# Section 3.4
# Greenhouse Gases

This section presents the greenhouse gas (GHG) analysis conducted for the proposed project. The analysis that follows includes a description of the existing conditions of the project site and surrounding area, the regulatory framework that guides the decision-making process, thresholds for determining if the proposed project would result in a significant impact, potential greenhouse gas impacts, mitigation measures where necessary to reduce the severity of potentially significant impacts, and the level of significance after mitigation. Emission calculations and GHG modeling results are provided in Appendix D.

## 3.4.1 Introduction

This section summarizes the potential impacts to GHG associated with the construction and operation of the proposed project. This analysis and assessment were completed to support project impact disclosure requirements under the California Environmental Quality Act (CEQA).

Briefly stated, global climate change (GCC), also known as global warming, is a change in the average climatic conditions of the earth, characterized by changes in wind patterns, storms, precipitation, and temperature. The baseline by which these changes are measured originates in historical records identifying temperature changes that have occurred in the past, such as during previous ice ages. Analyzing these records shows a statistically significant difference in the rate and magnitude of GCC in the last 150 years (the Industrial Age) as compared to historical climate change.

GHGs have a role in GCC by trapping heat near the surface of the earth. The principal GHGs are carbon dioxide ($CO_2$), methane ($CH_4$), nitrous oxide ($N_2O$), ozone ($O_3$), and water vapor. Fossil fuel consumption in the transportation sector (on-road motor vehicles, off-highway mobile sources, and aircraft) is the single largest source of GHG emissions, accounting for approximately half of GHG emissions globally. Industrial and commercial sources are the second largest contributors of GHG emissions with about one-fourth of total emissions.

## 3.4.2 Existing Conditions

### 3.4.2.1 Background

The natural process through which heat is retained in the troposphere[1] is called the greenhouse effect. The greenhouse effect traps heat in the troposphere through a three-fold process: (1) short-wave radiation in the form of visible light emitted by the sun is absorbed by the Earth as heat; (2) long-wave radiation re-emitted by the Earth; and (3) GHGs in the atmosphere absorbing or trapping the long-wave radiation and re-emitting it back towards the Earth and into space. Human activities that affect this third process are the focus of current climate change actions.

While water vapor and $CO_2$ are the most abundant GHGs, other trace GHGs have a greater ability to absorb and re-radiate long-wave radiation. Scientists have established a global warming potential

1 The troposphere is the bottom layer of the atmosphere, which varies in height from the Earth's surface to 10 to 12 kilometers.

(GWP) to gauge the potency of each GHG's ability to absorb and re-emit long-wave radiation. The GWP of a gas is determined using $CO_2$ as the reference gas with a GWP of 1 over 100 years. For example, a gas with a GWP of 10 is 10 times more potent than $CO_2$ over 100 years. The sum of each GHG multiplied by its associated GWP is referred to as $CO_2$ equivalents or $CO_2e$. State law defines GHGs to include the following compounds:[2]

**Carbon Dioxide ($CO_2$).** $CO_2$ is primarily generated from fossil fuel combustion from stationary and mobile sources. $CO_2$ is the reference gas (GWP of 1) for determining the GWPs of other GHGs.

**Methane ($CH_4$).** $CH_4$ is emitted from biogenic sources (i.e., resulting from the activity of living organisms), incomplete combustion in forest fires, landfills, manure management, and leaks in natural gas pipelines. The GWP of $CH_4$ is 21.

**Nitrous Oxide ($N_2O$).** $N_2O$ produced by human-related sources including agricultural soil management, animal manure management, sewage treatment, mobile and stationary combustion of fossil fuel, adipic acid production, and nitric acid production. The GWP of $N_2O$ is 310.

**Hydrofluorocarbons (HFCs).** HFCs are typically used as refrigerants in both stationary refrigeration and mobile air conditioning. The GWPs of HFCs ranges from 140 for HFC-152a to 11,700 for HFC-23.

**Perfluorocarbons (PFCs).** PFCs are compounds consisting of carbon and fluorine. They are primarily created as a byproduct of aluminum production and semiconductor manufacturing. The GWPs of PFCs range from 5,700 to 11,900.

**Sulfur Hexafluoride ($SF_6$)**. $SF_6$ is a colorless, odorless, nontoxic, nonflammable gas. It is most commonly used as an electrical insulator in high voltage equipment that transmits and distributes electricity. Sulfur hexafluoride has a GWP of 23,900. It is not prevalent in the atmosphere (4 parts per trillion [ppt] in 1990 versus 365 parts per million [ppm] of $CO_2$).[3]

The primary GHGs of concern relative to the proposed project are $CO_2$, $CH_4$, and $N_2O$. These three GHGs are generally emitted from combustion activities. HFCs are associated with refrigeration and air conditioning and are accounted for in this analysis with respect to motor vehicle air conditioning system leakage. The other GHGs listed above are related to specific industrial uses and are not anticipated to be emitted in measurable quantities by the project.

### 3.4.2.2 Effects of Global Climate Change

Climate models for California project that temperatures in California will increase anywhere from 3 to 10.5 degrees Fahrenheit (°F) (California Climate Change Center 2006) by the end of the 21st century. Almost all climate change scenarios include a continuing trend of warming through the end of the 21st century due to substantial amounts of GHG already released and the difficulty of reducing emissions to a level that would stabilize the climate. According to the *2006 California Climate Action Team Report* (California Environmental Protection Agency [CalEPA] 2006), the following climate change effects are predicted in California over the course of the 21st century.

