARB adopted the following early actions on June 21, 2007:

- Group 1—Three new GHG-only regulations are proposed to meet the narrow legal definition of "discrete early action greenhouse gas reduction measures" in Section 38560.5 of the Health and Safety Code. These include the Governor's Low Carbon Fuel Standard, reduction of refrigerant losses from motor vehicle air conditioning maintenance, and increased methane capture from landfills. These actions are estimated to reduce GHG emissions

between 13 and 26 MMT of CO2E) annually by 2020 relative to projected levels. If approved for listing by the Governing Board, these measures will be brought to hearing in the next 12 to 18 months and take legal effect by January 1, 2010.

- Group 2—CARB is initiating work on another 23 GHG emission reduction measures in the 2007-2009 time period, with rulemaking to occur as soon as possible where applicable. These GHG measures relate to the following sectors: agriculture, commercial, education, energy efficiency, fire suppression, forestry, oil and gas, and transportation.
- Group 3—CARB staff has identified 10 conventional air pollution control measures that are scheduled for rulemaking in the 2007-2009 period. These control measures are aimed at criteria and toxic air pollutants, but will have concurrent climate co-benefits through reductions in CO2 or non-Kyoto pollutants (i.e., diesel particulate matter, other light-absorbing compounds and/or ozone precursors) that contribute to global warming.

In October 2007, CARB expanded the early actions to include the following measures.

- Group 1 Discrete Early Actions—SF6 reductions from non-electricity sector; reduction of emissions from consumer products; Smartway Truck Efficiency (require existing trucks and trailers to be retrofitted with devices that reduce aerodynamic drag); tire inflation (require tune-up and oil change technicians to ensure proper tire inflation as part of overall service); reduction of PFCs from semiconductor industry; and Green ports (allow docked ships to shut off their auxiliary engines by plugging into shoreside electrical outlets or other technologies).
- Group 2: Other Early Actions—refrigerant tracking, reporting and recovery program; energy efficiency of California cement facilities; blended cements; anti-idling enforcement; and research regarding nitrogen land application efficiency.

AB 32 Draft Scoping Plan

In June 2008, CARB released its Draft Scoping Plan which outlines an approach to meet AB 32's goal and is summarized in Table 4.16-2. The plan identified measures to reduce GHG emissions to 1990 levels which is approximately 30 percent from business-as-usual emission levels projected for 2020, or about 10 percent from today's (2008) levels. On a per-capita basis, that means reducing annual emissions of 14 tons of carbon dioxide for person in California down to about 10 tons per person by 2020. Below is a summary of the recommended reduction strategies.

The Proposed Scoping Plan, which will be released in October, 2008, will be based on additional staff modeling and analysis, consideration of public comment on the Draft Plan, recommendations from the advisory committees and other

experts. The Proposed Plan will have a 45-day comment period before CARB considers adoption at its November 2008 meeting. The Scoping Plan, even after Board approval, will remain a plan. The measures in the Scoping Plan must be adopted through the normal rulemaking process, with the necessary public input.

Table 4.16-2. Summary of AB 32 Draft Scoping Plan Recommendations

Recommended Reduction Strategies	Sector	2020 Reductions (MMTCO2E)
The Role of State Government Reduce carbon footprint Set an example	Various	1–2 (under evaluation)
California Cap-and-Trade Program Linked to WCI: Emissions cap of 365 MMTCO2E covering electricity, transportation, residential/commercial and industrial sources by 2020. Shaded reductions below contribute to achieving the cap.		
California Light-Duty Vehicle GHG Standards · Implement Pavley standards Develop Pavley II light-duty vehicle standards	Transportation	31.7
Energy Efficiency Building and appliance energy efficiency and conservation 32,000 GWh reduced electricity demand · 800 million therms reduced gas use Increase Combined Heat and Power (CHP) electricity production by 30,000 GWh Solar Water Heating (AB 1470 goal)	Electricity & Commercial and Residential	26.4
Renewables Portfolio Standard (33% by 2020)	Electricity	21.2
Low Carbon Fuel Standard	Transportation	16.5
High Global Warming Potential Gas Measures	High GWP	16.2
Sustainable Forests	Forests	5
Water Sector Measures	Water	4.8
Vehicle Efficiency Measures	Transportation	4.8
Goods Movement Ship Electrification at Ports System-Wide Efficiency Improvements	Transportation	3.7
Heavy/Medium Duty Vehicles Heavy-Duty Vehicle GHG Emission Reduction (Aerodynamic Efficiency) Medium-and Heavy-Duty Vehicle Hybridization Heavy-Duty Engine Efficiency	Transportation	2.5
Million Solar Roofs (Existing Program Target)	Electricity	2.1
Local Government Actions and Regional GHG Targets	Land Use and Local Government	2
High Speed Rail	Transportation	1
Landfill Methane Control	Recycling & Waste	1
Methane Capture at Large Dairies	Agriculture	1
Energy Efficiency and Co-Benefits Audits for Large Industrial Sources	Industrial	TBD
Additional Emissions Reduction from Capped Sectors		35.2
Total Reductions		**169**

Source: California Air Resources Board 2008b.

Senate Bill 97 Chapter 185, Statutes of 2007

Senate Bill 97 (SB 97) requires that Office of Planning and Research (OPR) to prepare guidelines to submit to the California Resources Agency regarding feasible mitigation of greenhouse gas emissions or the effects of GHG emissions as required by CEQA. The California Resources Agency is required to certify and adopt these revisions to the State CEQA Guidelines by January 1, 2010. The Guidelines will apply retroactively to any incomplete environmental impact report, negative declaration, mitigated negative declaration, or other related document.

Executive Order S-01-07

Executive Order S-01-07 was enacted by Governor Schwarzenegger on January 18, 2007. The order mandates the following: 1) that a statewide goal be established to reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020; and 2) that a Low Carbon Fuel Standard (LCFS) for transportation fuels be established in California.

Draft Local Government Operations Protocol

In June, 2008, the California Air Resources Board, California Climate Action Registry, ICLEI - Local Governments for Sustainability, and the Climate Registry released a draft protocol for the preparation of GHG emissions inventories for local government municipal operations. The draft protocol does not contain recommendations for GHG reductions by local governments (CARB 2008c).

4.16.4.3 Local Regulations

The Monterey Bay Unified Air Pollution District presently has no guidance concerning CEQA evaluation of GHG emissions and no regulatory requirements.

4.16.4.4 Monterey County Programs

Monterey County is currently implementing the following programs and initiatives that will, in part, help to reduce GHG emissions from municipal operations and other sources:

- Municipal Energy Audit—The County has initiated an energy audit of its existing building, beginning with the oldest structures to evaluate feasible energy and water retrofits.

- Lighting Retrofit—The County recently completed a lighting retrofit at the Adult Rehab Facility which reduced electricity consumption by approximately 686,000 kwh.
- Energy and Water Efficiency Standards for New Municipal Building Construction—The County will be including energy and water efficiency criteria in all of its Requests for Proposals for new construction and remodeling of County buildings.
- Carpools—The County is running two vanpools 5 days per week, twice a day (to and from the office)
- Fleet Vehicles—The County currently has 49 vehicles that are fuel efficient or hybrids.
- Goods Movement Planning—The County has entered into a partnership with AMBAG and the City of Salinas to evaluate the viability of converting up to 25% of its agricultural goods movement from truck to rail.
- Blueprint for Growth—The County is a partner with AMBAG in the Blueprint for Growth Plan development that was initiated in July 2008. The focus of the effort will be to further enhance regional plans for alternative transportation and inter-city route planning.

4.16.5 Project Impacts

4.16.5.1 Methodology

An inventory of GHG emissions was prepared for development allowed within unincorporated Monterey County for the planning horizon of 2030 and for buildout. The scope of the inventory was to include emissions due to new development in unincorporated areas when they occur within Monterey County, except for indirect emissions associated with electricity generation which are included based on PG&E generation sources on a regional basis.

GHG emissions were estimated for increases in vehicle traffic, electricity and natural gas consumption related to new residential, commercial, and industrial development, and landfill emissions due to increased waste disposal. The methodology is described in Appendix B.

