SECTION 4.9

Greenhouse Gas Emissions

4.6 GREENHOUSE GAS EMISSIONS

4.6.1 Existing Conditions

Introduction/Background

Parts of the Earth's atmosphere act as an insulating "blanket" for the planet. This blanket of various gases traps solar energy, which keeps the global average temperature in a range suitable for life. If this blanket were to suddenly disappear, the planet would be approximately 60°F colder. The various atmospheric gases that comprise this blanket are called "greenhouse gases" (GHG) based on the idea that these gases act to trap heat in the atmosphere much as the glass walls of a greenhouse. GHG gases, consisting mainly of water vapor, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), ozone (O_3), and chlorofluorocarbons (CFCs), all act as effective global insulators, reflecting visible light and infrared radiation back to earth. Most scientists agree that human activities, such as producing electricity by burning fossil fuels and driving internal combustion vehicles, have contributed to the elevated concentration of these gases in the atmosphere. As a result, the Earth's overall temperature is rising.

Scientists have observed a global warming trend that began in the late 1800s. Global temperature records show an average warming of about 1.3°F over the past century. The most rapid warming has occurred in recent decades. Within the past 30 years, the rate of warming across the globe is believed to be approximately three times greater than the rate over the last 100 years. According to the National Oceanic and Atmospheric Administration (NOAA), seven of the eight warmest years on record have occurred since 2001. While the earth's climate has changed many times over the planet's history for various reasons, the preponderance of scientific evidence indicates that most of this recent warming is the result of human activities.

In 1988, the United Nations and the World Meteorological Organization established the Intergovernmental Panel on Climate Change (IPCC) to assess the scientific, technical, and socioeconomic information relevant to understanding the scientific basis of the risk of human-induced climate change, its potential impacts, and options for adaptation and mitigation. In February 2007, the IPCC issued a report on global climate change, which concluded that warming of the Earth's climate system is now "unequivocal" (i.e., "definite") and that changes in climate are now affecting physical and biological systems on every continent. The IPCC based its conclusions on observations of increases in average air and ocean temperatures, melting of snow and ice, and rising average sea level across the globe.

The IPCC's best estimates are that the average global temperature rise could range from 0.6 degrees Celsius (1.08 degrees Fahrenheit) between 2000 and 2100 with no increase in GHG emissions above 2000 levels, to 4.0 degrees Celsius (7.2 degrees Fahrenheit) with a substantial increase in GHG emissions (IPCC, 2007). There is general agreement among scientists that a large increase in global temperatures could have massive deleterious impacts on the natural and human environments.

Climate change could impact the natural environment in California by triggering, among others things:

- Rising sea levels along the California coastline;
- Extreme-heat conditions, such as heat waves and very high temperatures, which could last longer and become more frequent;

- Increase in heat-related human deaths, an increase in infectious 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; and
- 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 could occur concurrently with a predicted increase in California's population from 34 million to 59 million by the year 2040 (California Energy Commission, 2005).

Climate Change and Global Warming

The term climate change is often used interchangeably with the term global warming, but according to the National Academy of Sciences, "the phrase 'climate change' is growing in preferred use to 'global warming' because it helps convey that there are [other] changes in addition to rising temperatures." When used in this analysis, the term climate change refers to any distinct change in measures of climate lasting for a long period of time. In other words, "climate change" means major changes in temperature, rainfall, snow, or wind patterns lasting for decades or longer. Global warming is an average increase in temperatures near the Earth's surface and in the lowest layer of the atmosphere. Increases in temperatures in our Earth's atmosphere contribute to changes in global climate patterns, for which reason global warming can be considered *part* of climate change along with changes in precipitation, sea level, etc. Global change is a broad term that refers to changes in the global environment, including climate change, ozone depletion, and land use change.

Primary Greenhouse Gas Emissions

Under California law GHGs include the following: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6) (Health and Safety Code, Section 38505g). The effect each GHG has on climate change is measured as a combination of the volume of its emissions and its global warming potential (GWP).

Although CO_2 is the most common of these gases, the other gases generally have a higher global warming potential (GWP). CO_2 equivalent (CO_2e) is a measure of GHG emissions that compares the GWP of the individual greenhouse gases with the GWP of CO_2. Therefore, GHG emissions are typically measured in terms of pounds or tons of CO_2 equivalents. CO_2e emissions are calculated by multiplying the metric tons of a gas by the appropriate GWP factor and are commonly expressed as metric tons of carbon dioxide equivalents ($MTCO_2e$). Below is a description of each GHG from the California Climate Action Registry (CCAR) General Reporting Protocol, including the sources of emissions and GWP.

Carbon Dioxide (CO_2)

Consisting of a single carbon and two oxygen atoms, CO_2 is the most common of the six GHGs and provides the reference point for the GWP of other gases. The GWP of CO_2 is equal to one CO_2 emissions result from the burning of fossil fuels (e.g., oil, natural gas, and coal), solid waste, trees and wood products. GHGs can result from other chemical reactions, such as those required to manufacture cement. Globally, the largest source of human based CO_2 emissions is the combustion of fossil fuels in power plants, automobiles, and industrial facilities. A number of specialized industrial production processes and product uses, such as mineral or metal production, and the use of petroleum-based products also generate CO_2 emissions.

CO_2 is removed (or sequestered) from the atmosphere as plants absorb it as part of the biological carbon cycle. Natural sources of CO_2 occur within the carbon cycle as billions of tons of atmospheric CO_2 are removed by oceans and growing plants and are emitted back into the atmosphere through natural processes. When in balance, total CO_2 emissions and removals from the entire carbon cycle are roughly equal. Since the Industrial Revolution however, most scientists agree that human activities that generate CO_2 emissions, including burning of fossil fuels, and those that reduce CO_2 absorption, such as deforestation, have increased CO_2 concentrations in the atmosphere by at least 35 percent.

