
5.7 Greenhouse Gas Emissions

The analysis of greenhouse gas emissions presented in this section is based on Greenhouse Gas Assessment technical report prepared for the Project by Mestre Greve Associates on May 10, 2011.

5.7.1 INTRODUCTION TO GLOBAL CLIMATE CHANGE AND GREENHOUSE GASES

The Earth's climate has always been in the process of changing, due to many different natural factors. These factors have included changes in the Earth's orbit, volcanic eruptions, and varying amounts of energy released from the sun. Differences such as these have caused fluctuations in the temperature of the climate, ranging from ice ages to long periods of warmth. However, since the late 18th century, humans have had an increasing impact of the rate of climate change, beginning with the Industrial Revolution.

Many human activities have augmented the amount of "greenhouse gases" ("GHGs") being released into our atmosphere, specifically the burning of fossil fuels, such as coal and oil, and deforestation. The gases increase the efficiency of the greenhouse effect, which is the process of trapping and recycling energy (in the form of heat) that the Earth emits naturally, resulting in higher temperatures worldwide. The Intergovernmental Panel on Climate Change stated in February 2007 that warming is unequivocal, expressing very high confidence (expressed as a nine out of ten chance of being correct) that the net effect of human activities since 1750 has been one of warming. According to the National Oceanic and Atmospheric Administration (NOAA) and National Aeronautics and Space Administration (NASA) data, the average surface temperature of the Earth has increased by about 1.2 to 1.4 °F since 1900. The warmest global average temperatures in human record have all occurred within the past 15 years, with the warmest two years being 1998 and 2005. [EPA, 2007, epa.gov/climatechange/basicinfo.html].

This process of heating is often referred to as 'global warming,' although the National Academy of Sciences prefers the terms 'climate change' as an umbrella phrase which includes global warming as well as other environmental changes, in addition to the increasing temperatures. Some of these effects include changes to rainfall, wind, and current weather patterns, as well as snow and ice cover, and sea level.

Depending on which GHG emissions scenario is used, climate models predict that the Earth's average temperature could rise anywhere between 2.5 to 10.4 °F from 1990 to the end of this century. The degree of change is influenced by the assumed amount of GHG emissions, and how quickly atmospheric GHG levels are stabilized. At this point, however, the climate change models are not capable of predicting local impacts, but rather, can only predict global trends. [EPA, 2007, epa.gov/climatechange/basicinfo.html].

Global GHG emissions are measured in million metric tons of carbon dioxide equivalent ("MMT CO₂EQ") units. A metric ton is approximately 2,205 lbs. Some GHGs emitted into the atmosphere are naturally occurring, while others are caused solely by human activities. The principal GHGs that enter the atmosphere because of human activities are:

- **Carbon dioxide (CO₂)** enters the atmosphere through the burning of fossil fuels (oil, natural gas, and coal), agriculture, irrigation, and deforestation, as well as the manufacturing of cement.
- **Methane (CH₄)** is emitted through the production and transportation of coal, natural gas, and oil, as well as from livestock. Other agricultural activities influence methane emissions as well as the decay of waste in landfills.
- **Nitrous oxide (N₂O)** is released most often during the burning of fuel at high temperatures. This greenhouse gas is caused mostly by motor vehicles, which also include non-road vehicles, such as those used for agriculture.
- **Fluorinated Gases** are emitted primarily from industrial sources, which often include hydrofluorocarbons (HFC), perfluorocarbons (PFC), and sulfur hexafluoride (SF₆). Though they are often released in smaller quantities, they are referred to as High Global Warming Potential Gases because of their ability to cause global warming. Fluorinated gases are often used as substitutes for ozone depleting substances.

These gases have different potentials for trapping heat in the atmosphere, called global warming potential (“GWP”). For example, one pound of methane has 21 times more heat capturing potential than one pound of carbon dioxide. When dealing with an array of emissions, the gases are converted to carbon dioxide equivalents for comparison purposes. The GWPs for common greenhouse gases are shown in Table 5.7-1.

Table 5.7-1 Global Warming Potentials and Atmospheric Lifetimes of Select Greenhouse Gases		
Gas	Atmospheric Lifetime (years)	Global Warming Potential (100 year time horizon)
Carbon Dioxide	50 – 200	1
Methane	12 ± 3	21
Nitrous Oxide	120	310
HFC-23	264	11,700
HFC-134a	14.6	1,300
HFC-152a	1.5	140
PFC: Tetrafluoromethane (CF ₄)	50,000	6,500
PFC: Hexafluoroethane (C ₂ F ₆)	10,000	9,200
Sulfur Hexafluoride (SF ₆)	3,200	23,900

Source: EPA 2006. Non CO₂ Gases Economic Analysis and inventory. (<http://www.epa.gov/nonco2/econ-inv/table.html>), December 2006

Consumption of fossil fuels in the transportation sector was the single largest source of California’s GHG emissions in 2004, accounting for 40.7 percent of total GHG emissions in the state (California Energy Commission 2006a). This category was followed by the electric power sector (including both in-state and out-of-state sources) (22.2 percent) and the industrial sector

(20.5 percent) (California Energy Commission 2006a). A byproduct of fossil fuel combustion is CO₂. Processes that absorb and accumulate CO₂, often called CO₂ “sinks,” include absorption by vegetation and dissolution into the ocean. Methane, a highly potent GHG, results from off-gassing associated with agricultural practices and municipal solid waste landfills.

Impact of Climate Change on California and Human Health

The long term environmental impacts of global warming may include sea level rise that could cause devastating erosion and flooding of coastal cities and villages, as well as more intense hurricanes and typhoons worldwide. In the United States, Chicago is projected to experience 25 percent more frequent heat waves and Los Angeles a four-to-eight-fold increase in heat wave days by the end of the century (IPCC, 2007: Climate Change 2007: Impacts, Adaptation and Vulnerability, Contribution of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge).