4.16.5.2 Thresholds of Significance

CEQA and the State CEQA Guidelines require the disclosure of the significant cumulative environmental effects, whether the project will make a cumulatively considerable contribution to any such effects, and, if so, mitigation measures intended to reduce the project's contribution (Section 15130 of the State CEQA Guidelines). A cumulative effect is one that results from past, present, and probable future projects. A project that has a less-than-significant direct effect

on the environment may nonetheless make a considerable contribution to a cumulative effect. The decision in *Communities for a Better Environment, et al v. California Resources Agency* (2002) 103 Cal.App.4th 98 put the approach to evaluating a project's contribution to a cumulative impact succinctly: "In the end, the greater the existing environmental problems are, the lower the threshold should be for treating a project's contribution to cumulative impacts as significant."

There are two fundamental questions regarding climate change under CEQA:

- *Does development allowed by the 2007 GP result in cumulative considerable GHG emissions and related climate change effects?*
- *Is development allowed by the 2007 GP prepared for the reasonably foreseeable changes in climate that will occur regardless of local, state, and global GHG reduction efforts?*

These are each addressed below separately.

Greenhouse Gas Emissions

AB 32 states, in part, that "Global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California." Because global warming is the result of GHG emissions, and GHGs are emitted by innumerable sources worldwide, global climate change is clearly a significant cumulative impact. However, the global increase in GHG emissions that has occurred and will occur in the future are the result of the actions and choices of individuals, businesses, local governments, states, and nations. Thus, the analysis below should be understood as an analysis of cumulative contributions to a significant global impact.

The Governor's Office of Planning and Research (OPR) is developing, and the California Resources Agency (Resources Agency) will certify and adopt amendments to the CEQA Guidelines on or before January 1, 2010, pursuant to Senate Bill 97 (Dutton, 2007). These new CEQA Guidelines will provide regulatory guidance on the analysis and mitigation of GHG emissions in CEQA documents.

In the interim, OPR has released a technical advisory (*CEQA and Climate Change: Addressing Climate Change through California Environmental Quality Act (CEQA) Review*, Office of Planning and Research, June 19, 2008). OPR offers informal guidance regarding the steps lead agencies should take to address climate change in their CEQA documents. This guidance was developed in cooperation with the Resources Agency, the California Environmental Protection Agency (Cal/EPA), and the CARB. The technical advisory provides the following guidance regarding significance determination:

- *"When assessing a project's GHG emissions, lead agencies must describe the existing environmental conditions or setting, without the project, which*

normally constitutes the baseline physical conditions for determining whether a project's impacts are significant.

- *As with any environmental impact, lead agencies must determine what constitutes a significant impact. In the absence of regulatory standards for GHG emissions or other scientific data to clearly define what constitutes a "significant impact", individual lead agencies may undertake a project-by-project analysis, consistent with available guidance and current CEQA practice.*
- *The potential effects of a project may be individually limited but cumulatively considerable. Lead agencies should not dismiss a proposed project's direct and/or indirect climate change impacts without careful consideration, supported by substantial evidence. Documentation of available information and analysis should be provided for any project that may significantly contribute new GHG emissions, either individually or cumulatively, directly or indirectly (e.g., transportation impacts).*
- *Although climate change is ultimately a cumulative impact, not every individual project that emits GHGs must necessarily be found to contribute to a significant cumulative impact on the environment. CEQA authorizes reliance on previously approved plans and mitigation programs that have adequately analyzed and mitigated GHG emissions to a less than significant level as a means to avoid or substantially reduce the cumulative impact of a project."*

CEQA currently has no thresholds for GHG emissions. As described by the OPR technical advisory, in absence of regulatory guidance or standards, lead agencies must undertake a project-by-project analysis, consistent with available guidance and current CEQA practice. What follows is Monterey County's significance criteria framework for this EIR on the 2007 General Plan

Scientific studies (as best represented by the IPCC's periodic reports) demonstrate that climate change is already occurring due to past GHG emissions. Forecasting of future growth and related GHG emissions under "business as usual (BAU)[3] conditions indicates large increases in those GHG emissions accompanied by an increasing severity of changes in global climate. Thus, the best scientific evidence concludes that global emissions must be reduced below current levels.

[3] "Business as usual" (BAU) conditions are defined as population and economic growth in the future using current (2008) building practices and current (2008) regulatory standards. For this EIR, reference to BAU conditions are specifically defined as including current mandatory requirements such as Title 24 (Energy Efficiency Standards), current federal vehicle mileage standards (but not California AB1493 vehicle emission standards which are not currently in force due to lack of issuance of a federal waiver), current renewable portfolio standards (RPS, SB 1078/SB107) for California regulated utilities, current County water efficiency requirements, and other existing local and state requirements. BAU conditions presume no improvements in energy efficiency, water efficiency, fuel efficiency beyond that existing today or as required by existing (2008) statute. Specifically, BAU conditions do not include the GHG reduction measures included in the CARB Draft Scoping Plan (June 2008) which are not yet enacted in statute.

On a state level, AB 32 identified that an acceptable level of GHG emissions in California 2020 is 427 million metric tons of CO_2e, which is the same as 1990 GHG emissions level, is about 11% less than current (480 million metric tons CO_2e in 2004) GHG emissions, and is about 28% less than projected 2020 BAU conditions (596 million metric tons CO_2e).

Thus, on a state level, if California can achieve these reductions, California as a whole will not contribute considerably to global GHG emissions. California's emissions in 2020 will still make a cumulative contribution to global GHG emissions, but relative to current baseline emissions will be substantively reduced.

In order to achieve these GHG reductions, there will have to be widespread reductions of GHG emissions from sources in many various sectors across the California economy including in Monterey County. Some of those reductions will need to come from the existing sources of emissions in the form of changes in vehicle emissions and mileage, changes in the sources of electricity, and increases in energy efficiency by existing residential, commercial, industrial, and agricultural development as well as other measures. While County action can help to promote GHG reductions from the existing economy, existing development is not under the discretionary land use authority of the County, and thus most of these reductions will come as the result of state and federal mandates. The remainder of the necessary GHG reductions will need to come from requiring new development to have a lower carbon intensity than BAU conditions. County land use discretion can substantially influence the GHG emissions from new development.

In terms of determining whether GHG emissions in Monterey County will be cumulatively considerable, one has to evaluate whether Monterey County, is doing its part to ensure that California, as a whole, meets the AB 32 target. While there can and likely will be variation in how much reductions each city or county or region can realistically achieve by 2020, on the average, they must all be approximately 30 percent compared to BAU conditions.

Thus, the simplest measure of whether Monterey County emissions will contribute considerably to GHG emissions in 2020 is whether they are 28 % less than BAU conditions. If they are, Monterey County would not contribute considerably to state or global GHG emissions and related climate change effects. Put another way, if Monterey County emissions are greater than 72% percent of BAU GHG emissions, then the emissions of new development allowed by the 2007 GP (along with the ongoing emissions of existing development) would contribute considerably to state and global GHG emissions and related climate change effects.

Thus, for this EIR, the 2007 GP would result in a cumulatively considerable contribution to a significant cumulative impact if:

- GHG emissions associated with unincorporated Monterey County (including the GHG emissions of Monterey County government and the GHG emissions

in unincorporated part of the County) are greater than 72 percent of forecasted BAU GHG emissions.

The 2007 GP requires preparation of a detailed current GHG inventory and GHG forecast for the County for 2020 within 24 months of GP adoption. As discussed below, the recommended goal for the GHG reduction plan required by Policy OS 10.11 is to reduce County GHG emissions by 28% relative to BAU emissions in 2020.

For the interim, this EIR will rely on the estimate of GHG emissions prepared for this EIR for 2030, adjusted to the year 2020. As discussed below, based on estimated BAU emissions, the 2007 GP will result in GHG emissions that exceed the significance criteria. Mitigation measures are included accordingly. As discussed above, in the next years the State will be adopting comprehensive regulations to reduce the GHG emissions from vehicles, industry, building, and other sources. These regulations are expected to play a major part in reaching the goal of reducing currently projected 2020 emissions levels by twenty-eight percent.