Nitrous Oxide (N_2O)

Consisting of two nitrogen atoms and a single oxygen atom, N_2O has a GWP of 310. Concentrations of N_2O began to rise at the beginning of the Industrial Revolution, reaching 314 parts per billion (ppb) in 1998. Microbial processes in soil and water, including those reactions that occur in fertilizer containing nitrogen, produce N_2O. In addition to agricultural sources, some industrial processes (fossil fuel-fired power plants, nylon production, nitric acid production, and vehicle emissions) also contribute to the atmospheric load of N_2O.

Methane (CH_4)

Consisting of a single carbon atom and four hydrogen atoms, CH_4 has a GWP of 21. CH_4 is emitted from a variety of both human-related and natural sources, including the production and transport of fossil fuels, livestock production and other agricultural practices, and the decay of organic waste in municipal solid waste landfills. It is estimated that 60 percent of global CH_4 emissions are related to human activities. Natural sources of CH_4 include wetlands, gas hydrates,[1] permafrost, termites, oceans, freshwater bodies, non-wetland soils, and wildfires. CH_4 emissions levels from a particular source can vary significantly from one country or region to another.

Chlorofluorocarbons (CFCs)

CFCs are not naturally occurring chemicals. Since their invention in 1928, they have been synthesized for use as refrigerants, aerosol propellants, and cleaning solvents, which led to rising concentrations of CFCs in the atmosphere. When it was discovered that CFCs are able to destroy stratospheric ozone, a global effort to halt their production was undertaken and levels of the major CFCs are now static or declining. However, their long atmospheric lifetimes mean that some of the CFCs will remain in the atmosphere for over 100 years. Since they are also a GHG, along with such other long-lived synthesized gases such as CF_4 (carbontetrafluoride) and SF_6

[1] Gas hydrates are crystalline solids that consist of a gas molecule, usually methane, surrounded by a "cage" of water molecules.

(sulfurhexafluoride), these chemicals are of concern. Another set of synthesized compounds called HFCs (hydrofluorocarbons) are also considered GHGs, but have a shorter lifetime and less impact. CFCs, CF_4, SF_6, and HFCs have been banned and are no longer available and are not included fin this analysis.

Potential Effects of Global Climate Change

Sea Level Rise and Flooding

The California Climate Change Center (CCCC) predicts that sea level in California could rise between 0.36 to 2.3 feet above existing mean sea level (MSL) by 2099 as a result of climate change.[2] Measurements taken in the City of Alameda indicate that the current rate of sea level rise is about 0.29 foot per century. Therefore, projected climate change effects on sea level would increase the existing rate of sea level rise to 1.94 feet per century.[3] When combined with astronomical tides, the frequency of a current 100-year high tide (about 9.5 feet above current MSL) would occur 10 times more often.

The CEC has collected a large number of precipitation projections for the next century based on considerations of continued global warming. On average, these projections show little change in the total annual precipitation in California. Further, among the models studied, precipitation projections do not show a consistent trend through 2100. The region's Mediterranean seasonal precipitation pattern is expected to continue, with most precipitation falling during winter from North Pacific storms. One of the four climate models projects slightly wetter winters; another projects slightly drier winters. Even modest changes in patterns of precipitation could have a significant impact because California ecosystems are conditioned to historical precipitation levels and its water resources are nearly fully utilized.[4]

Water Supply

Health and Safety Code § 38501(a) recognizes that climate change "poses a serious threat to the economic well-being, public health, natural resources, and the environment of California," and notes, "the potential adverse impacts of [climate change] include…reduction in the quality and supply of water to the state from the Sierra snowpack." Continued global warming will increase pressure on California's water resources, which are already over-stretched by the demands of a growing economy and population. Decreasing snowmelt and spring stream flows coupled with increasing demand for water resulting from both a growing population and hotter climate could lead to increasing water shortages. By the end of the century, if temperatures rise to the medium warming range and if precipitation decreases, late spring stream flow could decline by up to 30 percent.

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[2] California Climate Change Center, *Projecting Future Sea Level*, A Report from the California Climate Change Center, CEC-500-2005-202-SF, Prepared by D. Cayan, P. Bromirski, K. Hayhoe, M. Tyree, M. Dettinger, and R. Flick, Table 3 (Projected global sea level rise (SLR) (cm) for the SRES A1fi, A2, and B1 greenhouse gas emission scenarios. SLR for A2 and B1 scenarios is estimated by combining output recent global climate change model simulations with MAGICC projections for the ice melt component. SLR estimates for A1fi estimated from MAGICC based on A2 temperature changes scaled according to those in A1fi) (March 2006), p. 19.

[3] California Climate Change Center, *Climate Warming and Water Supply Management in California: White Paper*, A Report from Climate Change Center, CEC-500-2005-195-SF, Prepared by J. Medelin, J. Harou, M. Olivares, J. Lund, R. Howitt, S. Tanaka, M. Jenkins, K. Madani, and T. Zhu. Chapter 2 (Potential Impacts of Climate Change on California's Water Resources), Table 2-6 (Relative Sea Level Trends for Eight Tide Gauges Along the Coast of California with 50 Years or More of Record) (March 2006).

[6] CalAdapt: Precipitation: Decadal Averages, at http://cal-adapt.org/precip/decadal/, accessed 8/7/13. Data Contributors: The California Nevada Applications Program (CNAP) from Scripps Institution of Oceanography and California Climate Change Center.