Locally, global warming could cause changing weather patterns with increased storm and drought severity in California. Changes to local and regional ecosystems include the potential loss of species and a significant reduction in winter snow pack (e.g., estimates include a 30 to 90% reduction in snow pack in the Sierra Nevada mountain range). Current data suggest that in the next 25 years, in every season of the year, California could experience unprecedented heat, longer and more extreme heat waves, greater intensity and frequency of heat waves, and longer dry periods. The California Climate Change Center (2006) predicted that California could witness the following events:

- Temperature rises between 3 and 10.5 °F
- 6 to 20 inches or more increase in sea level
- 2 to 4 times as many heat-wave days in major urban centers
- 2 to 6 times as many heat-related deaths in major urban centers
- 1 to 1.5 times more critically dry years
- 10 to 55% increase in the risk of wildfires

An increase in the frequency of extreme events may result in more event-related deaths, injuries, infectious diseases, and stress-related disorders. Particular segments of the population such as those with heart problems, asthma, the elderly, the very young and the homeless can be especially vulnerable to extreme heat. Also, climate change may increase the risk of some infectious diseases; particularly those diseases that appear in warm areas and are spread by mosquitoes and other insects. These "vector-borne" diseases include malaria, dengue fever, yellow fever, and encephalitis. Also, algal blooms could occur more frequently as temperatures warm — particularly in areas with polluted waters — in which case diseases (such as cholera) that tend to accompany algal blooms could become more frequent.

Adaptation Impact

Adaptation refers to potential climate change impacts on the project. Global warming is already having a profound impact on water resources. Climate change already altered the weather patterns and water supply in California leading to increased water shortages (i.e., a dwindling snowpack, bigger flood flows, rising sea levels, longer and harsher droughts). Water supplies are

also at risk from rising sea levels. Risks may include degradation of California’s estuaries, wetlands, and groundwater aquifers which would threaten the quality and reliability of the major California fresh water supply (Climate Change Adaptation Strategies for California’s Water, State of California Department of Water Resources, October 2008).

Higher temperatures will also likely increase electricity demand due to higher air conditioning use. Even if the population remained unchanged, toward the end of the century annual electricity demand could increase by as much as 20 percent if temperatures rise into the higher warming range. (Implementing aggressive efficiency measures could lower this estimate).

Higher temperatures may require that the project consume more electricity for cooling. Additionally, more water may be needed for the landscaping. However, sea level rise will not impact the project because it is so far and high relative to the ocean.

Adaptation includes the responses to the changing climate and policies to minimize the predicted impacts (e.g., building better coastal defenses to sea level rise). Adaptation is not included in this report. It should be note that adaptation is not mitigation. Mitigation includes intervention or policies to reduce GHG emissions or to enhance the sinks of GHGs.

Emission Inventories

To put perspective on the emissions generated by a project and to better understand the sources of GHGs, it is important to look at emission inventories. The United Nations has taken the lead in quantifying GHG emissions and compiling the literature on climate change. The United Nations estimate for CO2 equivalents for the world and for the top ten CO2 producing countries is presented in Table 5.7-2.

Table 5.7-2 Top Ten CO2 Producing Nations Between 1990-2004 (Emissions in Million Metric Tons (MMT) CO2EQ)		
Country	Emissions	Percent of Global
1. United States	7017.32	21.06%
2. China	4057.31	12.17%
3. Japan	1340.08	4.02%
4. India	1214.25	3.64%
5. Germany	1004.79	3.02%
6. Canada	720.63	2.16%
7. Brazil	658.98	1.98%
8. United Kingdom	655.79	1.97%
9. Italy	567.92	1.70%
10. France	546.53	1.64%
Total Global	33,326	100%
California	480	1.44%

Source: United Nations Framework Convention on Climate Change, "National Greenhouse Gas Inventory Data for the Period 1990–2006 and Status of Reporting," October 19, 2006.

Global CO₂ emissions totaled about 33,326 MMT CO₂EQ in 2006. The United States released 7,017 MMT CO₂EQ in 2006, which is approximately 21% of the earth's total emissions.

Within the United States, California has the second highest level of GHG production with Texas having the highest. In 2001, the burning of fossil fuels produced over 81% of total GHG emissions. In relation to other states, California is the second highest producer of CO₂ by fossil fuels.

Sources of Greenhouse Gases in California

The California Energy Commission ("CEC") categorizes GHG generation by source into five broad categories. The categories are:

- **Transportation** includes the combustion of gasoline and diesel in automobiles and trucks. Transportation also includes jet fuel consumption and bunker fuel for ships.
- **Agriculture and forestry** GHG emissions are composed mostly of nitrous oxide from agricultural soil management, CO₂ from forestry practice changes, methane from enteric fermentation, and methane and nitrous oxide from manure management.
- **Commercial and residential** uses generate GHG emissions primarily from the combustion of natural gas for space and water heating.
- **Industrial** GHG emissions are produced from many industrial activities. Major contributors include oil and natural gas extraction; crude oil refining; food processing; stone, clay, glass, and cement manufacturing; chemical manufacturing; and cement production. Wastewater treatment plants are also significant contributors to this category.
- **Electric generation** includes both emissions from power plants in California as well as power plants located outside of the state that supply electricity to the state.

Most of California's GHGs are emitted by transportation sources, such as automobiles, trucks, and airplanes. Combustion of fossil fuels in the transportation sector contributed approximately 38% of the California GHG. This category was followed by the electric power sector (including both in-state and out-of-state sources) (24%) and the industrial sector (23%). Residential and commercial activity accounted for approximately 9% of the emissions. The smallest GHG contributors are the waste and recycling sector and the agricultural and forestry sector, which accounted for about 1% and 6%, respectively.

While California has the second highest rate of GHG production in the nation, it should also be noted that California has one of the lowest per capita rates of GHG emissions. California had the fourth lowest per capita rate of CO₂ production from fossil fuels in the United States. Wyoming produced the most CO₂ per capita, while the District of Columbia produced lowest.