Climate Change Adaptation

A certain amount of environmental change is inevitable in Monterey County due to current GHG emissions and unavoidable future increases in GHG emissions worldwide. Change on a local basis to Monterey County agriculture, water supplies, flooding, wildfire potential, environmental health, and other areas is reasonably foreseeable, although not quantifiable in many aspects as present. New development allowed by the 2007 GP could place persons and property at higher levels of risk to climate change effects if it does not anticipate reasonably foreseeable changes in environmental conditions. Thus, for this EIR, the 2007 GP would result in a cumulatively considerable contribution to a significant cumulative impact if:

- Development allowed by the 2007 GP is unprepared for reasonably foreseeable environmental changes that will occur due to climate change and thus subjects property and persons to additional risk of physical harm related to flooding, public health, wildfire risk and other impacts.

4.16.5.3 Impact Analysis

Contribution to Global Climate Change

Impact CC-1: Development of the 2007 General Plan would contribute considerably to cumulative GHG emissions and global climate change as the County in 2020 would have GHG emissions greater than 72 percent of BAU conditions (Mitigated to Less Than Considerable for 2030 Planning Horizon, but Cumulatively Considerable with Mitigation for Buildout)

2030 Planning Horizon

Impact of Development with Policies

New GHG Emissions from transportation and direct and indirect energy consumption from residential, commercial, and industrial growth were estimated for the 2030 Planning Horizon for development allowed by the 2007 General Plan and are shown in Table 4.16-3. Emissions associated with land use change were not estimated for the reasons discussed below.

Transportation Emissions

New vehicle carbon dioxide emissions will result from new residential, commercial, industrial and public service development. The results of the EMFAC2007 modeling indicate that as of 2030, vehicular traffic within the Monterey County planning area with implementation of the 2007 General Plan (without consideration of City or adjacent County growth) would increase CO_2e emissions by 136,000 metric tons in 2030.

Taking into account the adopted AB 1493 standards for GHG emissions, there could be a reduction of 11% in the carbon dioxide emissions of light duty vehicles and therefore the increased emissions for 2030 would be 126,000 metric tons instead of 136,000 tons.

The AB-32 Draft Scoping Plan calls for implementation of AB 1493 standards (commonly called Pavley I) for GHG emissions and a more stringent enhancement named Pavley II, which would result in a reduction in GHG emissions from passenger vehicles of 20% by 2020. In addition, the Scoping Plan includes the implementation of a Low Carbon Fuel Standard that will reduce GHG emissions from passenger vehicles by 10%. The Pavley I and II efforts and Low Carbon Fuel Standard would result in an increase in GHG emissions of 109,000 metric tons in 2030 instead of 136,000 tons.

Table 4.16-3. Monterey County Greenhouse Gas Increase in Emissions, 2020 and 2030

Source	GHG Emissions	% of Total	Notes
Business as Usual Conditions			
Vehicle Emissions	136,476	55%	Based on growth in VMT
Natural Gas Consumption	26,000	10%	Residential, commercial, and industrial consumption.
Electricity Consumption	24,935	10%	Residential, commercial, and industrial consumption.
Industrial processes	51,230	21%	Based on growth in industrial employment
Landfill Emissions	8,987	1%	Based on growth in population.
Agricultural Emissions	No change	NA	Assumed no overall change in agricultural acreage.
Total from New Development 2030	247,628	100%	
Total from New Development 2020	144,450		Scaled based on years (+14 years to 2020/+24 years to 2030)
Total from Existing Development	1,394,404		Assumed no change since 2006.
Total for 2020	1,538,853		
Percent Change relative to 2006		*10%*	
With AB 1493 vehicle emissions standards and SB 1078, SB 107 RPS requirement of 20% renewable energy			
Vehicle Emissions	126,477	54%	Adjusted for Pavely 1
Natural Gas Consumption	26,000	11%	Not adjusted
Electricity Consumption	22,940	10%	Adjusted for SB 1078/SB 107
Industrial processes	51,230	22%	Not adjusted for potential improvements in process efficiency.
Landfill Emissions	8,987	4%	Not adjusted for potential improvements in landfill capture.
Agricultural Emissions	No change	NA	Assumed no overall change in agricultural acreage.
Total from New Development 2030	235,634	100%	
Total from New Development 2020	137,453		Scaled based on years (+14 years to 2020/+24 years to 2030)

Total from Existing Development	1,306,486		Assumes similar percentage reduction for existing development relative to BAU as estimated for new development (due to Pavely 1 and SB 1078/SB 107).
Total for 2020	1,443,939		
Percent Change relative to 2006		*-4%*	
Percent of 2020 BAU		*94%*	
With Pavley II vehicle emissions standards, Governor's Low Carbon Fuel Standard and Draft Scoping Plan RPS goal of 33% renewable energy			
Vehicle Miles Emissions	109,206	51%	Adjusted for Pavely 1, 2 and low-carbon fuel standard
Natural Gas Consumption	26,000	12%	Not adjusted
Electricity Consumption	19,699	9%	Adjusted for Scoping Plan RPS goal of 33%
Industrial processes	51,230	24%	Not adjusted for potential improvements in process efficiency.
Landfill Emissions	8,987	4%	Not adjusted for potential improvements in landfill capture.
Agricultural Emissions	No change	NA	Assumed no overall change in agricultural acreage.
Total from New Development 2030	215,122	100%	
Total from New Development 2020	125,488		Scaled based on years (+14 years to 2020/+24 years to 2030)
Total from Existing Development	1,156,340		Assumes similar percentage reduction for existing development relative to BAU as estimated for new development due to Paveley 2, LCFS and RPS goal of 33%
Total for 2020	1,281,828		
Percent Change relative to 2006		*-8%*	
Percent of 2020 BAU		*83%*	

Direct Energy Consumption Emissions

New buildings allowed by the 2007 General Plan would consume natural gas for heating, cooking, and other processes and other area sources. By 2030, residential, commercial and industrial development allowed by the 2007 General Plan would result in estimated new annual carbon dioxide emissions of 26,000 metric tons.

Indirect Electricity GHG Emissions

New buildings allowed by the 2007 General Plan would also consume electricity. By 2030, residential and commercial development allowed by the 2007 General Plan would result in estimated increase in annual indirect GHG emissions of 25,000 metric tons related to electricity under BAU conditions

Taking into account the adopted SB0178/SB107 RPS standards, there could be a reduction of 8% in the GHG emissions related to electricity production by PG&E and thus the increase in indirect GHG emissions would be reduced to 23,000 metric tons.

The Scoping Plan calls for an increase in RPS standards to 33%, which would result in a reduction of 21% in the GHG emissions related to electricity production by PG&E and thus the increase in indirect GHG emissions would be reduced to 20,000 metric tons.

Industrial Emissions

New industries would also consume fossil fuels and other GHGs for industrial processes. The nature of new industrial development is unknown, and thus no specific estimate was made of 2030 industrial process GHG emissions. However, an estimate was made based on scaling the current industrial GHG emissions based on the projected increase in industrial employment. Based on employment data, there would be an increase of industrial employment by 25% by 2030. Industrial process emissions in 2006 were estimated as 201,000 metric tons of CO2e. Thus increased GHG emissions in 2030 due to new growth are estimated to be 51,000 metric tons of CO2e.

Emissions Associated With Landfills

Development allowed by the 2007 General Plan would result in increased generation of waste which would require disposal in a landfill, which would increase methane emissions.

Based on population data, there would be an increase of population in the unincorporated County by 27% by 2030 and by 95% at buildout. Landfill emissions in 2006 were estimated as 33,000 metric tons of CO2e. Thus

increased GHG emissions by 2030 due to new growth are estimated to be 9,000 metric tons of CO2e.

Given the current and planned implementation of landfill gas capture and use of waste to energy technology in the future, future waste disposal may not contribute substantial amounts of methane. However, until full capture and reuse of landfill gas is achieved, there will be increased emissions associated with additional waste disposal.

Agricultural Emissions

Based on trends in agricultural employment (AMBAG 2004; AMBAG 2008), no net expansion in agricultural development is projected for 2030 or buildout as virtually no increase in agricultural employment is forecast by AMBAG to 2030 for the Monterey County in the most recent (2008) and the immediately prior (2004) economic forecasts. Thus, no estimate of additional agricultural emissions was made.

Traffic, electricity demand, and direct energy use for agricultural sector, including the new wineries is taking into account broadly in the calculation of vehicle emissions and of growth in electricity and direct energy use related emissions. Specific process emissions associated with new wineries were not estimated. Although emissions associated with wineries may rise compare to baseline, on a broad scale, with no increase in agricultural employment overall, it is expected that overall, there will not be substantial changes on overall agricultural emissions.