Water supplies are also at risk from rising sea levels. An influx of saltwater would degrade California's estuaries, wetlands, and groundwater aquifers located in close proximity to coastal waters, which is a matter of local concern in the City of Goleta. In particular, saltwater intrusion would threaten the quality and reliability of fresh water supply that is pumped from vulnerable aquifers.

Coping with the most severe consequences of global warming would require major changes in water management and allocation systems. As more winter precipitation falls as rain instead of snow, constructed reservoirs will be filled earlier in the year to provide for water supply and additional storage may need to be developed to maintain reservoir space for winter flood control and subsequent distribution. [5]

Water Quality

Climate change could have adverse effects on water quality, which would in turn affect the beneficial uses of surface water bodies and groundwater. Anticipated changes in precipitation could result in increased sedimentation, higher concentration of pollutants, higher dissolved oxygen levels, increased temperatures, and an increase in the amount of runoff constituents reaching surface water bodies.

Ecosystems and Biodiversity

Climate change could have adverse effects on diverse types of ecosystems, from alpine to deep-sea habitat. Temperature and precipitation changes could affect the distribution of flora and fauna species. Potential changes in species' habitat ranges could lead to fragmentation of habitat that could impact the distribution of certain sensitive species. The IPCC states that "20 percent to 30 percent of species assessed may be at risk of extinction from climate change impacts within this century if global mean temperatures exceed 3.6 to 5.4°F relative to pre-industrial levels."[6] Shifts in existing biomes[7] could also make ecosystems vulnerable to invasive species encroachment. Wildfires, which are an important control mechanism in many ecosystems, may become more severe and more frequent, making it difficult for native plant species to repeatedly re-germinate. In general terms, ecosystems could face a number of stressors from climate change, which could potentially have an adverse effect on biodiversity.

Human Health Impacts

Climate change may increase the risk of vector-borne infectious diseases particularly those found in tropical areas and spread by insects.[8] While these health impacts would largely affect tropical areas in other parts of the world, health effects would also be felt in California as warming of the atmosphere could increase smog and particulate pollution, adversely affecting individuals with heart and respiratory problems. Extreme heat events would also be expected to occur with more frequency, and could adversely affect the elderly, children, and the homeless.

[5] Ibid. Securing Adequate Water Supply (2011) accessed at http://cal-adapt.org/blog/2011/apr/12/securing-adequate-water-supply/ on 8/7/13.

[6] Intergovernmental Panel on Climate Change, *Climate Change 2007: Impacts, Adaptation, and Vulnerability*, Contribution of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change [Parry, Martin L., Canziani, Osvaldo F., Palutikof, Jean P., van der Linden, Paul J., and Hanson, Clair E. (eds.)] (Cambridge, United Kingdom: Cambridge University Press, 2007).

[7] A biome is a major ecological community classified by the predominant vegetation, and hence animal inhabitants.

Potential Effects of Human Activity on Climate Change

Worldwide

Globally, GHG emissions have grown since pre-industrial times, with an increase of 70 percent between 1970 and 2012. In 2011 total worldwide GHG emissions were estimated to be 32,578.645 million metric tons (MMT)[9] of CO_2 equivalents (CO_2e) a year, including ongoing emissions from industrial and agricultural sources but excluding emissions/removals from land use change. China, is currently the largest global source of GHG emissions, producing 9441 MMT CO_2e in 2010, while the United States produced contributed approximately 6821.1 MMR CO_2e. [10] .[11]

United States

In 2010, GHG emissions in the U.S. were approximately 6821.1 MMT CO_2e (EPA 2012) gross and 5,636.739 net MMT CO_2e. Total U.S. emissions increased by 10.5 percent from 1990 to 2010, and emissions increased from 2009 to 2010 by 3.2 percent before heading downward in 2011, due primarily to an increase in economic output resulting in an increase in energy consumption across all sectors. Since 1990, U.S. emissions have increased at an average annual rate of 0.5 percent per year. The primary GHG emitted by human activities in the U.S. was CO_2, representing approximately 83.6 percent of total GHG emissions. The largest source of CO_2, and overall GHG emission, was fossil fuel combustion. U.S. GHG emissions have been partially offset by carbon sequestration in forests, trees in urban areas, agricultural soils, landfilled green waste, and food wastes, which in aggregate offset 15.8 percent of total emissions in 2010. Industrial activities account for the largest share of GHG emissions (30 percent) in 2010. Transportation is the second largest contributor (27 percent).[12]

California

California is a substantial contributor of GHGs as it is the second largest contributor in the U.S. and the sixteenth largest in the world (California Energy Commission (CEC 2006). However, between 2000 and 2009, statewide GHG emissions decreased from 464 MMT CO_2e to 457 MMT CO_2e (453 net) in 2009.[13] While total emissions have increased 5.5 percent between 1990 and 2009, emissions decreased by 5.8 percent from 2008 to 2009. Between 2000 and 2009, the total net emissions decreased by 1.3 percent. The major source of GHG emissions in California is transportation, which contributes approximately 38 percent of the State's total. Electricity generation is the second largest source, contributing approximately 23 percent of the State's GHG emissions. The industrial sector contributed approximately 20 percent. Per capita emissions in California have decreased from 2000 to 2009 by approximately 9.7 percent. During this same period, California's population grew by approximately 9 percent. While California ranks second in the U.S. for GHG emissions, only behind Texas, from a per capita perspective California had the 46th lowest emissions.[14]

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9 Also expressed in teragrams. One teragram equals approximately 1,000,000 metric tons.