5.7.2 ENVIRONMENTAL SETTING

Regulatory Setting

International and Federal Plans, Policies, Regulations and Laws

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 risk of human-induced climate change, its potential impacts, and options for adaptation and mitigation.”

On March 21, 1994, the United States joined other countries around the world in signing the United Nations Framework Convention on Climate Change (UNFCCC). Under the Convention, governments gather and share information on GHG emissions, national policies, and best practices; launch national strategies for addressing GHG emissions and adapting to expected impacts, including the provision of financial and technological support to developing countries; and cooperate in preparing for adaptation to the impacts of climate change.

The Kyoto Protocol is a treaty made under the UNFCCC. Countries can sign the treaty to demonstrate their commitment to reduce their emissions of GHGs or engage in emissions trading. More than 160 countries, accounting for 55 percent of global emissions, are under the protocol. United States Vice President Al Gore symbolically signed the Protocol in 1998. However, in order for the Protocol to be formally ratified, it must be adopted by the U.S. Senate, which has not been done to date.

The federal government began studying the phenomenon of global warming as early as 1978 with the National Climate Protection Act, 92 Stat. 601, which required the President to establish a program to “assist the Nation and the world to understand and respond to natural and man-induced climate processes and their implications.” The 1987 Global Climate Protection Act, Title XI of Pub. L. 100-204, directed the U.S. EPA to propose a “coordinated national policy on global climate change,” and ordered the Secretary of State to work “through the channels of multilateral diplomacy” to coordinate efforts to address global warming. Further, in 1992, the United States ratified a nonbinding agreement among 154 nations to reduce atmospheric GHGs.

More recently, in *Massachusetts v. EPA* (April 2, 2007), the United States Supreme Court held that GHGs fall within the Clean Air Act’s definition of an “air pollutant,” and directed the EPA to consider whether GHGs are causing climate change. If so, the EPA must regulate GHG emissions from automobiles under the Clean Air Act.

While the EPA has not finalized a regulation, it did issue a proposed rule on April 17, 2009. The rule declared that GHGs endanger human health and is the first step to regulation through the federal Clean Air Act. If it becomes final, the EPA would define air pollution to include the six key GHGs – CO₂, CH₄, N₂O, HFCs, PFCs, and SF₆.

In addition, Congress has increased the corporate average fuel economy (CAFE) of the U.S. automotive fleet. In December 2007, President Bush signed a bill raising the minimum average miles per gallon for cars, sport utility vehicles, and light trucks to 35 miles per gallon by 2020.

This increase in CAFE standard will create a substantial reduction in GHG emissions from automobiles, which is the largest single emitting GHG sector in California.

As of this writing, however, there are no adopted federal plans, policies, regulations or laws setting a mandatory limit on GHG emissions. Further, the EPA has not finalized its evaluation in the wake of *Massachusetts v. EPA*.

State Regulations and Directives

In the past year, California has distinguished itself as a national leader in efforts to address global climate change by enacting several major pieces of legislation, engaging in multi-national and multi-state collaborative efforts, and preparing a wealth of information on the impacts associated with global climate change.

In November 2008, the Governor issued Executive Order S-13-08 directing state agencies to plan for sea level rise and other climate change impacts. There are four key actions in the Executive Order: (1) initiation of a climate change adaptation strategy that will assess the state's expected climate change impacts where the state is most vulnerable, with recommendations by early 2009; (2) an expert panel on sea level rise will inform state planning and development efforts; (3) interim guidance to state agencies on planning for sea level rise in coastal and floodplain areas for new projects; and (4) initiation of a report on critical existing and planned infrastructure projects vulnerable to sea level rise.¹

Pursuant to AB 32, the California Air Resources Board (CARB) has adopted a number of relevant policies and directives. In December 2008, the Scoping Plan was adopted. The Plan is a central requirement of the statute. In addition, it has adopted a number of protocols for industry and government sectors, including one for local government.²

In response to SB 97, the Office of Planning and Research (OPR) issued a Technical Advisory on CEQA and Climate Change in June 2008. The Advisory provides an outline of what should be included in a GHG analysis under CEQA. In January 2009, OPR issued draft amendments to the CEQA Guidelines that address GHGs. Among the amendments are the following.

- Determining the Significance of Impacts from Greenhouse Gas Emissions (Guidelines § 15064.4);
- Thresholds of Significance (Guidelines § 15064.7(c));
- Discussion of Cumulative Impacts (Guidelines § 15130(a)(1)(B) and Guidelines § 15130(f));
- Tiering and Streamlining the Analysis of Greenhouse Gas Emissions (Guidelines § 15183.5);

¹ Executive Order S-13-08. <http://gov.ca.gov/executive-order/11036/>

² See <http://www.arb.ca.gov/cc/protocols/localgov/localgov.htm> and the *Local Government Toolkit* (<http://www.coolcalifornia.org/local-government>)

Assembly Bill 32, the California Global Warming Solutions Act of 2006 (Health and Safety Code §38500 et seq.): In September 2006, Governor Arnold Schwarzenegger signed AB 32, the California Global Warming Solutions Act of 2006. In general, AB 32 directs CARB to do the following:

- On or before June 30, 2007, CARB shall publish a list of discrete early action measures for reducing GHG emissions that can be implemented by January 1, 2010;
- By January 1, 2008, establish the statewide GHG emissions cap for 2020, based on CARB's calculation of statewide GHG emissions in 1990 (an approximately 25 percent reduction in existing statewide GHG emissions);
- Also by January 1, 2008, adopt mandatory reporting rules for GHG emissions sources that "contribute the most to statewide emissions" (Health & Safety Code § 38530);
- By January 1, 2009, adopt a scoping plan that indicates how GHG emission reductions will be achieved from significant GHG sources through regulations, market mechanisms, and other strategies;
- On or before January 1, 2010, adopt regulations to implement the early action GHG emission reduction measures;
- On or before January 1, 2011, adopt quantifiable, verifiable, and enforceable emission reduction measures by regulation that will achieve the statewide GHG emissions limit by 2020;
- On January 1, 2012, CARB's GHG emissions regulations become operative; and
- On January 1, 2020, achieve 1990 levels of GHG emissions.