Emissions Associated With Land Use Changes

Development allowed by the 2007 General Plan would result in the conversion of natural vegetation and agricultural lands that would result in the loss of carbon sinks. Given the uncertainties associated with estimated GHG fluxes associated with natural vegetation and agricultural lands, the potential loss of carbon sinks was not quantified, but would nevertheless contribute GHG emissions along with other sources. As discussed below a number of 2007 General Plan policies seek to limit the amount of natural land conversion due to urban growth.

2007 General Plan Policies

The policies in the 2007 General Plan that relate to reduction of GHGs (compared to BAU) are referenced below by element and concern six different subjects: land use, transportation, water efficiency, energy, open space/conservation, and waste reduction. These policies address focusing growth in a limited number of communities that can provide services, jobs and housing. This is intended to result in a reduction in vehicle miles traveled. These policies also would result in a limitation on the conversation of agricultural land to residential and commercial development.

Land Use Element

The General Plan land use policies related to reduction of GHGs support higher density in the urban areas, transfer of development rights and credits, affordable housing, jobs/housing balance, and mixed use and transit oriented development. Land use related GP policies include:

LU-1.1 requires management of the type, location, timing, and intensity of growth in the unincorporated area shall be managed. LU-1.2 discourages premature and scattered development. LU-1.7 encourages clustering of residential development. LU-1.8 promoted voluntary reduction or limitation of development potential in the rural and agricultural areas through dedication of scenic or conservation easements, Transfer of Development Rights (TDR). LU-1.9 establishes a priority of infill of vacant non-agricultural lands in existing developed areas and new development within designated urban service areas. LU-1.19 establishes a priority of development within the focused growth areas (Community Areas, Rural Centers and Affordable Housing Overlay districts) and includes a Development Evaluation System for other areas that includes criteria that consider proximity to a City, Community Area, or Rural Center mixture of uses, proximity to multiple modes of transportation and jobs-housing balance within the community and between the community and surrounding areas.

LU-2.3 directs that high density residential areas shall be designated closest to urban areas. LU-2.4 directs that areas designated for residential use shall be located with convenient access to employment, shopping, recreation, and transportation and that higher density residential areas should be located with convenient access to public transit. LU-2.12 encourages and directs the development of affordable and workforce housing projects through the establishment of an Affordable Housing Overlay Program. LU-2.13 establishes a program for retaining affordable housing units. LU-2.15 directs the county to work with AMBAG and cities to direct the majority of urban growth including higher density housing development into cities and their spheres of influence with an emphasis on redevelopment and infill. LU-2.17 directs that, in coordination with the cities, sufficient land shall be designated to locate new housing as close to employment centers as feasible. LU-2.21 and LU 2.23 promote mixes use, transit, and jobs-housing balances in Community Areas.

LU-4.5 encourages a mix of residential and commercial uses in commercial areas.

Circulation Element

The General Plan transportation policies related to reduction of GHGs support public transportation and alternative transportation modes, reduce vehicle miles traveled, and promote transit oriented developments.

C-2.2 requires protection of existing and proposed public transportation facilities. C-2.4 encourages a reduction of the number of vehicle miles traveled per person. C-2.5 encourages overall land use patterns that reduce the need to travel by automobile. C-2.6 encourages bicycle and automobile storage facilities in conjunction with public transportation facilities. C-2.7 directs that new development shall be located and designed with convenient access and efficient transportation for all intended users, and where possible consider alternative transportation modes.

C-3.1 requires that the transportation modes be planned and strategies developed to, among other requirements, reduce the consumption of fossil fuels. C-3.4 supports strategies to encourage travel in non-peak hours. C-3.5 encourages transportation alternatives such as bicycles, car pools, public transit, and compact vehicles to be accommodated within and outside the public right-of-way and may be included as part of an Area Plan.

C-4.3 requires that the needs of bicyclists, and pedestrians, where appropriate, be provided in all public rights-of-way. C-4.5 directs that new public local and collector roads among, other requirements provide for bicycle and pedestrian traffic within the right-of-way. C-4.7 requires, where appropriate, that bicycle paths shall be separated from major roads and highways and be provided between adjacent communities.

C-6.1 endorses the efforts of transit operators to improve their services and equipment, including aggressive marketing and education campaigns. C-6.2 requires that major traffic generating events encourage the use of mass transit options. C-6.3 supports concentration of new development along major transportation corridors and near cities to make transit services to these areas more feasible. C-6.4 requires coordinated transit services. C-6.5 encourages use of public transit and alternative modes of transportation through land use designations and zoning which cluster employment centers with a mix of other uses, and project design that incorporates car pool areas, “park and ride” facilities and similar incentives. C-6.6 requires transit and bus parking facilities at major hotels, motels, convention centers, other tourist-serving areas and events.

C-8.1 requires protection of the potential for future rail transportation. C-8.3 encourages passenger rail, light rail, or bus rapid transit service to urban centers. C-8.4 encourages transit-oriented development around existing and future rail, light rail, or bus rapid transit stations.

C-10.1 requires an integrated system of suggested bicycle routes for Monterey County. C-10.2 requires coordination of a comprehensive bicycle plan. C-10.3 requires consideration of improved bike routes during construction or expansion of roadways within major transportation corridors. C-10.4 requires the integration of bicycle systems with other public transportation modes. C-10.5 encourages bicycling as a viable transportation mode for visitor-serving areas. C-10.6 encourages visitor-serving facilities to provide adequate and secure bicycle parking facilities. C-10.7 requires that new and improved multi-modal transfer facilities, such as transit centers and park-and-ride lots, include adequate and secure bicycle parking facilities.

Open Space and Conservation Element

The General Plan open space and conservation related policies related to GHG emissions reductions support open space networks, require tree conservation, promote alternative energy and energy efficiency and reduction of travel through concentrated development.

OS-5.11 promotes conservation of large, continuous expanses of native trees and vegetation.

OS-9.1 encourages the use of solar, wind and other renewable resources for agricultural, residential, commercial, industrial, and public buildings . OS-9.2 directs development toward cities, Community Areas, and Rural Centers where energy expended for transportation can be minimized. OS-9.3 requires that areas of urban concentration provide convenient access for employment, commercial, and other activities. OS-9.4 requires lots to be oriented to maximize the energy gains from solar and/or wind resources in order to minimize energy losses where possible. OS-9.5 promotes clustered development where such development will conserve energy. OS-9.6 requires development to incorporate features that reduce energy used for transportation, including pedestrian and bicycle pathways, access to transit, and roadway design as appropriate. OS-9.7 encourages weatherization of existing buildings. OS-9.8 requires solar heating as the primary source for heat in all new swimming pools where it is proven most cost-effective.

OS-10.2 encourages mass transit, bicycles and pedestrian modes of transportation and other transportation alternatives to automobiles. OS-10.3 supports conservation of naturally vegetated and forested

areas.OS-10.4 supports industrial and commercial development to be concentrated in areas that are more easily served by public transit. OS-10.5 encourages mixed land uses that reduce the need for vehicular travel.

OS-10.10 requires consideration of sustainable land use strategies for the design of future development within Community Areas and Rural Centers, to reduce energy consumption, minimize GHG emissions, and foster healthier environments for people including: design development to take advantage of solar-orientation; employ systematic water conservation measures including high efficiency appliances; Promote Transit Oriented Development (TOD) to increase mobility and reduce auto dependency. The policy supports design of future development to maximize energy efficiency and accommodate energy infrastructure (i.e., transmission lines, power plants and pipelines, and fueling stations), including the potential for distributed renewable generation.

OS-10.11 required that within 24 months of the adoption of the General Plan, Monterey County will develop a Greenhouse Gas Reduction Plan to reduce emissions by 2020 to the 1990 level. At a minimum, said Plan will establish an inventory of current emissions in the County of Monterey and include an inventory of emissions as of 1990.

Public Services Element

The Public Services Element includes policies that promote water conservation and efficiency (which saves pumping energy), waste reduction/recycling (which reduces landfill –related GHG emissions and emissions associated with goods fabrication), and compact development.