10 UN Framework Convention on Climate Change, 2011.

11 U.S. energy Information Administration (EIA), International Energy Statistics 2007 – 2011 @ http://www.eia.gov/cfapps/ipdbproject/iedindex3.cf?tid=90&pid=44&aid+8, accessed November 14, 2013.

12 U.S. EPA, U.S. Greenhouse Gas Inventory Report: GHG Emissions and Sinks: 1990 – 2010, Executive Summary @ http://www.epa.gov/climatechange/ghgemissions/usinventoryreport/archive.html accessed November 14, 2013.

13 California Environmental Protection Agency, Air Resources Board, California Greenhouse Gas Emissions Inventory 2000 – 2009, December 2011, at http://www.arb.ca.gov/cc/inventory/pubs/reports/ghg_inventory_00-09_report.pdf, accessed November 14, 2013.

14 Ibid. Page 3.

Various activities in industrial processes, commercial uses, and residential development result in GHG emissions. Operational GHG emissions result from energy use associated with heating, lighting, and powering buildings (typically through natural gas and electricity consumption), pumping and processing water (which consumes electricity), as well as fuel used for transportation, and decomposition of waste associated with building occupants. New development can also create GHG emissions in its construction and demolition phases through the use of diesel fuels in construction equipment, creation and decomposition of building materials, vegetation clearing, and other activities. However, new development does not necessarily create entirely new GHG emissions. Occupants of new buildings are often relocating and shifting their operational-phase emissions from other locations.

4.6.2 Regulatory Framework

Global climate change is addressed by various federal, state, regional, and local government agencies as well as national and international scientific and governmental conventions and programs.

Federal

Federal U.S. Environmental Protection Agency

The USEPA is responsible for implementing Federal policy to address global climate change. The federal government administers a wide array of public-private partnerships to reduce GHG emissions generated by the United States. These programs focus on energy efficiency, renewable energy, methane and other non-CO_2 gases, agricultural practices, and implementation of technologies to achieve GHG reductions.

Currently, there are no federal regulations that address GHG emissions. However, in *Massachusetts v. Environmental Protection Agency*, 579 U.S. 497, 127 S. Ct. 1438 (2007), the United States Supreme Court found that the United States Environmental Protection Agency (EPA) has statutory authority under the Clean Air Act to regulate "greenhouse gas" emissions (including CO_2 emissions) from new motor vehicles.[15] In response to this decision, the EPA is drafting regulations that address GHG emissions.

State

California Air Resources Board

The California Air Resources Board (CARB), a part of the California EPA, is responsible for the coordination and administration of both federal and state air pollution control programs within California. In this capacity, CARB conducts research, sets state ambient air quality standards, compiles emission inventories, develops suggested control measures, and provides oversight of local programs. CARB establishes emissions standards for motor vehicles sold in California, consumer products (such as hairspray, aerosol paints, and barbecue lighter fluid), and various types of commercial equipment. It also sets fuel specifications to further reduce vehicular emissions. CARB has primary responsibility for the development of California's State Implementation Plan (SIP), for which it works closely with the federal government and the local air districts.

[15] Abreu, Heidy and Miguel Loza, Massachusetts v. Environmental Protection Agency (05-1120). The Legal Information Institute, Cornell Law School. 2007, August 5, 2007 http://www.law.cornell.edu/supct/cert/05-1120.html.

California Executive Order S-3-05

In 2005, Governor Arnold Schwarzenegger issued California Executive Order S-3-05 establishing the following emission targets for California: 1) reduce GHG emissions to 2000 levels by 2010; 2) reduce GHG emissions to 1990 levels (427 MMT CO_2e) by 2020; and 3) reduce GHG emissions to 80 percent below 1990 levels (85 MMT CO_2e) by 2050. Executive Orders are binding on State agencies. Accordingly, S-3-05 will guide State agencies' efforts to control and regulate GHG emissions but will have no direct binding effect on local efforts.

Executive Order S-13-08

Executive Order S-13-08 requests that the National Academy of Sciences (NAS) convene an independent panel to complete the first California Sea Level Rise Assessment Report and initiate an independent sea level rise science and policy committee made up of state, national and international experts.

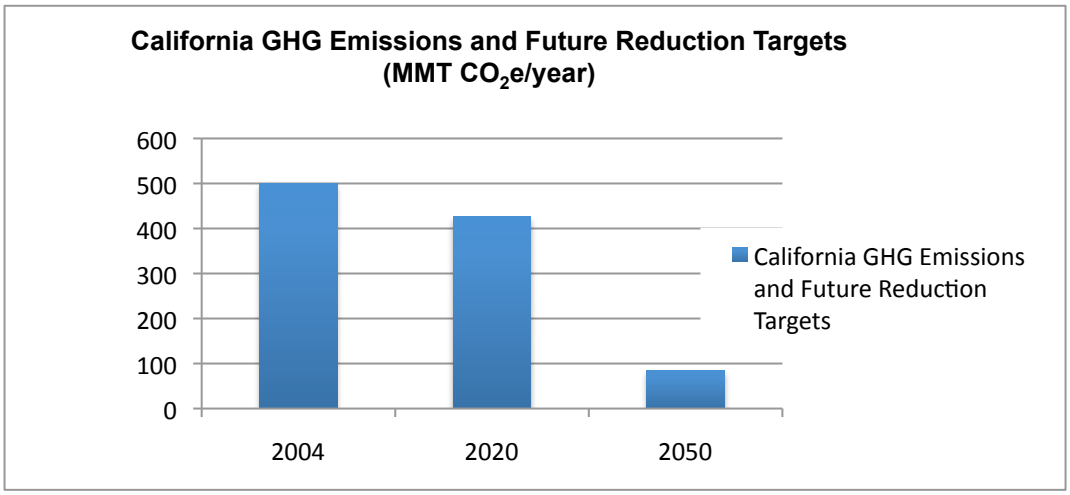
Before release of the final Sea Level Rise Assessment Report, the Executive Order also requires that all State agencies planning construction projects in areas vulnerable to future sea level rise consider a range of sea level rise scenarios for the years 2050 and 2100 in order to assess project vulnerability and, to the extent feasible, reduce expected risks and increase resiliency to sea level rise.[16] An Interim Guidance Report was issued in 2010 by the State of California. The final report form the National Research Council (NRC), *Sea Level Rise for the Coasts of California, Oregon, and Washington.*[17] On March 13, 2013, the Coastal and Ocean Working Group of the California Climate Action Team (Co-CAT) released an updated State of California Sea Level Rise Guidance Document, which incorporated information provided by the Ocean Protection Council's Science Advisory Team and the California Ocean Science Trust and updated the NRC Final Report.