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2 All GWPs are given as 100-year values. Unless noted otherwise, all GWPs were obtained from the Intergovernmental Panel on Climate Change. Climate Change 1995: The Science of Climate Change – Contribution of Working Group I to the Second Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge (UK): Cambridge University Press, 1996.

3 US Environmental Protection Agency, "High GWP Gases and Climate Change," http://www.epa.gov/highgwp/scientific.html#sf6. n.d.

- A diminishing Sierra snowpack, declining by 70 to 90 percent, thereby threatening the state's water supply.
- Increasing temperatures of up to approximately 10°F under the higher emission scenarios, leading to a 25 to 35 percent increase in the number of days $O_3$ pollution levels are exceeded in most urban areas.
- Coastal erosion along the length of California and seawater intrusion into estuarine areas from a 4- to 33-inch rise in sea level. This would exacerbate flooding in already vulnerable regions.
- Increased vulnerability of forests due to pest infestation and increased temperatures.
- Increased challenges for the state's important agricultural industry from water shortages, increasing temperatures, and saltwater intrusion.
- Increased electricity demand, particularly in the hot summer months.

Temperature increases would lead to adverse environmental impacts in a wide variety of areas, including sea level rise, reduced snowpack resulting in changes to existing water resources, increased risk of wildfires, public health hazards associated with higher peak temperatures, heat waves, and deteriorated air quality.

### 3.4.2.3 State of California GHG Emissions Inventory

Worldwide, California ranges from the twelfth to sixteenth largest emitter of carbon dioxide ($CO_2$), depending on the data source, and is responsible for approximately two percent of the world's $CO_2$ emissions (California Energy Commission [CEC] 2006). As shown in Table 3.4-1, fuel combustion activities were responsible for 88 percent of the state's GHG emissions in 1990, which was reduced to 84 percent in 2009. Emissions of $CO_2$ and nitrous oxide ($N_2O$) are largely byproducts of fossil fuel combustion. Methane ($CH_4$), a highly potent GHG, results largely from off-gassing associated with agricultural practices and landfills. Sinks of $CO_2$, which are sources that absorb more $CO_2$ then they release, include uptake by vegetation and dissolution into the ocean. California net GHG emissions in 2009 (the last year inventoried) totaled approximately 453 million metric tons carbon dioxide equivalent ($MMTCO_2e$) (California Air Resources Board [CARB] 2007a and 2012).

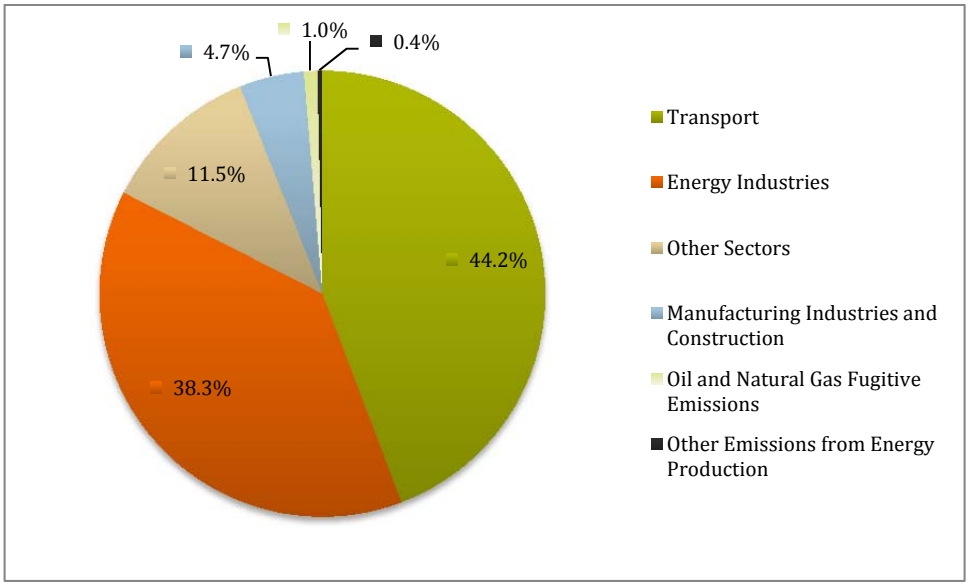
**Table 3.4-1 GHG Emissions in California**

| Source Category | 1990 ($MMTCO_2e$) | Percent of Total | 2009 ($MMTCO_2e$) | Percent of Total |
|---|---|---|---|---|
| Energy | 386.41 | 89.2% | 389.05 | 85.2% |
| Fuel Combustion Activities | 381.16 | 88.0% | 383.86 | 84.0% |
| Fugitive Emissions from Fuels | 5.25 | 1.2% | 5.20 | 1.1% |
| Industrial Processes and Product Use | 18.34 | 4.2% | 28.07 | 6.1% |
| Mineral Industry | 4.85 | 1.1% | 3.63 | 0.8% |
| Chemical Industry | 2.34 | 0.5% | 0.12 | 0.0% |
| Non-Energy Products from Fuels and Solvent Use | 2.29 | 0.5% | 1.70 | 0.4% |
| Electronics Industry | 0.59 | 0.1% | 0.78 | 0.2% |
| Product Uses as Substitutes for $O_3$ Depleting Substances | 0.04 | 0.0% | 14.51 | 3.2% |
| Other Product Manufacture and Use | 3.18 | 0.7% | 1.65 | 0.4% |
| Other | 5.05 | 1.2% | 5.68 | 1.2% |
| Agriculture, Forestry and Other Land Use | 19.11 | 4.4% | 29.67 | 6.5% |