Water conservation and efficiency policies include the following:

PS-2.8 requires all projects be designed to maintain or increase the site's pre-development absorption of rainfall (minimize runoff), and to recharge groundwater where appropriate. PS-3.3 requires specific criteria for proof of a long term sustainable water supply for new residential or commercial. PS-3.12 requires the County to establish an ordinance identifying conservation measures that reduce agricultural water demand. PS-3.13 requires the County to establish an ordinance identifying conservation measures that reduce potable water demand. PS-3.14 promotes the maximization of recycled water use as a potable water offset by increasing the use of treated water, working with the agricultural community to develop new uses for tertiary recycled water and increase the use of tertiary recycled water for irrigation of lands currently being irrigated by groundwater pumping; working with urban water providers to emphasize use of

tertiary recycled water for irrigation of parks, playfields, schools, golf courses, and other landscape areas to reduce potable water demand; working with urban water providers to convert existing potable water customers to tertiary recycled water as infrastructure and water supply become available. PS-4.4 encourages groundwater recharge through the use of reclaimed wastewater.

Waste reduction related policies include the following

PS-5.1 supports programs to reduce the amount of waste generated in the County to the maximum extent feasible including increased recycling, establishment of yard waste collection services, and encouraging the participation of residents and businesses in other waste diversion programs. PS-5.2 supports the designation, development and maintenance of efficient disposal sites. PS-5.3 requires the implementation of programs to facilitate recycling/diversion of waste materials at new construction sites, demolition projects, and remodeling projects. PS-5.4 promotes the maximum use of solid waste source reduction, reuse, recycling, composting, and environmentally-safe transformation of wastes, consistent with the protection of the public's health and safety. PS-6.1 requires that future waste disposal County contracts require efficient, cost-effective solid waste disposal sites and diversion programs. PS-6.5 requires that site development plans shall include adequate solid waste recycling collections areas.

Policies that support reduction of vehicle miles travelled (by motor vehicle) include:

PS-7.2 requires that school sites should be located so that they are served by adequate infrastructure including vehicle, pedestrian and bicycle access. PS-8.7 promotes compact, mixed use development utilizing the concepts of the walkable community, which are designed to encourage physical activity and fitness by permitting walking and bicycle riding to shopping, work and entertainment venues as an alternative to the use of motor vehicles.

Area Plan Policies

Cachagua Area Plan

CACH-3.4 discourages the removal of native trees. CACH-3.8 supports dedication of trail easements as a condition of development approval.

Carmel Valley Master Plan

CV-1.6 limits new residential subdivision in Carmel Valley to creation of 266 new lots with preference to projects including at least

50% affordable housing units. Given the location of much of Carmel Valley far from centers of commerce and employment, the limitation overall of development in remote areas supports development in areas with shorter travels for services and work.

CV-2.1 requires exploration of public transit and new development to include a road system adequate for bus (both transit and school), pedestrian, and bicycle traffic as well as vehicles. CV-2.3 requires all new road work or major work on existing roads within the commercial core areas to provide room for use of bicycles and separate pedestrian walkways and the provision of bicycle routes on the shoulders between development areas throughout the Carmel Valley. CV-2.4 requires that all new bridge construction or remodeling include provision for pedestrians and bicyclists. CV-2.15 requires that new major developments with access adjacent to Carmel Valley Road provide space for the transit buses to stop, the parking of cars and facilities for the safe storage of bicycles.

CV-3.11 discourages removal of native trees. CV-3.14 encourages a network of shortcut trails and bike paths to interconnect neighborhoods, developments and roads. CV-3.19 supports potential dedication of trail easements as a condition of development approval.

CV-5.3 requires development to incorporate designs with water reclamation and conservation. CV-5.4 supports the use of reclaimed water to replace potable water in landscape irrigation.

Central Salinas Valley Plan

CSV-3.2 encourages the development and utilization of renewable energy sources such as solar, wind generation, and biomass technologies in the Central Salinas Valley. CSV-6.1 encourages energy-efficient business and agricultural practices.

Greater Monterey Peninsula Plan

GMP-2.7 encourages new sites for office employment, services, and local conveniences to be located to allow use of alternate modes of transportation such as public transit buses, bicycles and walking. GMP-2.9 encourages provision of separate bike paths during construction and expansion of all highways and major arterials. GMP-3.13 supports potential dedication of trail easements as a condition of development approval.

North County Area Plan

NC-3.4 discourages removal of healthy trees. NC-3.7 requires development of a Trails Plan consistent with General Plan Policy OS-1.10.

South County Area Plan

SC-1.2 encourages clustered development in all areas where development is permitted in order to make the most efficient use of land and to preserve agricultural land and open space. SC-3.1 notes that co-generation facilities may be allowed in conjunction with other industrial uses and oil and gas removal as a means of energy conservation on lands designated for industrial use, subject to a use permit in each case.

Toro Area Plan

T-2.4 supports improvement of public transit roadway improvements, and improved bicycle safety measures at the earliest time that funding becomes available. T-2.6 requires improvements to Corral de Tierra, River and San Benancio Roads to accommodate bicycles, horses, and people where possible. T-2.10 requires increasing accessibility of Toro residents to mass transit, either through maintenance of existing park and ride lots or new bus service, particularly in the Corral de Tierra, San Benancio, and River Road areas. T-3.7 discourages the removal of oak trees.

Significance Determination

Many of the policies identified in the 2007 General Plan for land use, circulation, and open space and conservation, and public services will help reduce GHG emissions. In particular, Policy OS -0.11 requires development of a detailed GHG inventory and adoption of a Greenhouse Gas Reduction Plan.

As shown above in Table 4.16-3, GHG emissions in Monterey County under BAU conditions would result in 2020 emissions that are 10% higher than current (2006) GHG emissions without consideration of currently adopted programs (AB 1493 and SB 1078/SB 107). With consideration of currently adopted programs, County GHG emissions would be 4% less than current (2006) GHG emissions and would be an estimated 94% of BAU GHG emissions. This amount exceeds the significance threshold of 72% of BAU GHG emissions.

Implementation of the GHG Reduction Plan by the County would reduce emissions to the significance threshold. However, preparation of the plan is at least 24 months in the future, and current policies do not provide a comprehensive framework for reducing GHG emissions in the County for discretionary development, and thus without the articulation of specific requirements for GHG reductions, the 2007 General Plan would result in a considerable contribution to cumulative GHG emissions and global climate change.

The following mitigation measures are recommended for implementation by the County.

Mitigation Measures

Mitigation Measure CC-1a: Modify Policy OS-10.11 regarding the Greenhouse Gas Reduction Plan

Revise Policy OS-10.11 as follows:

OS-10.11 - Within 24 months of the adoption of the General Plan, Monterey County will develop a Greenhouse Gas Reduction Plan with a target to reduce emissions by 2020 by 28 percent relative to estimated "business as usual" 2020 emissions.

At a minimum, the Plan shall:

a. establish an inventory of current (2006) GHG emissions in the County of Monterey including but not limited to residential, commercial, industrial and agricultural emissions;

b. forecast GHG emissions for 2020 for County operations;

c. forecast GHG emissions for areas within the jurisdictional control of the County for "business as usual" conditions;

d. identify methods to reduce GHG emissions;

e. quantify the reductions in GHG emissions from the identified methods;

f. requirements for monitoring and reporting of GHG emissions;

g. establish a schedule of actions for implementation;

h. identify funding sources for implementation; and

i. identify a reduction goal for the 2030 Planning Horizon.

During preparation of the Greenhouse Gas Reduction Plan, the County shall also evaluate potential options for changes in County policies regarding land use and circulation as necessary to further achieve the 2020 and 2030 reduction goals and measures to promote urban forestry and public awareness concerning climate change.

Mitigation Measure CC-2: Add Policy OS-10.12: Adoption of a Green Building Ordinance

OS-10.12 - Within 24 months of the adoption of the General Plan, the County shall adopt a Green Building Ordinance to require green building practices and materials for new civic buildings and new private residential, commercial, and industrial buildings that will include, but are not limited to, the following:

- All new County government projects and major renovations shall meet, at a minimum, LEED-Silver standards or an equivalent rating system
- All new commercial buildings shall be certified under the LEED rating system for commercial buildings or an equivalent rating system.
- All new residential projects of 6 units or more shall meet the GreenPoint Rating System for residential buildings, or an equivalent alternate rating system.
- The County shall require consideration of solar building orientation, solar roofs, cool pavements, and planting of shade trees in development review of new commercial and industrial projects and new residential projects of 6 units or more.
- Prioritized parking within new commercial and retail areas for electric vehicles, hybrid vehicles, and alternative fuel vehicles shall be provided for new commercial and institutional developments.
- New commercial and industrial projects greater than 25,000 square feet shall be required to provide on-site renewable energy generation as part of their development proposal. This requirement can be met through a solar roof or other means.

