

APPENDIX C

AIR QUALITY AND GREENHOUSE GAS EMISSIONS AND CLIMATE CHANGE TECHNICAL REPORT

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TABLE OF CONTENTS

Section	Page
1	Executive Summary..... 1
2	Introduction 2
3	Project Description 14
4	Regulatory Framework 17
5	Existing Conditions..... 49
6	Methods of Analysis..... 65
7	Air Quality and Greenhouse Gas Emissions Analysis..... 68
8	Mitigation Measures..... 86
9	Level of Significance after Mitigation 93
10	Conclusion and Recommendations 94
11	References 95

Table	Page
2-1	Greenhouse Gases and Their Relative Warming Potential Compared to CO ₂ 10
3-1	2016 RTP/SCS Goals 16
4-1	National Ambient Air Quality Standards..... 20
4-2	California Ambient Air Quality Standards 27
5-1	American Lung Association Report Card for SCAG Region 54
5-2	Population-Weighted Asthma Rate per 10,000..... 54
5-3	Sensitive Receptors by County..... 56
5-4	2015 Nonattainment in Counties in the SCAG Region for All Criteria Pollutants..... 57
5-5	CAAQS Area Designations 58
5-6	Criteria Pollutant Emissions by County—Existing Conditions (Base Year 2012)..... 59
5-7	Peak Criteria Pollutants Readings for the SCAG Region Air Basins..... 61
6-1	Scenario Planning Model Metrics Assumptions 66
7-1	Criteria Pollutant Emissions by County— Plan [2040] vs. Existing Conditions [2015]..... 70
7-2	Sensitive Receptors by County..... 72
7-3	Summary Maximum Exposed Individual Residential 30-Year Exposure Cancer Risk 75
7-4	Daily VMT by County..... 76
7-5	Greenhouse Gas Emissions from Transportation by County..... 78
7-6	Greenhouse Gas Emissions Summary for the SCAG Region 80
7-7	SB 375 Analysis 81

Figure	Follows Page
3-1	SCAG Region..... 14
3-2	SCAG Subregions..... 14
3-3	Federally-Recognized Tribal Sovereign Nations..... 14
5-1	Annual Average Concentration of PM 2.5 55
5-2	Average Daily Ozone Exposure in Excess of the National 8-hr Standard (0.75 ppm)..... 55
5-3	Sensitive Receptors..... 56
5-4	Air Quality Districts, Basins, and Monitoring Stations..... 59

7-1	PM _{2.5} Emissions Change	70
7-2	CO Emissions Change	70
7-3	SB 375 GHG (per capita) Reduction Trajectory	81

1.0 EXECUTIVE SUMMARY

The Southern California Association of Governments (SCAG) 2016 Regional Transportation Plan and Sustainable Communities Strategy (2016 RTP/SCS) would generally improve air quality, with the exception of re-entrained roadway dust resulting from total vehicle miles travelled (VMT); improve health, as a result of greatly reduced diesel particulates that are strongly correlated with cancer risk; and reduce greenhouse gas (GHG) emissions consistent with Senate Bill (SB) 375 requirements. According to SB 375, the state's targets for the SCAG region are an 8 percent per capita reduction in GHG emissions from automobiles and light trucks by 2020 and a 13 percent reduction by 2035 (compared with 2005 levels). The 2016 RTP/SCS is anticipated to result in an 8 percent reduction in emissions by 2020, an 18 percent reduction by 2035, and a 22 percent reduction by 2040 as compared to 2005 levels. For air quality in the SCAG region, the three criteria pollutants that are not in attainment are ozone, PM₁₀, and PM_{2.5}. The 2016 RTP/SCS would help reduce these emissions and bring the region into attainment by increasing land use density, incorporating alternative fuels and technologies, increasing transit and active transportation options, and improving community design.

2.0 INTRODUCTION

This Air Quality and Greenhouse Gas Emissions Technical Report describes the air quality and GHG emissions in the SCAG region, includes an explanation of the methodology and assumptions used in the analysis, discusses the potential impacts of the 2016 RTP/SCS on air quality and GHG, identifies mitigation measures for the impacts, and evaluates the residual impacts. Air quality was evaluated in accordance with Appendix G of the 2015 California Environmental Quality Act Guidelines (State CEQA Guidelines). Air quality within the SCAG region was evaluated at programmatic level of detail, in relation to Air Quality Management Plans (AQMPs) for the five air quality districts and the general plans of the six counties and 191 cities within the SCAG region, a review of published and unpublished literature germane to the SCAG region, as well as a review of the 2012 SCAG RTP/SCS. This analysis focuses on air pollution from on-road motor vehicles in two perspectives: daily emissions and pollutant concentrations. The analysis is based upon air quality modeling, performed by SCAG, using EMFAC2014. Air quality modeling that produces criteria pollutant emissions for the SCAG region and by county is based on SCAG's transportation modeling and network built for the existing conditions and the Plan.