| | | | | |
|---|---|---|---|---|
| Livestock | 11.67 | 2.7% | 19.64 | 4.3% |
| Land | 0.19 | 0.0% | 0.19 | 0.0% |
| Aggregate Sources and Non-$CO_2$ Emissions Sources on Land | 7.26 | 1.7% | 9.84 | 2.2% |
| Waste | 9.42 | 2.2% | 9.98 | 2.2% |
| Solid Waste Disposal | 6.26 | 1.4% | 6.70 | 1.5% |
| Biological Treatment of Solid Waste | n/a | n/a | 0.62 | 0.1% |
| Wastewater Treatment and Discharge | 3.17 | 0.7% | 2.66 | 0.6% |
| **Gross California Emissions** | **433.28** | **100.0%** | **456.77** | **100.0%** |
| Sinks from Forests and Rangelands | -6.69 | | -3.80 | |
| **Net California Emissions** | **426.59** | | **452.97** | |

Source: CARB 2007a; CARB 2012.
Key: $CO_2$ = carbon dioxide; $MMTCO_2e$ = million metric tons carbon dioxide equivalent; $O_3$ = ozone

As shown in Figure 3.4-1, within the energy source category, transportation sources accounted for approximately 44 percent of emissions in 2009, followed by energy industries (e.g., electricity generation) at approximately 38 percent of emissions.




Source: CARB 2007a.

**Figure 3.4-1**
**2009 GHG Emissions for Energy Source Category**

In December 2008, CARB released a *Climate Change Scoping Plan* (CARB 2008a) outlining the State's strategy to achieve the 2020 GHG emissions limit mandated by Assembly Bill (AB) 32. AB 32 requires the state to reduce GHG emissions to 1990 levels by 2020. GHG emissions in the state are expected to increase by nearly 30 percent between the 2002-2004 levels (average emissions) and 2020 levels under the business-as-usual (BAU) conditions. The Scoping Plan estimated the 2002-2004 average emissions at 469 $MMTCO_2e$ with the projected 2020 BAU emissions increasing to 596 $MMTCO_2e$.

In a staff report entitled *California 1990 Greenhouse Gas Emissions Level and 2020 Emissions Limit*, CARB estimated the 1990 emission level as approximately 427 $MMTCO_2e$ (CARB 2007b). The state

would need to reduce emissions by 169 $MMTCO_2e$ in 2020 as compared to BAU to meet the emission targets; that amount of reduction represents a nearly 30 percent decrease in emissions from BAU.

### 3.4.2.4 Global Ambient $CO_2$, $CH_4$, and $N_2O$ Concentrations

Air trapped by ice has been extracted from core samples taken from polar ice sheets to determine the global atmospheric variation of $CO_2$, $CH_4$, and $N_2O$ from before the start of the industrialization, around 1750, to over 650,000 years ago. For that period, it was found that $CO_2$ concentrations ranged from 180 parts per million (ppm) to 300 ppm. For the period from around 1750 to the present, global CO2 concentrations increased from a pre-industrialization period concentration of 280 ppm to 379 ppm in 2005, with the 2005 value far exceeding the upper end of the pre-industrial period range. Recent values continue this upward trend. Global CH4 and N2O concentrations show similar increases for the same period (see Table 3.4-2).

**Table 3.4-2 Comparison of Global Pre-Industrial and Current GHG Concentrations**

| GHG | Natural Range for Last 650,000 Years[(1)] (ppm) | Year 1750 Concentrations (Early Industrial Period)[(1)] (ppm) | Year 2005 Concentrations[(1)] (ppm) | Year 2012 Concentrations[(2),(3)] (ppm) |
|---|---|---|---|---|
| $CO_2$ | 180 to 300 | 280 | 379 | 392 |
| $CH_4$ | 0.320 to 0.790 | 0.715 | 1.774 | 1.871 / 1.750 |
| $N_2O$ | 0.180 to 0.260 | 0.270 | 0.319 | 0.323 / 0.322 |

Source: IPCC 2007; Conway 2012; Blasing 2012

Key: $CH_4$ = methane; $CO_2$ = carbon dioxide; GHG = greenhouse gas; $N_2O$ = nitrous oxide; ppm = parts per million

(1) Concentration data taken from the Intergovernmental Panel on Climate Change's Fourth Assessment Report (IPCC 2007).

(2) $CO_2$ concentration represents the global average as of October 2012 (Conway 2012).

(3) The first $CH_4$ and $N_2O$ values represent Mace Head, Ireland, a mid-latitude Northern-Hemisphere site, and the second values represents Cape Grim, Tasmania, a mid-latitude Southern-Hemisphere site. These "current" concentrations are based on 2010 data (Blasing 2012)

## 3.4.3 Regulatory Framework

Climate change regulations are quickly evolving. The current regulatory setting related to climate change and GHG emissions is summarized below.

### 3.4.3.1 Federal

#### Massachusetts et al. v. Environmental Protection Agency et al.

Twelve U.S. states (including California) and local governments, in conjunction with several environmental organizations, brought suit to force the United States Environmental Protection Agency (USEPA) to regulate GHGs as a pollutant pursuant to the Federal Clean Air Act (CAA)(*Massachusetts et al. v. Environmental Protection Agency et al.* [U.S. Supreme Court No. 05–1120]; argued November 29, 2006—decided April 2, 2007). The Court ruled that the plaintiffs had standing to sue, that GHGs fit within the CAA's definition of an air pollutant, and that the USEPA's reasons for not regulating GHGs were insufficiently grounded in the CAA.