Mitigation Measure CC-3: New Policy OS-10.13 - Promote Alternative Energy Development

OS-10.13: The County shall use Geographic Information Systems (GIS) to map and assess local renewable resources, the electric and gas transmission and distribution system, community growth areas anticipated to require new energy services, and other data useful to deployment of renewable technologies.

The County shall adopt an Alternative Energy Promotion ordinance that will:

- identify possible sites for production of energy using local renewable resources such as solar, wind, small hydro, and, biogas;
- consider the potential need for exemption from other General Plan policies concerning visual resources, ridgeline protection, biological resources;
- evaluate potential land use, environmental, economic, and other constraints affecting renewable energy development; and
- adopt measures to protect both renewable energy resources, such as utility easement, right-of-way, and land set-asides as well as visual and biological resources.

The County shall also complete the following:

- Evaluate the feasibility of Community Choice Aggregation (CCA) for the County. CCA allows cities and counties, or groups of them, to aggregate the electric loads of customers within their jurisdictions for purposes of procuring electrical services. CCA allows the community to choose what resources will serve their loads and can significantly increase renewable energy.
- If CCA is ultimately not pursued, the County shall evaluate the feasibility of purchasing renewable energy certificates to reduce the County's contribution to GHG emissions related to County electricity use.
- The County shall develop a ministerial permit process for approval of small-scale wind and solar energy systems for on-site home, small commercial, and farm use.

Mitigation Measure CC-4: New Policy PS-5.5 - Promote Recycling and Waste Reduction

PS-5.5: The County shall promote waste diversion and recycling and waste energy recovery as follows:

- The County shall adopt a 75% waste diversion goal.
- The County shall support the extension of the types of recycling services offered (e.g., to include food and green waste recycling).
- The County shall support waste conversion and methane recovery in local landfills to generate electricity.
- The County shall support and require the installation of anaerobic digesters for winery facilities and wastewater treatment facilities under County jurisdiction.

Mitigation Measure CC-5: Adopt GHG Reduction Plan for County Operations

Within 12 months of adoption of the General Plan, the County shall quantify the current and projected (2020) GHG emissions associated with County operations and adopt a GHG Reduction Plan for County Operations. The goal of the plan shall be to reduce GHG emissions associated with County Operations by at least 28% relative to BAU 2020 conditions.

Potential elements of the County Operations GHG Reduction Plan shall include, but are not limited to, the following measures: an energy tracking and management system; energy-efficient lighting; lights-out-at-night policy; occupancy sensors; heating, cooling and ventilation system retrofits; ENERGY STAR appliances; green or reflective roofing; improved water pumping energy efficiency; central irrigation control system; energy-efficient vending machines; preference for recycled materials in purchasing; use of low or zero-emission vehicles

and equipment and recycling of construction materials in new county construction; conversion of fleets (as feasible) to electric and hybrid vehicles; and solar roofs.

Environmental Impacts Associated with Mitigation Measures

Many of the measures described above, for example, improved energy-efficiency for residential and commercial developments, will have little to no secondary environmental impacts. However, some of the measures described above, such as new renewable energy facilities could have significant secondary environmental impacts. New utility-scale wind power could have significant impacts related to noise and biology. New utility-scale wind and solar installations could have impacts related to aesthetics and ridgeline development. New recycling facilities could have impacts related to land use compatibility and odor. Environmental impacts would be reviewed in accordance with General Plan policies and under CEQA (for discretionary projects). For the proposed ministerial permit program for small-scale wind and solar installations, CEQA review would be completed for the program as a whole and environmental conditions incorporated into the program to avoid, minimize, and compensate for any identified significant environmental impacts.

Significance Conclusion

Many of the policies identified in the 2007 General Plan for land use, circulation, and open space and conservation, and public services will help reduce GHG emissions, in particular Policy OS-10.11 which requires development of a detailed GHG inventory and adoption of a Greenhouse Gas Reduction Plan. New Policies OS-10.12, OS-10.13, and PS-5.5 are proposed above as mitigation along with a GHG Reduction Plan for Municipal Operations.

As shown above in Table 4.16-3, with consideration of currently adopted programs, County GHG emissions would be 2% higher than current (2006) GHG emissions and would be an estimated 93% of BAU GHG emissions. This amount exceeds the significance threshold of 72% of BAU GHG emissions. The GHG reductions associated with full implementation of 2007 General Plan policies and the proposed mitigation have not been quantified but will be quantified during the GHG reduction planning required by Policy OS-10.11 and recommended mitigation,

By 2012 the state's regulations will be fully enacted and the 2007 General Plan requires completion of the County's Greenhouse Gas Reduction Plan prior to that time (assuming General Plan adoption at the latest in 2009). At that time, the framework will be in place to achieve substantial GHG emission reductions by 2020 that will be consistent with AB 32. As the state and County's efforts proceed to reduce emissions, the County's contribution would less than considerable at 2020. Mitigation identified in this chapter

requires extension of the Greenhouse Gas Reduction Plan to 2030 along with a 2030 reduction goal, which, when enacted will make the County's contribution less than cumulatively considerable for the 2030 planning horizon as well.

Buildout

Impact of Development with Policies

Beyond 2020 and 2030, substantial further reductions in GHG emissions will be necessary to stabilize atmospheric GHG concentrations to eventually halt anthropogenic-induced climate change. A number of researchers have proposed reduction of GHG emissions in the developed world by 80 percent below 1990 levels by 2050. California Executive Order S-3-05, signed by the current governor, adopts this reduction level as the goal for the state; however as an Executive Order it only applies to state agencies – not to the actions of local governments. Nevertheless, for this analysis, substantive reductions in emissions are assumed necessary after 2020 and 2030 in order to address cumulative GHG emissions and associated climate change effects.

While emissions were estimated for buildout as shown below in Table .16-4, these estimates are considered highly speculative as the likelihood of 100 percent buildout is very low and the character of residential, commercial, and industrial development and transportation technology more than 80 years in the future is unknown.

Transportation Emissions

The results of the modeling indicate that at buildout (assumed to be 2092), under BAU conditions, vehicular traffic in the Monterey County planning area would result in increased CO_2e emissions related to increased VMT would be 400,000 metric tons at buildout.

Taking into account the proposed Pavley II standards and the Low Carbon Fuel Standard, there could be a reduction of 30% in the carbon dioxide emissions of passenger vehicles compared to BAU. If Pavley II and the Low Carbon Fuel Standard are implemented as part of the ARB Draft Scoping Plan, the increased emissions would be 320,000 metric tons compared to 400,000 metric tons under BAU conditions.

Direct Energy Consumption Emissions

New buildings would consume natural gas for heating, cooking, and other processes and other area sources. At buildout, residential, commercial and industrial development allowed by the 2007 General Plan would result in estimated new annual carbon dioxide emissions of 92,000 metric tons.