In a December 2006 report, CARB estimated that California emitted between 425 and 468 million metric tons of CO₂ in 1990. In December 2007, CARB finalized 1990 emissions at 427 million metric tons of CO₂. In the August 2007 draft report, CARB estimated California emitted approximately 480 million metric tons of CO₂ in 2004. Based on the U.S. Census Bureau California 2007 population of 36,553,215, this would result in about 13 metric tons of CO₂ per capita.

AB 32 takes into account the relative contribution of each source or source category to protect adverse impacts on small businesses and others by requiring CARB to recommend a *de minimis* (minimal importance) threshold of GHG emissions below which emissions reduction requirements would not apply. AB 32 also follows the Governor to adjust the deadlines mentioned above for individual regulations or the entire state to the earliest feasible date in the event of extraordinary circumstances, catastrophic events, or threat of significant economic harm.

CARB "Early Action Measures" (June 30, 2007). On June 21, 2007, CARB approved its early action measures to address climate change, as required by AB 32. The three measures include: (1) a low carbon fuel standard, which will reduce the carbon-intensity in California fuels, thereby reducing total CO₂ emissions; (2) reduction of refrigerant losses from motor vehicle air

conditioning system maintenance through the restriction of “do-it-yourself” automotive refrigerants; and (3) increased CH₄ (methane) capture from landfills through the required implementation of state-of-the-art capture technologies.

CARB Mandatory Reporting Regulations (December 2008). Under AB 32, CARB propounded regulations to govern mandatory greenhouse gas emissions reporting for certain sectors of the economy, most dealing with approximately 94 percent of the industrial and commercial stationary sources of emissions. Regulated entities include electricity generating facilities, electricity retail providers, oil refineries, hydrogen plants, cement plants, cogeneration facilities, and industrial sources that emit over 25,000 metric tons of CO₂ from stationary source combustion.

Senate Bill 97 (2007). By July 1, 2009, the Governor’s Office of Planning and Research (OPR) is directed to prepare, develop, and transmit to the Resources Agency guidelines for the feasible mitigation of greenhouse gas emissions or the effects of greenhouse gas emissions, as required by the California Environmental Quality Act. The Resources Agency is required to certify and adopt these guidelines by January 1, 2010. OPR is required to periodically update these guidelines as CARB implements AB 32. In addition, SB 97 states that the failure to include a discussion of greenhouse gas emissions in any CEQA document for a project funded under the Highway Safety, Traffic Reduction, Air Quality and Port Security Bond Act of 2006, or projects funded under the Disaster Preparedness and Flood Prevention Bond Act of 2006 shall not be a cause of action under CEQA. This last provision will be repealed on January 1, 2010.

Executive Order S-01-07: This Order was set forth by the Governor on January 18, 2007. The order mandates that a statewide goal shall be established to reduce the carbon intensity of California's transportation fuels by at least ten percent by 2020. It also requires that a Low Carbon Fuel Standard for transportation fuels be established for California.

Senate Bill 1368 (2006) (Public Utilities Code §§ 8340-41). SB 1368 required the California Public Utilities Commission (“PUC”) to establish a “GHG emission performance standard” by February 1, 2007, for all electricity providers under its jurisdiction, including the state’s three largest privately-owned utilities. Pub. Res. Code § 8341(d)(1). These utilities provide approximately 30 percent of the state’s electric power. After the PUC acted, the CEC adopted a performance standard “consistent with” the PUC performance standard and applied it to local publicly-owned utilities on May 23, 2007 (over one month ahead of its June 30, 2007 deadline). Cal. Pub. Res. Code § 8341(e)(1). However, the California Office of Administrative Law (“OAL”) found four alleged flaws in the CEC’s rulemaking. The CEC overcame these alleged flaws and adopted reformulating regulations in August 2007.

Senate Bill 107 (2006). Senate Bill 107 (“SB 107”) requires investor-owned utilities such as Pacific Gas and Electric, Southern California Edison and San Diego Gas and Electric, to generate 20 percent of their electricity from renewable sources by 2010. Previously, state law required that this target be achieved by 2017.

Senate Bill 375 (September 2008). In September 2008, SB 375 was signed by Governor Schwarzenegger. SB 375 is a comprehensive global warming bill that helps to achieve the goals of AB32. To help establish these targets, the CARB assigned a Regional Targets Advisory

Committee to recommend factors to be considered and methodologies for setting greenhouse gas emission reduction targets. SR 375 also provides incentive – relief from certain CEQA requirements for development projects that are consistent with regional plans that achieve the targets. SB 375 requires CARB to develop, in collaboration with the Metropolitan Planning Organization (MPO), passenger vehicle greenhouse gas emissions reduction targets for 2020 and 2035 by September 30, 2010. The MPO is required to include and adopt, in their regional transportation plan, a sustainable community strategy that will meet the region’s target provided by CARB.

Western Regional Climate Action Initiative (Arizona, California, New Mexico, Oregon, Utah, Washington)(2007). Acknowledging that the western states already experience a hotter, drier climate, the Governors of the foregoing states have committed to three time-sensitive actions: (1) by August 26, 2007, to set a regional goal to reduce emissions from the states collectively, consistent with state-by state goals; (2) by August 26, 2008, to develop “a design for a regional market-based multi-sector mechanism, such as a load-based cap and trade program, to achieve the regional GHG reduction goal;” and (3) to participate in a multi-state GHG registry “to enable tracking, management, and crediting for entities that reduce GHG emissions, consistent with state GHG reporting mechanisms and requirements.”