The Executive Order also directs the California Resources Agency, through the Climate Action Team, to develop a state Climate Adaptation Strategy. The document was adopted in 2009 and further updated in 2010. It summarizes the best known science on climate change impacts to California, assess California's vulnerability to the identified impacts, and outline solutions that can be implemented within and across State agencies to promote resiliency.

[16] Sea Level Rise Interim Guidance Document (2010) @ http://opc.ca.gov/webmaster/ftp/pdf/agenda_items/20110311/12.SLR_Resolution/SLR-Guidance Document.pdf

[17] Sea Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future (2010) @ http://www.nap.edu/catalog.php?record_id+13389

Chart 4.6-1



California Global Warming Solutions Action of 2006 (AB 32)

In September 2006, Governor Arnold Schwarzenegger signed Assembly Bill (AB) 32, the *California Global Warming Solutions Act of 2006* (Health and Safety Code § 38500, *et seq.*). AB 32 establishes regulatory, reporting, and market mechanisms to achieve quantifiable reductions in GHG emissions and places a cap on statewide greenhouse gas (GHG) emissions, requiring reduction in statewide GHG to 1990 levels by 2020. AB 32 also includes guidance to institute emission reductions in an economically efficient manner and conditions to ensure that businesses and consumers are not unfairly affected by the reductions. AB 32 demonstrates California's commitment to reducing the rate of GHG emissions and the State's associated contribution to climate change, without limiting population or economic growth. Although AB 32 did not amend CEQA, it identifies the environmental problems in California caused by global warming (see, e.g., Health and Safety Code § 38501).

Senate Bill (SB) 97

SB 97, enacted in 2007, amends the CEQA statute to include analysis of GHG emissions and the effects of GHG emissions as part of any CEQA analysis. In March 2010, the California Office of Administrative Law promulgated CEQA amendments that provide regulatory guidance for the analysis and mitigation of the potential effects of GHG emissions in CEQA document, found in CEQA Guidelines § 15183.5. To streamline analysis, CEQA provides for analysis through compliance with a previously adopted plan or mitigation program under special circumstances.

State of California Climate Change Proposed Scoping Plan

In October 2008, CARB published its *Climate Change Proposed Scoping Plan* (*Proposed Scoping Plan*), which is the State's plan to achieve the GHG reductions required by AB 32. The *Proposed Scoping Plan* contains the primary strategies that California will implement to achieve a reduction of 169 MMT of CO_2e, or approximately 30 percent from the State's projected 2020 emission level of 596 MMT of CO_2e under a "business-as-usual" scenario. The *Proposed Scoping Plan* states that land use planning and urban growth decisions will play an important role in the State's GHG reductions because local governments have primary authority to plan, zone, approve, and permit how land is developed to accommodate population growth and the changing needs of their jurisdictions. CARB further acknowledges that decisions on how land is used will

have large impacts on the GHG emissions that will result from transportation, housing, industry, forestry, water, agriculture, electricity, and natural gas emission sectors. The *Proposed Scoping Plan* was approved by CARB on December 11, 2008.

In addition to the Scoping Plan, CARB has also released the Preliminary Draft Staff Proposal: Recommended Approaches for Setting Interim Significance Thresholds for Greenhouse Gases under the CEQA (ARB Draft Staff Proposal). The CARB Draft Staff Proposal includes potential interim performance standards for various project types and emissions sources including construction, energy, water use, waste, transportation, and total mass GHG emissions. Specific thresholds and performance criteria for these categories have yet to be developed.

Senate Bill (SB) 375

Senate Bill 375 (SB 375) establishes mechanisms for the development of regional targets for reducing passenger vehicle GHG emissions. On September 23, 2010, CARB adopted the vehicular GHG emissions reduction targets that were developed in consultation with the State's metropolitan planning organizations (MPOs); the targets require a 7 to 8 percent reduction by 2020 and a 13 to 16 percent reduction by 2035 for each MPO. Through the SB 375 process, MPOs will work with local jurisdictions to develop sustainable communities strategies (SCS) designed to integrate development patterns and the transportation network in a way that reduces GHG emissions while meeting housing needs and other regional planning objectives. The Santa Barbara County Association of Governments adopted its RTP/SCS on August 15, 2030 and certified an EIR for the policy document.

Regional

Santa Barbara County Air Pollution Control District (SBCAPCD)

The Santa Barbara County Air Pollution Control District (SBCAPCD) is the agency principally responsible for comprehensive air pollution control in Santa Barbara County. In order to provide GHG emission guidance to the local jurisdictions, the SBCAPCD has been developing a proposal to adopt GHG thresholds of significance for stationary source projects. Additional public review for consideration and adoption of greenhouse gas thresholds is expected, but the timing of the adoption of greenhouse gas thresholds for stationary source projects is unknown.