Table 4.16-4. Monterey County Greenhouse Gas Increase in Emissions, Buildout

Source	GHG Emissions	% of Total	Notes
Business as Usual Conditions			
Vehicle Emissions	399,713	50%	Based on growth in VMT
Natural Gas Consumption	92,251	11%	Residential, commercial, and industrial consumption.
Electricity Consumption	89,282	11%	Residential, commercial, and industrial consumption.
Industrial processes	194,226	24%	Based on growth in industrial employment
Landfill Emissions	31,243	4%	Based on growth in population.
Agricultural Emissions	No change	NA	Assumed no overall change in agricultural acreage.
Total from New Development	806,715	100%	
Total from Existing Development	1,394,404		Assumed no change since 2006.
Total	2,201,119		
Percent Change relative to 2006		*58%*	
With Pavley II vehicle emissions standards, Governor's Low Carbon Fuel Standard and Draft Scoping Plan RPS goal of 33% renewable energy			
Vehicle Emissions	319,739	45%	Adjusted for Pavely 1, 2 and low-carbon fuel standard
Natural Gas Consumption	92,251	13%	Not adjusted
Electricity Consumption	70,533	10%	Adjusted for Scoping Plan RPS goal of 33%
Industrial processes	194,226	27%	Not adjusted for potential improvements in process efficiency.
Landfill Emissions	31,243	4%	Not adjusted for potential improvements in landfill capture.
Agricultural Emissions	No change	NA	Assumed no overall change in agricultural acreage.
Total from New Development	707,992	100%	
Total from Existing Development	1,156,340		Assumes similar percentage reduction for existing development relative to BAU as estimated for new development for Pavely 2, LCFS and RPS goal of 33%.
Total	1,864,332		
Percent Change relative to 2006		*34%*	

Although the efficiency of natural gas consumption and other areas will likely improve dramatically by buildout, there are no current programs included in the AB 32 draft scoping plan or early action items concerning direct natural gas consumption.

Indirect Electricity GHG Emissions

New buildings would also consume electricity. At buildout, residential, commercial and industrial development allowed by the 2007 General Plan would result in estimated increase in annual indirect GHG emissions of 89,000 metric tons related to electricity under BAU conditions

Taking into account the proposed 33% RPS standard in the AB 32 Draft Scoping Plan, there could be a reduction of 21 % in the GHG emissions related to electricity production by PG&E and thus the indirect GHG emissions would be further reduced to 71,000 metric tons. It is likely that the carbon intensity of electricity generation 80 years in the future will be far lower than that resultant from full implementation of the 33% RPS standard.

Industrial Emissions

Based on employment data, there would be an increase of industrial employment by 96% at buildout. Industrial process emissions in 2006 were estimated as 201,000 metric tons of CO2e. Thus increased GHG emissions at buildout due to new growth are estimated to be 194,000 metric tons of CO2e. A number of the proposed measures in the AB 32 Draft Scoping Plan would help to reduce industrial GHG emissions but the potential amount of reduction has not been estimated.

Agricultural Emissions

While economic forecasting of agricultural employment was available for the 2030 planning horizon, the amount of expansion or contraction of the agricultural economy over 80 years in the future is unknown. Further, there are substantive uncertainties in estimating GHG emissions associated with diverse agricultural practices and crops. Thus, no estimate of GHG emissions associated with potential agricultural expansion at buildout was prepared.

Emissions Associated With Land Use Changes

Development allowed by the 2007 General Plan through buildout would result in the conversion of natural vegetation and agricultural lands that would result in the loss of carbon sinks. Given the uncertainties associated with estimated GHG fluxes associated with natural vegetation and agricultural lands, the potential loss of carbon sinks was not

quantified, but would nevertheless contribute GHG emissions along with other sources. As discussed below a number of 2007 General Plan policies seek to limit the amount of natural land conversion due to urban growth.

Emissions Associated With Waste Processing

Development allowed by the 2007 General Plan would result in increased generation of waste which would require disposal in a landfill, which would increase methane emissions.

Based on population data, there would be an increase of population in the unincorporated County by 95% at buildout. Landfill emissions in 2006 were estimated as 33,000 metric tons of CO2e. Thus increased GHG emissions by buildout due to new growth are estimated to be 31,000 metric tons of CO2e.

Given the current and planned implementation of landfill gas capture and use of waste to energy technology in the future, future waste disposal may not contribute substantial amounts of methane. However, until full capture and reuse of landfill gas is achieved, there will be increased emissions associated with additional waste disposal.

2007 General Plan and Area Policies

The 2007 General Plan and Area Plan policies summarized above would apply to buildout after 2030.

Significance Determination

There are substantial uncertainties as to the technical means to implement substantial reductions to meet future post-2020 goals, which could be a reduction of GHG emissions to levels 80 percent below 1990 levels. The 2007 General Plan focuses growth in Community Areas, Rural Centers, and Affordable Housing Areas, but growth in these areas will occur early in the life of the General Plan and later growth would be dispersed across the County primarily on lots of record, thus resulting in greater travel distances and greater energy uses. Policy OS-10.11 only has a goal of GHG reductions up to 2020 (matching the AB 32 horizon), but further substantive reductions in GHGs will be required beyond 2030 in order to avoid even worse consequences of climate change. Thus, for the period after 2030, development under the 2007 General Plan would result in a considerable contribution to cumulative GHG emissions and global climate change.

The following mitigation measures are recommended for implementation by the County.

Mitigation Measures

Mitigation Measure CC-11 (Same as BIO-1.9): By 2030, prepare an Update to the General Plan to identify expansion of existing focused growth areas and/or to identify new focused growth areas to reduce loss of natural habitat in Monterey County and vehicle miles traveled.

The County shall update the County General Plan by no later than January 1, 2030 and shall consider the potential to expand focused growth areas established by the 2007 General Plan and/or the designation of new focused growth areas. The purpose of such expanded/new focused growth areas would be to reduce the loss of natural habitat due to continued urban growth after 2030. The new/expanded growth areas shall be designed to accommodate at least 80% of the projected residential and commercial growth in the unincorporated County from 2030 to buildout.

Mitigation Measure CC-12: Greenhouse Gas Reduction Plan Requirements Beyond 2030

In parallel with the development and adoption of the 2030 General Plan, Monterey County will develop and adopt a Greenhouse Gas Reduction Plan with a target to reduce 2050 GHG emissions by 80 percent relative to 1990 emissions.

At a minimum, the Plan shall establish an inventory of current (2030) GHG emissions in the County of Monterey; forecast GHG emissions for 2050 for County operations and areas within the jurisdictional control of the County; identify methods to reduce GHG emissions; quantify the reductions in GHG emissions from the identified methods; identify requirements for monitoring and reporting of GHG emissions; establish a schedule of actions for implementation; and identify funding sources for implementation.

Significance Conclusion

For buildout within the County beyond the 2030 planning horizon, there are substantial uncertainties as to the technical means to implement reduction of greenhouse gas emissions to levels 80 percent below 1990 levels. Mitigation identified in this chapter requires continuation of the Greenhouse Gas Reduction Plan beyond 2030 as well as adoption of a new General Plan by 2030 that would examine options to focus growth for the period after 2030. These measures would identify feasible means along with state and federal actions that might be able to reduce emissions to 80 percent below 1990 levels, but given that the means to effect such emissions are not known at present, buildout within the County beyond 2030 is determined to make a considerable and unavoidable contribution to cumulative GHG emissions and global climate change

Adverse Effects of Climate Change on Monterey County

Impact CC-2: Development Allowed by the 2007 General Plan May Subject Property and Persons to Otherwise Avoidable Physical Harm in Light of Inevitable Climate Change. (Mitigated to Less Than Considerable)

2030 Planning Horizon and Buildout

Impact of Development with Policies

Existing and new development and the natural environment in Monterey County will be subject to climate change impacts resultant from past, present, and future GHG emissions regardless of the success of local, state, national, or international in reducing future GHG emissions due to the existing concentrations of GHG emissions in the atmosphere and the inevitable additional emissions before GHG reductions plans provide reductions.

Without further planning, current requirements may provide inadequate protection against adverse physical impacts and may not anticipate changed conditions resultant from climate change.

"Scenarios of Climate Change in California: An Overview" (Climate Scenarios report), was published in February 2006 (California Climate Change Center 2006). The Climate Scenarios report uses a range of emissions scenarios developed by the IPCC to project a series of potential warming ranges with temperature increases from 3.0 to 10.5 degrees Fahrenheit. The Climate Scenarios report then presents analysis of future climate in California under each warming range. Substantial temperature increases would result in a variety of impacts to the people, economy, and environment of California. The description of potential impacts for California from this report were used to generally characterize potential impacts to Monterey County, that would include but are not limited to the following:

Sea Level Rise

Rising sea levels, more intense coastal storms, and warmer water temperatures will increasingly threaten the County's coastal regions. Under the higher warming scenario, sea level is anticipated to rise 22 to 35 inches by 2100. Elevations of this magnitude could inundate coastal areas with salt water, accelerate coastal erosion, potentially harm coastal aquifers, and disrupt coastal wetlands and natural habitats.