Executive Order S-3-05: California Governor Arnold Schwarzenegger announced on June 1, 2005, through Executive Order S-3-05, GHG emission reduction targets as follows: by 2010, reduce GHG emissions to 2000 levels; by 2020, reduce GHG emissions to 1990 levels; by 2050, reduce GHG emissions to 80 percent below 1990 levels.

California’s Renewable Energy Portfolio Standard Program (2005). In 2002, California established its Renewable Energy Portfolio Standard Program, which originally included a goal of increasing the percentage of renewable energy in the state’s electricity mix to 20 percent by 2017. The state’s most recent 2005 Energy Action Plan raises the renewable energy goal from 20 percent by 2017, to 33 percent by 2020.

Title 24, Part 6, California Code of Regulations (2005). In 2005, California adopted new energy efficiency standards for residential and nonresidential buildings in order to reduce California’s energy consumption. This program has been partially responsible for keeping California’s per capita energy use approximately flat over the past 30 years.

California Assembly Bill No. 1493 (AB 1493): Enacted on July 22, 2002, this bill required the California Air Resources Board (CARB) to develop and adopt regulations that reduce GHGs emitted by passenger vehicles and light-duty trucks. Regulations adopted by CARB will apply to 2009 and later model year vehicles. CARB estimates that the regulation will reduce GHG emissions from the light-duty/passenger vehicle fleet by an estimated 18 percent in 2020 and by 27% in 2030, compared to today.

Climate Action Registry (2001). California Senate Bills 1771 and 527 created the structure of the California Climate Action Registry (“Registry”), and former Governor Gray Davis signed the final version of the Registry’s enabling legislation into law on October 13, 2001. These bills establish the Registry as a non-profit entity to help companies and organizations establish GHG emissions baselines against which future GHG emission reduction requirements could be

applied. Using any year from 1990 forward as a base year, participants can record their annual GHG emissions with the Registry. In return for this voluntary action, the State of California promises to offer its “best efforts” to ensure that participants receive consideration for their early action if they are subject to any future state, federal or international emissions regulatory scheme.

South Coast Air Quality Management District Regulations and Directives

The South Coast Air Quality Management District (SCAQMD) adopted a “Policy on Global Warming and Stratospheric Ozone Depletion” in April 1990. The policy commits the SCAQMD to consider global impacts in rulemaking and in drafting revisions to the Air Quality Management Plan. In March 1992, the SCAQMD Governing Board reaffirmed this policy and adopted amendments to the policy to include the following directives:

- Phase out the use and corresponding emissions of chlorofluorocarbons (CFCs), methyl chloroform (1,1,1-trichloroethane or TCA), carbon tetrachloride, and halons by December 1995;
- Phase out the large quantity use and corresponding emissions of hydrochlorofluorocarbons (HCFCs) by the year 2000;
- Develop recycling regulations for HCFCs (e.g., SCAQMD Rules 1411 and 1415);
- Develop an emissions inventory and control strategy for methyl bromide; and,
- Support the adoption of a California GHG emission reduction goal.

The legislative and regulatory activity detailed above is expected to require significant development and implementation of energy efficient technologies and shifting of energy production to renewable sources.

Existing Conditions

Existing land uses on site consist of 599,089 sf of retail, 103,434 sf of commercial/office, 49,873 sf of civic, 107,490 sf of religious, 77,617 sf of education, 19,385 sf of other uses, and 40 residential units. The primary source of existing GHG emissions are generated from motor vehicles. Other emissions generated from the Project area include combustion of natural gas for space and water heating, as well as off-site GHG emissions from the generation of electricity consumed by the project.

5.7.3 THRESHOLD FOR DETERMINING SIGNIFICANCE

According to Appendix G of the California Environmental Quality Act (CEQA) Guidelines, a project will normally have a significant adverse impact on global climate change if it would:

Threshold GHG-1 Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.

Threshold GHG-2 Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases. Environmental Impacts

California Air Resource Board Significance Thresholds

The CARB is the lead agency for implementing AB32. In October 2008, CARB published a Proposed Scoping Plan, in coordination with the Climate Action Team (CAT), to establish a comprehensive set of actions designed to reduce overall greenhouse gas emissions in California. The measures in the Scoping Plan approved by the Board will be developed over the next two years and be in place by 2020. California is the fifteenth largest emitter of GHGs on the planet, representing about 2 percent of the worldwide emissions. According to climate scientists, California and the rest of the developed world will have to cut emissions by 80 percent from today's levels to stabilize the amount of CO₂ in the atmosphere and prevent the most severe effects of global climate change. This long range goal is reflected in California Executive Order S-3-05 that requires an 80 percent reduction of greenhouse gases from 1990 levels by 2050. Reducing GHG emissions to 1990 levels means cutting approximately 30 percent from business-as-usual emissions levels projected for 2020, or about 15 percent from today's levels. On a per-capita basis, that means reducing our annual emissions of 14 tons of CO₂ equivalent for every man, woman and child in California down to about 10 tons per person by 2020.

Significant progress can be made toward the 2020 goal with existing technologies and improving the efficiency of energy use. Other solutions involve improving our state's infrastructure, transitioning to cleaner and more secure sources of energy, and adopting 21st century land use planning and development practices. Key elements of California's recommendations for reducing its greenhouse gas emissions to 1990 levels by 2020 include:

- Expanding and strengthening existing energy efficiency programs as well as building and appliance standard;
- Achieving a statewide renewable energy mix of 33 percent;
- Developing a California cap-and-trade program that links with other Western Climate Initiative partner programs to create a regional market system;
- Establishing targets for transportation-related greenhouse gas emissions for regions throughout California, and pursuing policies and incentives to achieve those targets;
- Adopting and implementing measures pursuant to existing State laws and policies, including California's clean car standards, goods movement measures, and the Low Carbon Fuel Standard; and
- Creating targeted fees, including a public goods charge on water use, fees on high global warming potential gases, and a fee to fund the administrative costs of the State's long term commitment to AB 32 implementation.