Local

City of Goleta Energy Efficiency Standards

The Goleta General Plan/Coastal Land Use Plan (GP/CLUP) does not directly address GHGs. However, on November 2, 2010, the Goleta City Council adopted the 2010 Edition of the California Green Building Standards Code (CAL Green Code), (24 California Code of Regulations Part 11) as the Green Building Code of the City (Goleta Municipal Code (GMC) Chapter 15.12). The Code mandates new requirements for planning and design, energy efficiency, water efficiency and conservation, material conservation and resource efficiency, environmental quality, and installer and special inspector qualifications. In 2010, the City also adopted Municipal Code Chapter 15.13, entitled "Energy Efficiency Standards," establishing minimum energy efficiency standards for new building construction. The GMC requires that new residential and nonresidential construction and additions greater than 500 square feet use a performance approach to demonstrate that they exceed the California Green Building Standards by 15 percent.

4.6.3 Thresholds of Significance

The State Natural Resources Agency adopted amendments to the CEQA Guidelines for GHG emissions effective March 18, 2010. According to these amendments, a project would have a significant impact if it would:

- Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment; or
- Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs.

The adopted CEQA amendments require a lead agency to make a good-faith effort based, to the extent possible, on scientific and factual data, to describe, calculate, or estimate the amount of GHG emissions resulting from a project. The amendments give lead agencies discretion to the lead agency to determine whether to:

1) Use a model or methodology to quantify GHG emissions resulting from a project, and to determine which model or methodology to use; and/or
2) Rely on a qualitative analysis or performance-based standards.

In addition, a lead agency is expected to consider the following factors, among others, when assessing the significance of a project's GHG emission impacts on the environment:

1) The extent to which the project may increase or reduce GHG emissions as compared to the existing environmental setting;
2) Whether the project emissions exceed a threshold of significance that the lead agency has determined will apply to the project; and
3) The extent to which the project complies with regulations or requirements adopted to implement any statewide, regional, or local plan for the reduction or mitigation of GHG emissions.

Currently, neither the City of Goleta nor the State of California has adopted significance thresholds for GHG emissions. Establishment of thresholds at the State and/or local level has been a point of discussion and analysis by various agencies and boards (i.e., OPR, CARB, CAPCOA [California Air Pollution Control Officers Association]).

In June 2010, the Bay Area Air Quality Management District (BAAQMD) became the first regulatory agency in the nation to approve guidelines that establish thresholds of significance for GHG emissions. These thresholds are summarized in **Table 4.6-1**.

Table 4.6-1
Bay Area Air Quality Management District GHG Thresholds of Significance

GHG Emission Source Category	Operational Emissions
Commercial and Residential (land use projects)	1,100 MT CO_2e/yr. or 4.6 MT CO_2e/SP/yr. [a]
Stationary Sources[b]	10,000 MT CO_2e /yr.

Source: Santa Barbara County APCD, Scope and Content of Air Quality Sections in Environmental Documents, December 2011.
[a] SP = Service Population (residents + employees).
[b] Stationary Sources include stationary combustion sources (industrial-type uses) regulated by the APCD.

On June 10, 2010, Santa Barbara County Planning & Development Department issued a memorandum, "*Support for Use of Bay Area Air Quality Management District Greenhouse Gas Emissions Standards,"*[18] which states, "While Santa Barbara County land use patterns differ from those in the Bay Area as a whole, Santa Barbara County is similar to certain Bay Area counties (in particular, Sonoma, Solano, and Marin) in terms of population growth, land use patterns, General Plan/Coastal Land Use Plan policies, and average commute patterns and times. Because of these similarities, the methodology used by BAAQMD to develop its GHG emission significance thresholds, as well as the thresholds themselves, have applicability to Santa Barbara County and represent the best available interim standards for Santa Barbara County."

In accordance with CEQA Guidelines §§15064.4(b)(2) and 15064.7(c), Goleta has consistently relied upon Santa Barbara County's "*Support for Use of Bay Area Air Quality Management District Greenhouse Gas Emissions Standards"* as the recommended threshold for establishing the GHG impacts of a project. Therefore, this analysis makes use of the BAAQMD/Santa Barbara County Interim Thresholds of Significance to help determine the significance of Project GHG emissions related, based on the 1,100 MT CO_2e/year or 4.6 MT CO_2e per service population per year threshold for commercial and residential land uses. There is no BAAQMD threshold of significance for construction emissions.

However, in 2012, a court judgment determined that the BAAQMD GHG emissions thresholds of significance were not properly adopted under CEQA and cannot be readopted until compliance with CEQA occurs.[19] Since a significant amount of public and expert opinion and input went into the development of the BAAQMD thresholds of significance, the use of the BAAQMD threshold can be used to support analysis even though its use does not imply that it is a threshold that the City has formally adopted as a GHG emissions significance threshold.

According to the applicable thresholds for this Project, the Project would result in a significant impact if it:

a. Generates operational emissions in an amount more than 4.6 MT CO_2e/SP/yr. (SP=service population, including residents and employees), and/or results in significant construction or operational GHG emissions based on a qualitative analysis.

[18] Santa Barbara County Planning & Development Department, *Support for Use of Bay Area Air Quality Management District Greenhouse Gas Emissions Standards. Interim GHG Emissions – Evidentiary Support*, June10, 2010.
[19] California Building Industry Assoc. v. Bay Area Air Quality Management District, (March 5, 2012) Alameda Super. Ct. Case No. RG10-548693.

b. Fails to employ reasonable and feasible means to minimize GHG emissions from a qualitative standpoint, in a manner that is consistent with the goals and objectives of AB 32.