Agriculture

Agriculture, along with forestry, is the sector of the California economy that may be most be affected by a change in climate. Regional analyses of climate trends over agricultural regions of California suggest that climate change is already in motion. Over the period 1951 to 2000, the growing season has lengthened by about a day per decade, and warming temperatures have resulted in an increase of 30 to 70 growing degree days per decade, with much of the increase occurring in the spring. Climate change affects agriculture directly through increasing temperatures and rising CO2 concentrations, and indirectly through changes in water availability and pests (California Climate Change Center 2006).

Crop growth models show that a warming from a low to a higher temperature generally raises yield at first, but then becomes harmful. Possible effects of excessively high temperature include: decreased fruit size and quality for stone fruits, premature ripening and possible quality reduction for grapes, reduced fruit yield for tomatoes, increased incidence of tipburn for lettuce, and similar forms of burn for other crops. From a variety of studies in the literature, photosynthesis increases when a plant is exposed to a doubling of CO2. However, whether this translates into increased yield of economically valuable plant product is uncertain and highly variable. Also, elevated CO2 levels are associated with decreased concentrations of mineral nutrients in plant tissues, especially a decrease in plant nitrogen, which plays a central role in plant metabolism. Some crops may benefit in quality from an increase in CO2 while some crops are harmed by an increase in CO2. Growth rates of weeds, insect pests, and pathogens are also likely to increase with elevated temperatures, and their ranges may expand (California Climate Change Center 2006).

Over time, new seed varieties could be developed that are better adapted to the changed climate and pest conditions, and entirely new crops may be found to meet pharmaceutical or energy supply needs. However, some of these adaptations may require publicly supported research and development if they are to materialize (California Climate Change Center 2006).

Public Health and Safety

Climate change could affect the health of County residents by increasing the frequency, duration, and intensity of conditions conducive to air pollution formation, heat, and wildfires. The primary concern is not the change in average climate, but rather the projected increase in extreme conditions that are responsible for the most serious health consequences. In addition, climate change has the potential to influence asthma symptoms and the incidence of infectious disease (California Climate Change Center 2006).

Wildland Fire Risk

With climate change, the potential for wildland fires may change due to changes in fuel conditions (transitioning forests to chaparral/grasslands for example), precipation (longer dry seasons, higher extreme temperatures), and wind (affecting potential spread), among other variables.

Westerling and Bryant (2006) estimated future statewide wildfire risk from a statistical model based on temperature, precipitation, and simulated hydrologic variables. These are conservative estimates because they do not include effects of extreme fire weather, but implications are nonetheless quite alarming. Projections made for the probabilities of "large fires"—defined as fires that exceed an arbitrary threshold of 200 hectares (approximately 500 acres)—indicate that the risk of large wildfires statewide would rise almost 35% by mid-century and 55% by the end of the century under a medium-high emissions scenario, almost twice that expected under lower emissions scenarios. Estimates of increased damage costs from the increases in fire season severity (Westerling and Bryant 2006) are on the order of 30% above current average annual damage costs.

A second study explored, through a case study in Amador and El Dorado Counties, the effects of projected climate change on fire behavior, fire suppression effort, and wildfire outcomes (Fried et al. 2006). Climate and site-specific data were used in California Department of Forestry and Fire Protection (CDF) standard models to predict wildfire behavior attributes such as rate of spread and burning intensity. The study found an increase in the projected area burned (10%–20%) and number of escaped fires (10%–40%) by the end of century, under the drier climate scenarios. However, the less dry model showed little change.

Hydrology/Flooding

At present, it is uncertain whether coastal areas like Monterey County will experience increases, decreases, or no change in precipitation due to climate change. Regional (as in on the scale of Northern California as a whole) climate change modeling shows mild (5 to 10%) increases and decreases in precipitation depending on the climate change scenarios studied (Anderson 2006).

Localized studies of potential changes in storm intensity have not been done for Monterey County. On a broad (California level), there is a potential increase in the severity of winter storms due to climate change (Dettinger 2007). If this were to occur, peak stream flows and flooding may increase the risk of flooding beyond the risk levels currently anticipated in the County.

Water Supplies

While much of California is dependent on the Sierra Nevada snowpack for its water supply (and the snowpack could be heavily altered by climate change), Monterey County is not. Nevertheless, the County's water resources could be altered due to warming which may affect evaporation levels for existing reservoirs (such as Nacimiento and San Antonio reservoirs) and may affect sea levels, resulting in salination of coastal aquifers (although no study of the potential effects have been conducted). As noted above, it is unknown at present whether there may be changes in precipitation within the County due to climate change and thus water supplies could increase, decrease, or stay the same depending on the net effect of climate change.

Natural Ecosystems

Climate changes and increased CO2 concentrations are expected to alter the extent and character of natural ecosystems. The distribution of species is expected to shift; the risk of climate-related disturbance such as wildfires, disease, and drought is expected to rise; and forest productivity is projected to increase or decrease—depending on species and region. In Monterey County, these ecological changes could have significant implications for fire suppression, public health, and the sustainability of the County's natural ecosystems.

2007 General Plan and Area Policies

Although the 2007 General Plan and Area Plans have numerous policies about flooding, water supplies, habitat protection, and environmental health, there are no specific policies integrating climate change considerations into planning for these subject areas.

Significance Determination

Without further mitigation, development allowed under the 2007 General Plan, as well as existing development, could subject to people and property to otherwise avoidable physical harm related to sea level rise, flooding, agriculture, public health, and natural ecosystems.

The following mitigation measure is recommended for implementation by the County to promote adaptation planning as integral part of advance planning.

Mitigation Measures

Mitigation Measure CC-13: Develop and Integrate Climate Change Preparedness Planning for Monterey County

Monterey County shall prepare and implement a Climate Change Preparedness Plan to prepare proactively for the impacts of climate change to the County's economy and natural ecosystems and to promote a climate resilient community.

A useful guide to climate resiliency planning is *Preparing for Climate Change: A Guidebook for Local, Regional, and State Governments*. (The Climate Impacts Group, King County, Washington, and ICLEI – Local Governments for Sustainability 2007), which outlines the following steps:

- Scope the climate change impacts to major County sectors and building and maintain support among stakeholders to prepare for climate change.
- Establish a climate change preparedness team.
- Identify planning areas relevant to climate change impacts.
- Conduct a vulnerability assessment based on climate change projections for the region, the sensitivity of planning areas to climate change impacts, and the ability of communities to adapt to climate change impacts
- Conduct a risk assessment based on the consequences, magnitude, and probability of climate change impacts, as well as on an evaluation of risk tolerance and community values.
- Establish a vision and guiding principles for climate resilient communities and set preparedness goals in priority planning areas based on these guiding principles.
- Develop, select, and prioritize possible preparedness actions.
- Identify a list of important implementation tools
- Develop an understanding of how to manage risk and uncertainty in the planning effort.
- Develop measures of resilience, and use these to track the results of actions over time
- Review assumptions and other essential information to ensure that planning remains relevant to the most salient climate change impacts.
- Update plans regularly.

Potential areas of emphasis for preparedness planning may include risk of wildfires, agricultural impacts, flooding and sea level rise, salt water intrusion; and health effects of increased heat and ozone, through appropriate policies and programs.

Potential implementation steps could include adopting land use designations that restrict or prohibit development in areas that may be

more severely impacted by climate change, e.g., areas that are at high risk of wildfire, sea level rise, or flooding; adoption of programs for the purchase or transfer of development rights in high risk areas to receiving areas of equal or greater value; and support for agricultural research on locally changing climate conditions.

To be effective, preparedness planning needs to be an ongoing commitment of the County. The first plan shall be completed no later than 5 years after the adoption of the General Plan and shall be updated at least every 5 years thereafter.

Significance Conclusion

A certain amount of environmental change is inevitable due to current and unavoidable future increases in GHG emissions worldwide. The extent of such change on a local basis to Monterey County agriculture, water supplies, flooding, natural ecosystems, and environmental health, and other areas is not fully understood at present. With implementation of the policies in the Climate Change Preparedness Plan over time, new development will be resilient to these inevitable changes and would avoid additional physical harm to persons and property resultant from climate change effects. Thus, with mitigation, the 2007 General Plan would not make a considerable contribution to a cumulative impact related to adaptation to climate change effects.