To meet the 1990 target established by AB 32, CARB recommends a de minimis (minimal importance) emission threshold of 0.1 MMT annual (100,000 MT per year) CO₂EQ per transportation source category. Source categories whose total aggregated emissions are below this level are not proposed for emission reduction requirements in the Scoping Plan but may

contribute toward the target via other means. As each regulation to implement the Scoping Plan is developed, CARB and other agencies will consider more specific de minimis levels below which the regulatory requirements would not apply. These levels will consider the cost to comply, especially for small businesses, and other factors. Until approved thresholds and guidelines are adopted at the local and regional level, the proposed de minimis threshold of 100,000 MT CO₂EQ per year for transportation sources will be utilized for transportation sources.

In addition to the Proposed Scoping Plan, CARB released the Preliminary Draft Staff Proposal (Staff Proposal) on October 24, 2008 with the objective of developing interim significant thresholds for commercial and residential projects. CARB has already proposed a threshold of 7,000 annual MT for industrial operational sources. However, the Staff Proposal has not yet developed thresholds applicable for residential and commercial sources. Therefore, criteria for determining threshold levels for residential and commercial sources have yet to be defined. Under CARB's Staff Proposal, recommended approaches for setting interim significant thresholds for GHG under the CEQA are underway. CARB staff proposes to define certain performance standards (e.g., for energy efficiency) by referencing or compiling lists from existing local, state or national standards. For some sub-sources of GHG emissions (e.g., construction, transportation, waste), CARB staff has not identified reference standards.

The Staff Proposal's Potential Performance Standards and Measures were released in December 2008. Inside the Staff Proposal, CARB's Potential Performance Standard and Measures included some construction measures. These guideline measures are:

- Provide alternative transportation mode options or incentives for workers to and from worksite on days that construction requires 200 or more workers; and
- Recycle and/or salvage at least 75% of non-hazardous construction and demolition debris by weight (residential) or by weight in volume (commercial); and
- Use recycled materials for at least 20% of construction materials based on cost for building materials, based on volume for roadway, parking lot, sidewalk and curb material. Recycled materials may include salvaged, reused, and recycled content materials.

CARB's Staff Proposal has identified California Energy Commission's (CEC) Tier II Energy Efficiency goals as an appropriate performance standard for energy use. Under State Law, the CEC is required to establish eligibility criteria, conditions for incentives, and rating standards. Thus, the CEC established energy efficiency standards for homes and commercial structures, and requires new buildings to exceed current building standards by meeting Tier Energy Efficiency goals. Currently, CEC's proposed guidelines for the solar energy incentive program recommend a Tier II goal for residential and commercial projects of a 30% reduction in building combined space heating, cooling, and water heating energy compared to the 2008 Title 24 standards.

Existing green building rating systems like LEED, GreenPoint Rated, the California Green Building Code, and others, contain examples of measures that are likely to result in substantial GHG emission reductions from residential and commercial projects. Performance standards that

already exist and have been proven to be effective, at the local, state, national or international level, are preferable. For residential and commercial projects, staff has proposed that the GHG emissions of some projects that meet GHG performance standards might under some circumstances still be considered cumulatively considerable and therefore significant. However, criteria threshold for residential and commercial has yet to be developed.

SCAQMD's Significance Thresholds

In December 5, 2008, the South Coast Air Quality Management District (SCAQMD) adopted GHG significance threshold for Stationary Sources, Rules and Plans where the SCAQMD is lead agency. The threshold utilizes a tiered approach, with a screening significance threshold of 10,000 MTCO₂EQ, if the project was not part of a general plan's GHG reduction plan. The SCAQMD has also developed draft thresholds for commercial and residential projects, where it is not the lead. The draft recommends a 3,000 MTCO₂EQ per year screening threshold. The SCAQMD's working group has not set a date for finalizing the recommendations.

5.7.4 ENVIRONMENTAL IMPACTS

Existing Plans, Programs, and Policies

The following measures are existing plans, programs, or policies that apply to the proposed Project, which will help to reduce potential impacts related to global climate change.

PPP-GHG-1 Title 24 Energy Standards: Site-specific projects shall comply with all State Energy Insulation Standards and City of San Juan Capistrano codes in effect at the time of application for building permits. (Commonly referred to as Title 24, these standards are updated periodically to allow consideration and possible incorporation of new energy efficiency technologies and methods. Title 24 covers the use of energy efficient building standards, including ventilation, insulation and construction and the use of energy saving appliances, conditioning systems, water heating, and lighting). Plans submitted for building permits shall include written notes demonstrating compliance with energy standards and shall be reviewed and approved by the Public Utilities Department prior to issuance of building permits.

PPP-GHG-2 New development and redevelopment will comply with the City of San Juan Capistrano's Green Building Program.

Project Design Features

PDF-GHG-1 Green Site Design: The Project reduces potential GHG emissions because of its favorable location near major transportation and employment centers, land use mix, and density. Additionally, as recommended in the Attorney General's letter, the following features have been incorporated into the Project design:

Transportation and Motor Vehicles

- Incorporate bicycle lanes into street systems in regional transportation plans, new subdivisions, and large developments.
- Incorporate bicycle-friendly intersections into street design.

Land Use Measures

- Incorporate public transit into project design.
- Preserve and create open space and parks. Preserve existing trees and require the planning of replacement trees for those removed in construction.
- Include pedestrian and bicycle-only streets and plazas within developments. Create travel routes that ensure that designations may be reached conveniently by public transportation, bicycling or walking.

Impacts Analysis

Threshold GHG-1 Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.