GHGs are emitted by natural processes and human activities. GHGs are responsible for trapping heat in the atmosphere and regulating the Earth's temperature. The six major GHGs are carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), sulfur hexafluoride (SF₆), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs). While there is no set significance threshold for GHGs, they are evaluated for consistency with legislation such as Assembly Bill (AB) 32, SB 375, Executive Order (EO) B-30-15, and EO S-03-05. Because the EIR is a programmatic document, the analysis concludes whether SCAG is on track for meeting the regional goals set by the legislation.

Consistent with the emphasis of the 2016 RTP/SCS on environmental justice, the PEIR considers the potential for benefits and impacts on sensitive receptors and low-income and minority populations, in the vicinity of transportation facilities that have the potential to increase or decrease diesel particulate emissions.

Definitions

Air Dispersion: Air dispersion is defined as how air pollutants travel through ambient air. Toxic Air Contaminants/Mobile Source Air Toxics (TACs/MSATs) impact those located closest to the emission sources more than those located further away. A California law passed in 2003 (Public Resources Code Section 21151.8) prohibits the siting of a school within 500 feet of a freeway unless "the school district determines, through analysis based on appropriate air dispersion modeling, that the air quality at the proposed site is such that neither short-term nor long-term exposure poses significant health risks to pupils." The U.S. EPA has issued a number of regulations that will dramatically decrease MSATs through cleaner fuels and cleaner engines.

Carbon Dioxide (CO₂): Enters the atmosphere through the burning of fossil fuels (oil, natural gas, and coal), solid waste, trees and wood products, and respiration, and as a result of other chemical reactions (e.g., manufacture of cement). Carbon dioxide is removed from the atmosphere (sequestered) when it is absorbed by plants as part of the biological carbon cycle.

Carbon Dioxide-Equivalent (CO_{2e}): The standard unit to measure the amount of GHGs in terms of the amount of CO₂ that would cause the same amount of warming. CO_{2e} is based on the GWP ratios between the various GHGs relative to CO₂.

Chlorofluorocarbons (CFCs): One of a class of fluorinated gases with a high greenhouse warming potential, CFCs are GHGs covered under the 1987 Montreal Protocol and used for refrigeration, air conditioning, packaging, insulation, solvents, or aerosol propellants. Since they are not destroyed in the lower atmosphere (troposphere, stratosphere), CFCs drift into the upper atmosphere where, given suitable conditions, they break down ozone. These gases are therefore being replaced by other GHG compounds covered under the Kyoto Protocol.

Climate Change: Climate change is the variation of earth's climate over time, whether due to natural variability or as a result of human activities. Scientists have concluded that human activities are contributing to global climate change by adding large amounts of heat-trapping gases, known as GHGs, to the atmosphere. The primary source of these GHGs is fossil fuel use.

Concentrations: The amount of pollutant material per volumetric unit of air, measured in parts per million (ppm) or micrograms per cubic meter (µg/m³). The following discussion identifies the pollutants included in this analysis.

Criteria Pollutants: Health-based air quality standards have been established by California and the federal government for the following criteria pollutants: carbon monoxide (CO), ozone (O₃), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), particulate matter 2.5 microns or less in diameter (PM_{2.5}), particulate matter 10 microns or less in diameter (PM₁₀), and lead (Pb). California also includes standards for hydrogen sulfide, vinyl chloride, sulfates, and visibility.

The following describes the criteria pollutants and summarizes the health effects of each criteria pollutant:¹

Carbon Monoxide (CO): CO is a colorless, odorless, relatively inert gas. It is a trace constituent in the unpolluted troposphere, and is produced by both natural processes and human activities. In remote areas far from human habitation, carbon monoxide occurs in the atmosphere at an average background concentration of 0.04 ppm, primarily as a result of natural processes such as forest fires and the oxidation of methane. Global atmospheric mixing of CO from urban and industrial sources creates higher background concentrations (up to 0.20 ppm) near urban areas. The major source of CO in urban areas is incomplete combustion of carbon containing fuels, mainly gasoline. CO concentrations are generally highest in the vicinity of major concentrations of vehicular traffic.