#### Endangerment Finding

On December 15, 2009, the USEPA published its endangerment finding for GHGs in the Federal Register (FR) (74 FR 66496). The endangerment finding responds to the 2007 U.S. Supreme Court decision that GHGs fit within the CAA's definition of an air pollutant. The USEPA Administrator determined that six GHGs, taken in combination, endanger both the public health and welfare of current and future generations. Although the endangerment finding discusses the effects of six GHGs,

it acknowledges that transportation sources only emit four of the key GHGs: $CO_2$, $CH_4$, $N_2O$, and hydrofluorocarbons. Further, the USEPA Administrator found that the combined emissions of these GHGs from new motor vehicles contribute to air pollution that endangers the public health and welfare under CAA Section 202(a).

#### Greenhouse Gas and Fuel Efficiency Standards for Clean Vehicles

The USEPA and the Department of Transportation's National Highway Traffic Safety Administration (NHTSA) have finalized and are in the process of developing several joint rules to establish programs designed to reduce GHG emissions and to improve fuel economy for cars and trucks. These rules continue to respond to the U.S. Supreme Court's decision that GHGs should be regulated as air pollutants.

##### *Passenger Cars and Light-Duty Trucks*

In April 2010, the USEPA and NHTSA finalized new standards for new (model year 2012 through 2016) passenger cars, light-duty trucks, and medium-duty passenger vehicles. Under these standards, $CO_2$ emission limits would decrease from 295 grams per mile (g/mi) in 2012 to 250 g/mi in 2016 for a combined fleet of cars and trucks. If all of the necessary emission reductions were made from fuel economy improvements, then the standards would correspond to a combined fuel economy of 30.1 miles per gallon (mpg) in 2012 and 35.5 mpg in 2016.

On August 28, 2012, the USEPA and NHTSA issued final rules to further reduce GHG emissions from future light-duty vehicles (model year 2017 through 2025). The rules build upon the requirements of the previous rule for model year 2012 to 2016 and would decrease $CO_2$ emissions for combined cars and trucks from 243 g/mi in 2017 to 163 g/mi in 2025. This would be equivalent to a fuel efficiency of 54.5 mpg in 2025.

##### *Medium- and Heavy-Duty Engines and Vehicles*

In September 2011, the USEPA and NHTSA announced a program to reduce GHG emissions and to improve fuel efficiency for medium- and heavy-duty vehicles (model years 2014 through 2018). By 2018, the NHTSA fuel consumption standards require certain combination tractors to achieve up to approximately 20 percent reduction in fuel consumption, heavy-duty pickup trucks and vans will be required to achieve up to a 15 percent reduction in fuel consumption, and vocational vehicles will be required to reduce fuel consumption by approximately 10 percent. The USEPA released complementary GHG emissions standards.

### 3.4.3.2 State

#### California AB 1493

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

AB 1493 became law in 2002, and CARB enacted subsequent regulations in September 2004. Section 209 of the CAA prevents states from adopting motor vehicle emission standards that are contrary to

federal law; however, California is allowed to adopt its own motor vehicle emission standards that are at least as stringent as the federal requirements if the USEPA grants California a waiver request. Other states can either elect to follow the California standards or continue to follow federal requirements. The USEPA originally declined California's waiver request in March 2008, citing a failure to demonstrate "compelling and extraordinary" conditions that would make the new regulations necessary. The USEPA then reversed its waiver denial on June 30, 2009, granting California authority to implement new GHG emission standards.

On February 22, 2010, CARB proposed to amend the new passenger motor vehicle GHG emission standards promulgated in 13 California Code of Regulations (CCR) Section 1961 by allowing compliance with the 2009 through 2011 model year standards to be determined by pooling car sales from all fourteen states that adopted the California exhaust standards instead of determining compliance on a state-by-state basis. The rule also allows cars that comply with federal GHG emission standards for model years 2012 to 2016 to also comply with California's standards. Although the state and federal Corporate Average Fuel Economy standards differ slightly, they dovetail in 2016. The Office of Administrative Law (OAL) approved the rulemaking and filed it with the Secretary of State on April 1, 2010. The regulation became effective on the same date.

### California Executive Order S-3-05

California Executive Order S-3-05 (signed by Governor Schwarzenegger on June 1, 2005) established the following GHG emission reduction targets for California:

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

The order also requires the Secretary of the California Environmental Protection Agency (CalEPA) to report to the Governor and the state legislature biannually on progress made toward meeting the GHG emission reduction targets, commencing in January 2006. The Secretary is also required to report on impacts to water supply, public health, agriculture, the coastline, and forestry; mitigation and adaptation plans to combat these impacts must also be developed.

### Global Warming Solutions Act of 2006 (AB 32)

AB 32, the Global Warming Solutions Act of 2006, codifies the state's GHG emissions reduction targets. It requires California to reduce GHG emissions to 1990 levels by 2020 and CARB to enforce a statewide cap on GHG emissions that must be phased in by 2012. AB 32 was passed into law on September 27, 2006. Key AB 32 milestones are as follows:

- June 30, 2007—Identification of "discrete" early action GHG emissions reduction measures.
- January 1, 2008—Identification of the 1990 baseline GHG emissions level and approval of a statewide limit equivalent to that level. Adoption of reporting and verification requirements concerning GHG emissions.
- January 1, 2009—Adoption of a scoping plan for achieving GHG emission reductions.
- January 1, 2010—Adoption and enforcement of regulations to implement the "discrete" actions.