4.6.4 Project Impacts

Given the global nature of climate change resulting from GHG emissions, GHG emission impacts are inherently cumulative in nature. Accordingly, the determination of whether a project's GHG emissions impacts are significant depends on whether those emissions would make a cumulatively considerable contribution to a significant cumulative impact. This is assessed in the following subsection.

4.6.5 Cumulative Impacts

The California Emissions Estimator Model (CalEEMod) includes calculations for a project's CO_2(e) emissions from mobile and non-mobile sources. The CalEEMod estimated emissions from construction and operation of the Project are provided in Appendix B.

Construction Emissions

Impact GHG 1: Would the Project, either directly or indirectly, generate greenhouse gas emissions that would impact the environment during construction?

Significance Before Mitigation: Less Than Significant

Since the exact nature of the origin or make-up of the construction materials needed for this Project is unknown, construction-related GHG emissions are calculated using the estimated operation of vehicles and equipment during construction.

Using the prototype equipment fleet listed in Section 4.2 *Air Quality* Table 4.2-4, along with estimated annual emissions for demolition, grading, construction, painting, and paving, as provided in Table 4.2-5, Project-related annual construction emissions were converted from CO_2 pounds per year (without mitigation) to CO_2e[20] emissions.

Assuming an approximately 43-month schedule, the Project's construction would generate approximately 3,263 MT CO_2e per year. These emissions would be temporary, occurring only during construction of the Project, and therefore would not constitute an ongoing source of GHG emissions. Given the temporary nature of these projected emissions, and the fact that no threshold of significance has been established for temporary construction-related GHG emissions, such emissions would not represent a considerable contribution to state or global GHG emissions, or related global impacts. Additionally, because the construction-related emissions would occur within the site, the construction operations would be analogous to a stationary source similar to an industrial facility. In that respect, construction emissions would be below the 10,000 MT CO_2e per year threshold for stationary sources established by the BAAQMD. Therefore, the cumulative impacts from the Project's construction GHG emissions would be less than significant (**Class III**).

[20] MT CO_2 x 1.011 conversion factor for CO_2 to CO_2e. 1.1 conversion factor for short tons to metric units.

Operational Emissions

Impact GHG 2: Would the Project, either directly or indirectly, generate greenhouse gas emissions that would impact the environment during its operational (long term) period?

Significance Before Mitigation: Less Than Significant

The following sources of emissions are typically associated with the generation of GHG emissions by residential facilities:

Source of Emissions

Vehicular Trips

Vehicle trips generated by growth within the Project area would result in GHG emissions through combustion of fossil fuels. Project-generated carbon dioxide emissions were determined based on the annual vehicle miles traveled (VMT) provided in the traffic analysis with trip rates and average trip lengths in the CalEEMod software, averaged to match as closely as possible the VMT in the traffic analysis. Methane and nitrous oxide emissions were estimated using the VMT from the traffic analysis and USEPA emissions factors for on-road vehicles.

On-site Use of Natural Gas and Other Fuels

Natural gas would be used by the Project for heating of residential space, resulting in a direct release of GHGs. The use of landscaping equipment would also result in onsite GHG emissions. Emissions from the combustion of natural gas and other fuels from the implementation of the Project are based on the number of dwelling units and square footage of communal living areas as estimated by the CalEEMod software. GHG emissions associated with building envelope energy use vary based on the size of the structures, the type and extent of energy-efficiency measures incorporated into structural designs, and the type and size of equipment installed. Complete building envelope details regarding incorporation of energy efficiency measures could not be incorporated into the Project inventory as such information was not available at the time of the analysis. Therefore, it was assumed that the building envelopes would comply with the current minimal standards for all business-as-usual (BAU) analysis and for new development in the Project area.

Electricity Use

Electricity is generated by a combination of methods, which include combustion of fossil fuels. By using electricity, the Project would contribute indirectly to the GHG emissions associated with electricity production. Indirect emissions resulting from the use of electricity at the Project site are based on the number of dwelling units and square footage of communal living areas as estimated by the CalEEMod software.

Implementation of the Project would contribute to long-term increases in GHGs as a result of minor secondary fuel combustion emissions from space heating, etc. Development occurring as a result of the Project would also result in secondary operational increases in GHG emissions as a result of electricity generation to meet Project-related increases in energy demand. Electricity generation in California is mainly from natural gas-fired power plants; however, since California imports about 20 to 25 percent of its total electricity, GHG emissions associated with electricity generation could also occur outside of California.

Water Use and Wastewater Generation

California's water conveyance system is energy-intensive, using electricity to pump and treat water and wastewater. Typically, development of the Project would contribute to indirect emissions by consuming water and generating wastewater. Water consumption and wastewater generation, and their associated emissions, are calculated based on the number of residential units and square feet of communal living areas in CalEEMod.

Solid Waste

Disposal of organic waste in landfills can lead to the generation of methane, a potent greenhouse gas. By generating solid wastes, proposed Project development would indirectly contribute to the emission of fugitive methane from landfills, as well as CO_2, CH_4 and N_2O from the operation of trash collection vehicles.

Project Emissions

Implementation of the residential Village at Los Carneros Project would contribute to GHG emissions from mobile sources as a result of traffic increases as well as emissions from the generation of energy that is consumed off-site in order to service the Project (such as at utility providers associated with the Project's energy demands). Emissions contributed by the existing business park on Lots 1 and 3 are not included in this analysis as they are part of the community's ambient condition and the component of the Project that would impact the business park would not result in new construction or other measurable operational changes.