Threshold GHG-2 Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases. Environmental Impacts

Short-term Construction GHG Emissions

The Master Plan does not identify specific construction activity. However, construction activities that implement land use policies over the long term will produce GHG emissions. The primary source of GHG emissions generated by construction activities is from use of diesel-powered construction equipment and other combustion sources (i.e., generators, worker vehicles, materials delivery, etc.). The GHG air pollutants emitted by construction equipment would primarily be carbon dioxide.³

Construction emissions were estimated using the recently released California Emissions Estimator Model (CalEEMod) developed by the SCAQMD. Both URBEMIS and CalEEMod are accepted by the SCAQMD. However, the emission factors for construction have undergone a significant improvement for CalEEMod, so it was decided to use CalEEMod for the projection of construction and demolition emissions. The total GHG emissions for construction were computed and were averaged over a 30 year period.

³ When one gallon of diesel fuel is burned it produces 22.384 pounds of CO₂, 0.000534 pounds of CH₄, and 0.0001928 pounds N₂O. Based on the global warming potential of 21 for CH₄ and 310 for N₂O relative to CO₂, the total pounds of CO₂-equivalent (CO₂EQ) emissions from diesel fuel is 22.455 CO₂EQ/gallon, which is 99.6% of the total emissions. Bay Area Air Quality Management District (BAAQS), Source Inventory of Bay Area Greenhouse Gas Emissions, November 2006.

The square footages and emission factors utilized in calculating the emissions with these sources are provided in the appendix of the Greenhouse Gas Assessment. The construction GHG emissions are calculated to be 128 CO₂ MT/Year, which is well below the 3,000 CO₂ MT/Year SCAQMD screening threshold.

Historic Town Center Project Area GHG Emissions

The primary source of GHG emissions generated by the proposed project will be from motor vehicles. Other emissions from the project will be generated from the combustion of natural gas for space and water heating, as well as off-site GHG emissions from the generation of electricity consumed by the project. GHG emissions will also be generated by construction and demolition activities. GHG emissions due to construction are spread out over the life of the project, which is usually assumed to be 30 years.

GHG emissions associated with the project were calculated by using URBEMIS2007 (version 9.2.4). Default URBEMIS2007 variables were used for the calculations except the trip generation rate. The project’s land uses were obtained from the Development Summary contained in the Project Description. The daily trip generation was obtained from the “Historic Town Center Master Plan Traffic Impact Study,” (Transtech, October 11, 2010). The traffic report shows that the Master Plan will generate significantly fewer trips than existing conditions. According to the traffic report the “overall decrease results from the proposed replacement of existing land uses with high trip generation rates such as drive-through restaurants, with proposed uses that generate less trips.

The generation of electricity consumed by the project will also produce GHG emissions. The SCAQMD “CEQA Air Quality Handbook” estimates electricity consumption rates for various land uses. The annual electrical usage was multiplied by emission factors obtained from the Table C.2 of the “California Climate Action Registry General Reporting Protocol” to estimate the GHG emissions resulting from electricity consumption. Emissions for the CAMX region (most of California) are estimated to be 742.12 lbs/MWH of CO₂, 0.0302 lbs/MWH of CH₄, and 0.081 lbs/MWH of N₂O. For electrical generation, CH₄ represents 0.9% of the total CO₂EQ emissions and N₂O represents 0.34% of the total CO₂EQ emissions. CH₄ and N₂O emissions are included in the CO₂EQ emissions due to electricity generation reported below.

Table 5.7-3 Project Emissions – Year 2035	
Activity	CO₂ MT/Year
Vehicular Emissions	-2,086
Natural Gas Combustion	994
Hearth	21
Landscaping	1
Electricity	1,470
Construction	128
Total Emissions	528
Significance Threshold	3,000
Exceed Threshold?	No
<i>Source: Mestre Greve Associates, 2011</i>	

Table 5.7-3 shows that very few GHG emissions will be generated by the Project. The plan will result in a decrease in vehicular traffic, and this almost completely offsets the modest increases in the rest of the emission categories which are a result of additional development. As can be seen in Table 5.7-3, the total project emissions would be below the SCAQMD screening threshold of 3,000 MT CO₂EQ/Year, and the increase in GHG emissions is less than significant.

Other study years could not be evaluated due to the lack of traffic data for additional years. However, a similar low level of GHG emissions would be anticipated for other years in the more distant future.

Table 5.7-4 compares the GHG emissions from the project to total emissions in California, the United States, and globally. This comparison shows that the project will generate much less than significant amounts of total GHG emissions at all geographic levels.

Table 5.7-4 Comparison of Project Emissions With Global Emissions		
	MMT CO₂EQ	Year
Project Net Increase in Emissions	0.0005	2035
State of California	478	2004
United States	7,017	2006
World	33,326	2006
<i>MMT – Million metric tons</i>		
<i>Source: Mestre Greve Associates, 2011</i>		

The emissions generated by this project will contribute a miniscule amount to the overall climate change issue. By way of comparison, the global data from the United Nations indicates that the project would contribute less than 0.000002% to the GHG burden for the planet. Even when compared to California’s GHG emissions, the contribution from any of the equivalency programs would be miniscule, approximately 0.0001% of 2004 California emissions. Therefore, for the purposes of this analysis, global climate change impacts will be considered at the cumulative level to consider whether any potential increase in GHG emissions that may be associated with the project over the current physical baseline, should be considered significant on a cumulative basis.

According to the comment letter issued by the California Attorney General, Jerry Brown, on the Coyote Valley Specific Plan, cumulative impacts should be considered. The letter states, “Global warming is a quintessentially cumulative impact, caused by the added effects of countless individual projects at the local, regional, state, national, and international level.” If this project is considered in more of the regional context, it must be asked whether the project will in fact, generate new emissions or whether it actually results in a more efficient regional land use plan. For the proposed project, emissions will be generated on the order of 379 metric tons per year. This is below the SCAQMD screening threshold of 3,000 MTCO₂EQ/year for commercial and residential projects. Consequently, the project would not result in a significant cumulative impact.