- January 1, 2011—Adoption of GHG emission limits and reduction measures by regulation.
- January 1, 2012—GHG emission limits and reduction measures adopted in 2011 become enforceable.

CARB has been aggressively implementing the AB 32 milestones and has currently achieved all of the milestones for which deadlines have already passed.

### Senate Bill 97 (SB 97)

SB 97 mandates that the Governor's Office of Planning and Research amend the state's *CEQA Guidelines* to address impacts from GHGs, and these amendments must be adopted by the California Natural Resources Agency. The California Natural Resources Agency adopted CEQA Guideline Amendments on December 30, 2009. On February 16, 2010, the OAL filed the proposed amendments with the Secretary of State; the amendments became effective on March 18, 2010. The significance criteria for CEQA analysis of GHG emissions are discussed in Section 3.4.5.

### CARB Interim Significance Thresholds

CARB released a *Preliminary Draft Staff Proposal for Recommended Approaches for Setting Interim Significance Thresholds for Greenhouse Gases under the California Environmental Quality Act (CEQA)* in October 2008 (CARB 2008b). CARB's guidelines provide recommendations for assessing significance of operational and construction emissions from industrial and commercial/residential projects.

Although CARB's preliminary draft proposal suggests a quantitative threshold for assessing impacts from the operation of industrial projects, it prescribes the use of performance standards for construction-related emissions from all types of projects. CARB does not provide specific performance standards to address construction-related impacts. The California Natural Resources Agency developed amendments to the *State CEQA Guidelines* that define the analytical requirements for climate change and GHG emissions in environmental documents. As a result, CARB is currently taking no further action to define its interim thresholds of significance. Although the guidelines are not regulatory significant because they were not finalized, they still provide guidance on how to evaluate significance under CEQA.

### Senate Bill 375 (SB 375)

SB 375 requires CARB to set regional targets for 2020 and 2035 to reduce GHG emissions from passenger vehicles. Regional targets will be developed for each of the 18 metropolitan planning organizations (MPOs) in the state; the Southern California Association of Governments (SCAG) is the MPO that would have jurisdiction over the proposed project area. A Regional Targets Advisory Committee (RTAC) was appointed by CARB to provide recommendations to be considered and methodologies to be used in CARB's target setting process. The final RTAC report was released on January 23, 2009.

Each MPO is required to develop Sustainable Community Strategies (SCS) through integrated land use and transportation planning and to demonstrate an ability to attain the proposed reduction targets by 2020 and 2035. On April 4, 2012, the Regional Council of SCAG adopted the *2012-2035 Regional Transportation Plan (RTP)/SCS*. Implementation of the 2012-2035 RTP/SCS will achieve GHG emission reductions of nine percent per capita in 2020 and 16 percent per capita in 2035 (SCAG 2012). This surpasses the reduction targets of eight and 13 percent per capita for 2020 and 2035, respectively, proposed by the RTAC.

### California Executive Order S-01-07 and the Low Carbon Fuel Standard (LCFS)

California Executive Order S-01-07 establishes a statewide goal to reduce the carbon intensity of transportation fuels sold in California by at least ten percent by 2020 from 2005. The Executive Order also mandated the creation of a LCFS for transportation fuels. The LCFS requires that the life-cycle GHG emissions for the mix of fuels sold in California decline on average. Each fuel provider may meet the standard by selling fuel with lower carbon content, using previously banked credits from selling fuel that exceeded the LCFS, or purchasing credit from other fuel providers who have earned credits. The reduction goal of ten percent is expected to help meet other state goals such as AB 32, the Bioenergy Action Plan, and the CEC's 2003 Integrated Energy Policy Report.

## 3.4.3.3 Local

### South Coast Air Quality Management District (SCAQMD)

To provide guidance to local lead agencies in determining significance in their CEQA documents, the SCAQMD Governing Board adopted guidelines relating to GHG significance on December 5, 2008 (SCAQMD 2008). The guidelines set a threshold of significance for industrial sources of 10,000 metric tons of carbon dioxide equivalent per year ($MTCO_2e$/year) for operational emissions and construction emissions amortized over 30 years. The guidelines do not provide guidance on non-industrial projects.

### City of Pasadena Green City

The City has taken proactive steps over the past several years to operate as a green and sustainable city. Several of the actions taken by the city include the following (City of Pasadena 2012a):

- Adoption of an Environmental Charter
- Endorsement of the United Nations Green Cities Declaration and UEA
- Endorsement of the U.S. Conference of Mayors Climate Protection Agreement
- Adoption of a Green City Action Plan
- Adoption of an ordinance creating an Environmental Advisory Commission
- Adoption of a Green Building Program
- Adoption of a resolution in support of Green Cities California

As part of its *Green City Action Plan* (2006), the City identified several policies that would enable it to increase its sustainability while still meeting growing demands and reducing impacts to natural resources. Specific policies that would reduce GHG emissions, either directly or indirectly, include the following:

- Action 1 — Increase the use of renewable energy to meet 10 percent of the city's peak electric load within seven years.
- Action 2 — Reduce the city's peak electric load by 10 percent within seven years through energy efficiency, shifting the timing of energy demands, and conservation methods. Future cost-effective energy efficiency programs include:

  - Conducting a feasibility study for installing devices on municipal and private buildings that reduce the power required to operate equipment and for shifting the equipment usage to off-peak.
  - Creating a "time of use" billing rate that offers lower rates for electric usage during off-peak hours than during peak hours. Other possible rates to consider include tiered energy rates.