The Project's long-term annual operational GHG emissions are summarized in **Table 4.6-2**, which shows that unmitigated CO_2e (GHG emissions) from the Project's operation would ~~be~~ total 4,680 MT CO_2e annually. Of this, approximately 69 percent would be generated by the Project's transportation sources and 31 percent would be from the other operational energy consumption. At build-out, the Project is expected to accommodate 1,209 residents (2.6 persons per unit x 465 units) and 20 employees estimated by the applicant, who would be onsite to manage and maintain the residential facilities. The total service population of the residential component of the Project would be approximately 1,229 persons. Consequently, the Project would produce 3.81 MT CO_2e/service population/year (residents + employees),[21] in the unmitigated scenario. This amount falls under the significance threshold of 4.6 MT CO_2e per service population per year.

Table 4.6-2
Annual CO_2e Generation Threshold

Source	CO_2e Emissions Metric Tons/year
Area	5.8
Energy	1,220.6
Mobile	3,247.1
Waste	114.3
Water	92.3
Total	**4,679.9**

CalEEMod output in Appendix

[21] 4,680 MT CO_2e/(1,209 residents + 20 employees) = 3.81 MT CO_2e per resident or employee. Number of residents is based on City of Goleta General Plan Housing Element Technical Appendix, November 2010, Page 10A-20.

The 2010 California Air Pollution Control Officers Association (CAPCOA) *Quantifying Greenhouse Gas Mitigation Measures Report* estimated the potential reduction of emissions reduction associated with implementation of various potential mitigation measures. **Table 4.6-3** provides a list of reductions rates for GHG reducing design features that would be employed by the Project that would further reduce the Project's estimated emissions.

Table 4.6-3
Annual CO_2e Generation

Feature	% Reduction in GHG Emissions	Basis
Design Water Efficient Landscapes	0-70%	Outdoor Water Use
Use Water Efficient Landscape Irrigation Systems	6.1%	Outdoor Water Use
Install Low Flow Water Fixtures	20%	Indoor Water Use
Install Higher Efficiency Public Street and Onsite Lighting	16-40%	Outdoor Lighting Electrical Use
Install Energy Efficient Appliances	2-4%	Appliance Electrical Use

Based on the CalEEMod GHG estimations, without any mitigation, the Project's annual operational GHG emissions of 3.81 MT CO_2e per service population would be below the threshold of 4.6 MTCO_2e per service population per year. The Project's estimated GHG emissions would be further reduced by compliance with the requirements of the City's Green Building Code and implementation of other mitigation measures identified in Table 4.6-3. Therefore, the Project's GHG emissions impacts would be less than significant impact (**Class III**).

4.6.6 Mitigation Measures

The Project's GHG emissions would be less than significant and mitigation is not required. However, GHG emissions would be further reduced by implementation of Mitigation Measure AQ 2-1 (see Section 4.2 Air Quality), which requires the implementation of an Alternative Transportation/Transportation Demand Management Program to mitigate impacts from emissions of criteria pollutants. Implementation of this mitigation measure would also reduce the Project's transportation related GHG emissions. ~~The Project's non-transportation related emissions are to be reduced through increased energy efficiency provided through compliance with the GMC's Energy Efficiency Standards and the most current California Green Building Code as adopted by the City. Implementation of AQ 2-1 would further reduce the Project's less than significant GHG emissions impacts.~~

The Project's non-transportation related GHG emissions would also be reduced through compliance with mandatory Energy Efficiency Standards required by the GMC as well as the most current California Green Building Code as adopted by the City. Mitigation Measure GHG-1 is included as a recommendation to ensure energy efficiency and conservation features are incorporated as feasible. The use of energy efficient components listed in recommended Mitigation Measure GHG-1 may be adopted as Conditions of Approval for the Project.

GHG-1: (Recommended)

Energy conservation measures must be included in the Conditions of Approval as applicable and feasible for this Project. All new residential ~~and commercial buildings~~ structures of the Project must comply with the energy efficiency standards set forth in the Goleta Municipal Code ("GMC") and with the 2010 State of California Green Building Code, as adopted by the GMC.

Plan Requirements: The following additional energy conservation measures must be included in the plans unless the Permittee demonstrates their infeasibility to the satisfaction of the Director of Planning and Environmental Review, or designee:

a) use of photovoltaic systems;

b) passive cooling strategies such as passive or fan aided cooling plan designed into the structure and/or a roof opening for hot air venting or installation of underground cooling tubes;

c) high efficiency outdoor lighting and/or solar powered lighting;

d) installation of Energy Star roofs, furnaces, and appliances;

e) use of solar-assisted water heating for swimming pools and tankless hot water on demand systems if their energy efficiency is demonstrated to exceed that of a central storage tank water heating system;

f) use of passive solar cooling/heating;

g) use of natural lighting in lieu of artificial lighting;

h) installation of energy efficient lighting;

i) use of water-efficient landscapes; water-efficient irrigation systems and devices; and use of reclaimed water (if available);

j) installation of cool pavements;

k) provision of segregated waste bins for recyclable materials; and

l) zero waste/high recycling standards.

Timing: These requirements must be shown on all plans submitted to the City before the City issues a building permit.

Monitoring: The Director of Planning and Environmental Review, or designee, must verify compliance before the City issues building permit(s) for the Project.

4.6.7 Residual Impacts

The Project's GHG impacts would be less than significant. Implementation of AQ 2-1 and GHG-1 (recommended) would further reduce the Project's less than significant residual impacts (**Class III**).