The Attorney General letter continues with another benchmark for causing a significant impact. The Attorney General states, “Where a project’s direct and indirect GHG-related effects, considered in the context of the existing and projected cumulative effects, may interfere with California’s ability to achieve its GHG reduction requirements [as required by AB 32], the project’s global warming-related impacts must be considered cumulatively significant.” No regulations have yet been promulgated as a result of AB 32. So far, CARB’s indication is that the first wave of regulations will address emissions from major industrial and agricultural sources. CARB is also very likely to promote requirements for motor vehicles, via new emission controls and increased fuel economy that would significantly lower GHG emissions in future years. CARB is not considering restrictions on growth or new development. Since this project would, of course, comply with any regulations promulgated by the CARB and since CARB is not putting any restrictions on growth, this project cannot be seen as interfering with “California’s ability to achieve its GHG reduction requirements.” Therefore, no significant cumulative impacts are anticipated.

5.7.5 CUMULATIVE IMPACTS

The geographic scope of the cumulative air quality analysis is the South Coast Air Basin. The Project has incorporated design features that are consistent with the California Office of the Attorney General’s recommended measures to reduce Greenhouse Gas (GHG) emissions. No mitigation measures are required because the Project would reduce GHG emissions below the 3,000 MTCO₂eq/year screening threshold.

Other planned and approved projects are anticipated to comply with the Attorney General’s recommendations, and it is reasonable to assume that such projects would implement greenhouse gas emissions reduction measures. With the implementation of these measures, the Project and other planned or approved projects would not emit cumulatively considerable amounts of greenhouse gas emissions.

5.7.6 LEVEL OF SIGNIFICANCE BEFORE MITIGATION

Less than Significant.

5.7.7 MITIGATION MEASURES

In the absence of a significant impact, no mitigation measures are required. However, GHG emissions are a significant global, national state and local factor contributing to climate change. Therefore, the following list of measures from the Attorney General’s letter and energy efficiency and land use measures from URBEMIS are relevant to the proposed Project and are included in MM-GHG-1 below. Although not significant, MM-GHG-1 will further reduce operational greenhouse gas emissions of the Project and the effects of global warming:

MM-GHG-1 For future site specific new development and redevelopment, the project applicant shall demonstrate compliance with the following measures to the extent feasible.

Transportation and Motor Vehicles

-
- Coordinate controlled intersections so that traffic passes more efficiently through congested areas. Where signals are installed, require the use of Light Emitting Diode (LED) traffic lights. Generally it is the responsibility of the City to implement this type of measure, however, it is common for the developer to pay into a traffic improvement fund to finance these actions when appropriate.
 - Promote ride sharing programs e.g., by designating a certain percentage of parking spaces for high-occupancy vehicles, providing larger parking spaces to accommodate vans used for ride-sharing, and designating adequate passenger loading and unloading and waiting areas.
 - Limit idling time for commercial vehicles, including delivery and construction vehicles.
 - Use low or zero-emission vehicles, including construction vehicles.
 - Institute a low-carbon fuel vehicle incentive program.
 - Provide shuttle service to public transit.
 - Provide public transit incentives such as free or low-cost monthly transit passes.
 - For commercial projects, provide adequate bicycle parking near building entrances to promote cyclist safety, security, and convenience. For large employers, provide facilities that encourage bicycle commuting, including, e.g., locked bicycle storage or covered or indoor bicycle parking.
 - Provide information, training, and incentives to encourage participation.

Energy Efficiency and Renewable Energy

- Require energy efficient design for buildings. This may include strengthening local building codes for new construction and renovation to require a higher level of energy efficiency. Many developers, in response to concerns about GHG emissions, are designing projects to exceed the energy efficiency required by California Title 24 by 10 to 20%.
- Require the use of energy efficient appliances and office equipment.
- Require that projects use energy efficient lighting. (Fluorescent lighting uses approximately 75% less energy than incandescent lighting to deliver the same amount of light)
- Install efficient lighting and lighting control systems. Site and design building to take advantage of daylight.
- Use trees, landscaping and sun screens on west and south exterior building walls to reduce energy use.
- Install light colored “cool” roofs and cool pavements.
- Limit the hours of operation of outdoor lighting.

Land Use Measures

- Preserve and create open space and parks. Preserve existing trees and require the planning of replacement trees for those removed in construction.

5.7.8 LEVEL OF SIGNIFICANCE AFTER MITIGATION

Less than significant.

5.7.9 REFERENCES

All notes and references listed below are available for public review at the City of San Juan Capistrano, Community Development Department, 32400 Paseo Adelanto, San Juan Capistrano, California.

1. California Energy Commission, *Inventory of California Greenhouse Gas Emissions and Sinks: 1990 to 2004*” December 2006.
2. Edmund G. Brown, Jr., Attorney General, State of California, Comments on Draft Environmental Impact Report for Coyote Canyon Specific Plan,” June 19, 2007.
3. Michael Hendrix et. al., *Alternative Approaches to Analyze Greenhouse Gas Emissions and Global Climate Change in CEQA Documents*, Association of Environmental Professionals, Revised Draft April 27, 2007.
4. State of California, *Climate Change Portal*, <http://www.climatechange.ca.gov/index.html>.
5. United Nations Statistics Division, *Environment Indicators: Greenhouse Gas Emissions*, http://unstats.un.org/unsd/ENVIRONMENT/air_greenhouse_emissions.htm.
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12. Lancaster Landfill Draft Environmental Impact Report, Section 4.5.4.
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 14. California Air Resource Board, *Staff Proposal-Recommended Approaches for Setting Interim Significance Thresholds for Greenhouse Gases under the CEQA*, December 2008.
 15. California Air Resource Board, *Preliminary Draft Staff Proposal- Recommended Approaches for Setting Interim Significance Thresholds for Greenhouse Gases under the CEQA*, October 24,2008.
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 17. State of California Department of Water Resources (DWR), *Climate Change Adaptation Strategies for California's Water*, October 2008.