- Action 3 — Reduce GHG emission by 25 percent by 2030, and include a system for accounting and auditing these emissions.
- Action 4 — Achieve zero waste to landfills and incinerators by 2040.
- Action 5 — Reduce the use of disposable, toxic, or non-renewable product category by at least 50 percent in seven years.
- Action 21 — Adopt municipal wastewater management guidelines and reduce the volume of untreated wastewater discharges by 10 percent in seven years through the expanded use of recycled water and the implementation of a sustainable urban watershed planning process that includes participants of all affected communities and is based on sound economic, social, and environmental principles.

## 3.4.4 Methodology

This section describes the methodology used to develop the emission inventories and the comparison of the analysis results to the significance thresholds presented in Section 3.4.5.

Construction of the proposed project would generate GHG emissions from off-road construction equipment exhaust and on-road vehicle exhaust from vendor and haul trucks and construction employee commuting. During operation, the majority of emissions would be generated by vehicles entering and exiting the hotel. Operational emissions would also occur from the combustion of natural gas for space heating and indirectly from electricity used to power the building, to supply water to the project site, to deliver wastewater for treatment, and from the generation of solid waste. Emissions of $CO_2$, $CH_4$, and $N_2O$ were estimated using the California Emissions Estimator Model (CalEEMod), Version 2011.1.1 (SCAQMD 2011). CalEEMod is a statewide land use emissions computer model that estimates construction and operational emissions from a variety of land use projects.

Emissions from construction activities were modeled using a 13-month construction schedule commencing in 2013. The construction equipment list presented in the *Marriott Residence Inn Project Initial Study* (City of Pasadena 2012b), included in Appendix A of this EIR, was used for the various construction phases. Default data from CalEEMod for equipment size (i.e. horsepower) and daily hours of operation were used. Where there were updated load factors available from CARB in the 2011 Inventory Model for In-Use Off-Road Equipment, default CalEEMod load factors were replaced (CARB 2011).

Default parameters for a hotel land use type were used in CalEEMod to estimate operational emissions from energy (i.e., natural gas) use. Operational vehicular emissions were calculated based on future trip rates presented in the traffic analysis included in Appendix F of this EIR (RAJU Associates 2012). Operational emissions were assumed to occur beginning in 2014.

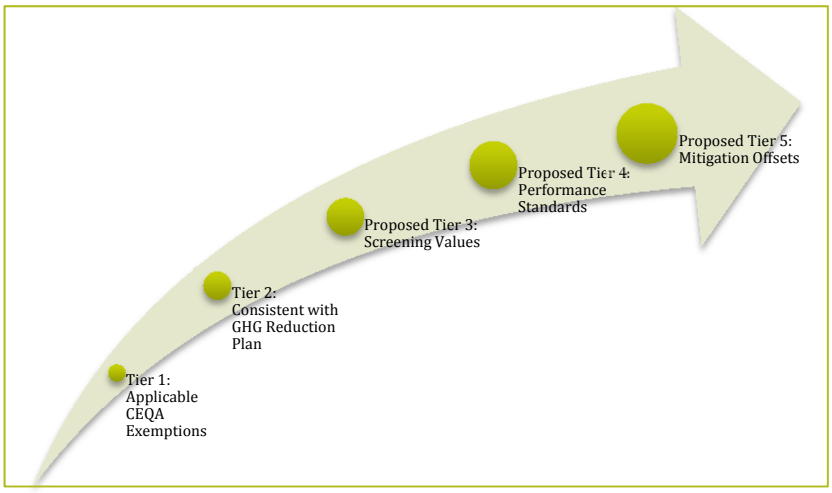
Emissions were converted to $CO_2e$ using the global warming potentials (GWPs) in the *Intergovernmental Panel on Climate Change's (IPCC's) Second Assessment Report (SAR)* (IPCC 1996). GWPs are defined by CARB as the radiative forcing impact (degree of warming to the atmosphere) of one mass-based unit of a given GHG relative to an equivalent unit of $CO_2$. For example, one ton of $CH_4$ is equivalent to approximately 21 tons of $CO_2$ in the atmosphere. Although the IPCC has released several updates to its Assessment Report since the SAR release in 1996, the international standard is to use the SAR to maintain consistency with GHG emission inventories already compiled.

## 3.4.5 Thresholds of Significance

The City of Pasadena utilizes Appendix G of the *State CEQA Guidelines* as its thresholds of significance for GHG emissions. Therefore, the proposed project would have a significant impact on GHGs if it would:

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

Although the SCAQMD adopted a quantitative significance threshold for industrial (stationary source) projects, they did not adopt thresholds for residential or commercial projects. The SCAQMD established an ongoing GHG Significance Threshold Working Group. At the last working group meeting in September 2010, the Working Group proposed a tiered approach for assessing GHG significance (SCAQMD 2010). Figure 3.4-2 summarizes the approach proposed by the Working Group.




Source: SCAQMD 2010.

**Figure 3.4-2**
**SCAQMD Tiered Approach to Assess GHG Significance**

For Tier 3 (Screening Values), the Working Group proposed establishing a quantitative threshold of 3,000 $MTCO_2e$/year for all residential or commercial land use projects. It also proposed threshold values by land use, but only if used consistently.

If GHG emissions do not pass the third tier, then projects could be evaluated based on efficiency targets using the service population (SP) for the project. For the purposes of this project, the SP would be defined as the sum of both guests and employees of the hotel. For a project level analysis, the Working Group proposed the following targets:

- 2020 Targets: 4.8 $MTCO_2e$/year per SP
- 2035 Targets: 3.0 $MTCO_2e$/year per SP

For the purposes of this analysis, the quantitative threshold of 3,000 $MTCO_2e$/year was used to evaluate significance. Tier 4 would be used only if emissions exceed this threshold.

## 3.4.6 Project Impacts

### Would the project generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment?

The SCAQMD proposed quantitative significance thresholds to determine if residential or commercial projects have significant GHG impacts. Projects that exceed these thresholds are considered to have a significant impact on the environment.

#### *Construction Emissions*

Construction emissions are expected to occur from engine exhaust from the off-road construction equipment and vehicle trips made by construction workers, vendors, and haul trucks. These emissions would primarily consist of $CO_2$, $CH_4$, and $N_2O$.

Construction of the proposed project is expected to start in July 2013 and last for 13 months. As previously discussed, emissions were estimated using CalEEMod, Version 2011.1.1. Default assumptions were used unless project-specific emissions were provided. It was assumed that the capacity of any haul trucks exporting soil from the site would be 16 cubic yards. The closest landfill to which exported soil would be transported was assumed located in Puente Hills, approximately 22 miles southeast of the project location. No phases were assumed to overlap, which is consistent with CalEEMod assumptions. Details of the assumptions and emission calculation methodologies are presented in Appendix D. Table 3.4-3 summarizes the estimated annual construction emissions based on a 13-month construction schedule.

**Table 3.4-3 Construction-Related GHG Emissions**

| Year | Annual GHG Emissions (metric tons per year) | | | Annual GHG Emissions ($MTCO_2e$/year) | | | |
|---|---|---|---|---|---|---|---|
| | $CO_2$ | $CH_4$ | $N_2O$ | $CO_2$ | $CH_4$ | $N_2O$ | Total |
| 2013 | 183 | <0.1 | <0.1 | 183 | 0.2 | <0.1 | 183 |
| 2014 | 82 | <0.1 | <0.1 | 82 | 0.2 | <0.1 | 82 |
| Total Construction | 265 | <0.1 | <0.1 | 265 | 0.4 | <0.1 | 265 |
| Amortized Construction[(1)] | 9 | <0.1 | <0.1 | 9 | <0.1 | <0.1 | 9 |

Key: "<" = less than; $CH_4$ = methane; $CO_2$ = carbon dioxide; GHG = greenhouse gas; $MTCO_2e$/year = metric tons carbon dioxide equivalent per year; $N_2O$ = nitrous oxide

Note:

[(1)] Project lifetime assumed to be 30 years (amortized emissions equal total construction emissions divided by 30 years).

### *Operational Emissions*

Once constructed, emissions associated with project operation would result from vehicles traveling to and from the hotel, natural gas combustion from space heating, disposal of solid waste, and electricity used directly by the building and indirectly to supply water to the site and to treat wastewater. Emissions were estimated using CalEEMod. Operational emissions are presented in Table 3.4-4. Annual emissions associated with the proposed project construction and operations amortized over 30 years and compared with the SCAQMD threshold are presented in Table 3.4-5. Detailed assumptions and calculations for operational GHG emissions are included in Appendix D.

**Table 3.4-4 Operational GHG Emissions**

| Emissions Type | Annual GHG Emissions (metric tons per year) | | | Annual GHG Emissions ($MTCO_2e$/year) | | | |
|---|---|---|---|---|---|---|---|
| | $CO_2$ | $CH_4$ | $N_2O$ | $CO_2$ | $CH_4$ | $N_2O$ | Total |
| Mobile Sources | 1,802 | 0.1 | <0.1 | 1,802 | 1.5 | <0.1 | 1,803 |
| Building Electricity | 604 | <0.1 | <0.1 | 604 | 0.2 | <0.1 | 605 |
| Natural Gas Combustion | 126 | <0.1 | <0.1 | 126 | <0.1 | <0.1 | 126 |
| Indoor/Outdoor Water Use | 40 | 0.1 | <0.1 | 40 | 2.3 | <0.1 | 43 |
| Solid Waste Disposal | 16 | 1.0 | <0.1 | 16 | 20.0 | <0.1 | 36 |
| Total | 2,587 | 1.1 | <0.1 | 2,587 | 23.9 | <0.1 | 2,614 |

Key: "<" = less than; $CH_4$ = methane; $CO_2$ = carbon dioxide; GHG = greenhouse gas; $MTCO_2e$/year = metric tons carbon dioxide equivalent per year; $N_2O$ = nitrous oxide

**Table 3.4-5 Annual Proposed Project Emissions Compared to GHG Threshold**

| Emissions Type | Annual GHG Emissions (metric tons per year) | | | Annual GHG Emissions ($MTCO_2e$/year) | | | |
|---|---|---|---|---|---|---|---|
| | $CO_2$ | $CH_4$ | $N_2O$ | $CO_2$ | $CH_4$ | $N_2O$ | Total |
| Amortized Construction Emissions | 9 | <0.1 | <0.1 | 9 | <0.1 | <0.1 | 9 |
| Operational Emissions | 2,587 | 1.1 | <0.1 | 2,587 | 23.9 | <0.1 | 2,614 |
| Total Project Emissions | 2,596 | 1.1 | <0.1 | 2,596 | 24.0 | <0.1 | 2,623 |
| SCAQMD Threshold | | | | | | | 3,000 |
| Exceeding Threshold? | | | | | | | NO |

Key: "<" = less than; $CH_4$ = methane; $CO_2$ = carbon dioxide; GHG = greenhouse gas; $MTCO_2e$/year = metric tons carbon dioxide equivalent per year; $N_2O$ = nitrous oxide

As shown in Table 3.4-5, the total project emissions would be 2,623 $MTCO_2e$/year, which is less than the SCAQMD's proposed significance threshold for commercial land uses. Impacts to GHG would be less than significant.

## Mitigation Measures

No mitigation is required.

## Residual Impacts

A less than significant GHG impact is anticipated to occur with implementation of the proposed project.

### Would the project conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of GHGs?

*Consistency with State Requirements*

As described previously, several initiatives, plans, policies, and regulations have been adopted at the state and local level related to reducing GHG emissions. In general, California's goals and strategies for the systematic statewide reduction of GHG emissions are embodied in the combination of Executive Order S-3-05 and AB 32, which call for the following reductions of GHG emissions:

- 2000 levels by 2010 (11 percent below BAU)
- 1990 levels by 2020 (25 percent below BAU)
- 80 percent below 1990 levels by 2050

As discussed above, GHG emissions that would occur from the proposed building construction and operation would be less than the SCAQMD's proposed significance criteria for commercial projects. The significance criteria proposed by the SCAQMD is sufficient to capture projects that represent approximately 90 percent of GHG emissions from new commercial and residential sources. SCAQMD staff (SCAQMD 2008) indicated that this threshold would be sufficient to prevent new development from substantially hindering progress towards achieving the goals of Executive Order S-3-05. GHG emissions would not conflict with AB 32 or S-3-05 and would be less than significant.

*Green City Action Plan*

As part of the *2006 Green City Action Plan* (City of Pasadena 2006), the City adopted a Green Building Practices Ordinance. The proposed project is over 25,000 square feet and is subject to the Tier 1 standards in the Green Building Ordinance (Pasadena Municipal Code, Section 14.04.504). As such, the building is required to exceed the California Energy Code based on the 2008 energy standards requirement (Title 24) by 20 percent (Pasadena Municipal Code, Section 14.04.540). The proposed project would be constructed in compliance with the City's Green Building Practices Ordinance and would not impede the implementation of the *Green City Action Plan*. Impacts would be less than significant.

### Mitigation Measures

No mitigation is required.

### Residual Impacts

No conflicts with adopted GHG reduction plans would occur with implementation of the proposed project.

## 3.4.7 Cumulative Impacts

By its very nature, climate change is a cumulative impact from various global sources of activities that incrementally contribute to global GHG concentrations. Individual projects provide a small addition to total concentrations, but contribute cumulatively to a global phenomenon. The goal of AB 32 is to require GHG emission reductions from existing conditions. As a result, cumulative GHG and climate change impacts must be analyzed from the perspective of whether they would impede the state's ability to meet its emission reduction goals.

The City has analyzed a scenario in which an NFL team could temporarily play at the Rose Bowl while a permanent stadium is being built outside the City limits (City of Pasadena 2012c). While the potential games from the NFL could overlap with operation of the proposed project, the maximum overlap is projected to be a maximum of 13 games in any one year and would last for a maximum of five years. As a result, this scenario would have a limited and temporary impact on cumulative GHG impacts. Because of the temporary duration of this scenario, cumulative impacts were analyzed with and without consideration of an NFL team so that the long term incremental effect of this project could be segregated and disclosed for purposes of determining whether it was cumulatively considerable.

### Scenario One (Excluding Project # 32 from the Cumulative Projects List (Temporary Use of the Rose Bowl by the NFL))

Several residential and commercial development projects could occur near the project vicinity that could contribute to cumulative impacts. As described earlier, individual projects provide a small addition to total GHG concentrations, but would add incrementally to global GHG concentrations. Because GHG emissions would be cumulative by definition, the project's contribution to this cumulative impact is evaluated based on the project-level significance criteria. Total project emissions would be less than the SCAQMD's proposed GHG threshold for residential or commercial projects (see Table 3.4-5). As a result, the proposed project's incremental effect would not result in or contribute to the severity of cumulatively significant GHG impacts, and is therefore not cumulatively considerable.

### Scenario Two (Including Project # 32 from the Cumulative Projects List (Temporary Use of the Rose Bowl by the NFL))

As discussed above, GHG emissions are by definition cumulative, so a project's incremental contribution to this cumulative impact is based on project-level significance. With inclusion of the NFL, the cumulative GHG emissions would exceed the SCAQMD's threshold for greenhouse gases. However, since total project emissions would be less than the SCAQMD's proposed GHG threshold for residential or commercial projects, the proposed project's incremental effect is even smaller than its incremental effect without the NFL project, and this project's incremental effect still would not result in or contribute to the severity of cumulative significant GHG emissions if the NFL were considered. Therefore, the incremental effect of this project is not cumulatively considerable.

### Mitigation Measures

No mitigation is required.

### Residual Impacts

Significant cumulative impacts are not anticipated to occur with implementation of the proposed project and related projects.