CO is a primary pollutant, meaning that it is directly emitted into the air, not formed in the atmosphere by chemical reaction of precursors, as is the case with ozone and other secondary pollutants. Ambient concentrations of CO exhibit large spatial and temporal variations due to variations in the rate at which CO is emitted and in the meteorological conditions that govern transport and dilution. Unlike ozone, CO tends to reach high concentrations in the fall and winter months. The highest concentrations frequently

¹ South Coast Air Quality Management District. February 2013. *Final Environmental Impact Report for the 2012 Air Quality Management Plan*. Available at: [http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2012-air-quality-management-plan/final-2012-aqmp-\(february-2013\)/final-ceqa-eir/2012-program-environmental-impact-report-ch-3-2.pdf?sfvrsn=2](http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2012-air-quality-management-plan/final-2012-aqmp-(february-2013)/final-ceqa-eir/2012-program-environmental-impact-report-ch-3-2.pdf?sfvrsn=2)

occur on weekdays at times consistent with rush hour traffic and late night during the coolest, most stable portion of the day.

Individuals with a deficient blood supply to the heart are the most susceptible to the adverse effects of CO exposure. The effects observed include earlier onset of chest pain with exercise, and electrocardiograph changes indicative of worsening oxygen supply to the heart.

Inhaled CO has no direct toxic effect on the lungs, but exerts its effect on tissues by interfering with oxygen transport by competing with oxygen to combine with hemoglobin present in the blood to form carboxyhemoglobin (COHb). Hence, conditions with an increased demand for oxygen supply can be adversely affected by exposure to CO. Individuals most at risk include patients with diseases involving heart and blood vessels, fetuses (unborn babies), and patients with chronic hypoxemia (oxygen deficiency) as seen in high altitudes.

Reductions in birth weight and impaired neurobehavioral development have been observed in animals chronically exposed to CO, resulting in COHb levels similar to those observed in smokers. Recent studies have found increased risks for adverse birth outcomes with exposure to elevated CO levels. These include preterm births and heart abnormalities.

Lead (Pb): Lead in the atmosphere is present as a mixture of a number of lead compounds. Leaded gasoline and lead smelters have been the main sources of lead emitted into the air. Due to the phasing out of leaded gasoline, there was a dramatic reduction in atmospheric lead in Southern California over the past three decades.

Fetuses, infants, and children are more sensitive than others to the adverse effects of lead exposure. Exposure to low levels of lead can adversely affect the development and function of the central nervous system, leading to learning disorders, distractibility, inability to follow simple commands, and lower intelligence quotient. In adults, increased lead levels are associated with increased blood pressure.

Lead poisoning can cause anemia, lethargy, seizures, and death. It appears that there are no direct effects of lead on the respiratory system. Lead can be stored in the bone from early age environmental exposure, and elevated blood lead levels can occur due to breakdown of bone tissue during pregnancy, hyperthyroidism (increased secretion of hormones from the thyroid gland), and osteoporosis (breakdown of bone tissue). Fetuses and breast-fed babies can be exposed to higher levels of lead because of previous environmental lead exposure of their mothers.

Nitrogen Dioxide and Nitric Oxide (NO_x): NO₂ is a reddish-brown gas with a bleach-like odor. Nitric oxide (NO) is a colorless gas, formed from the nitrogen and oxygen in air under conditions of high temperature and pressure which are generally present during combustion of fuels; NO reacts rapidly with the oxygen in air to form NO₂. NO₂ is responsible for the brownish tinge of polluted air. The two gases, NO and NO₂, are referred to collectively as NO_x. In the presence of sunlight, NO₂ reacts to form nitric oxide and an oxygen atom. The oxygen atom can react further to form ozone, via a complex series of chemical reactions involving hydrocarbons. Nitrogen dioxide may also react to form nitric acid (HNO₃), which reacts further to form nitrates, components of PM_{2.5} and PM₁₀.

Population-based studies suggest that an increase in acute respiratory illness, including infections and respiratory symptoms in children (not infants), is associated with long-term exposures to NO₂ at levels

found in homes with gas stoves, which are higher than ambient levels found in Southern California. Increase in resistance to air flow and airway contraction is observed after short-term exposure to NO₂ in healthy subjects. Larger decreases in lung functions are observed in individuals with asthma and/or chronic obstructive pulmonary disease (e.g., chronic bronchitis, emphysema) than in healthy individuals, indicating a greater susceptibility of these subgroups. More recent studies have found associations between NO₂ exposures and cardiopulmonary mortality, decreased lung function, respiratory symptoms, and emergency room asthma visits.

In animals, exposure to levels of NO₂ considerably higher than ambient concentrations results in increased susceptibility to infections, possibly due to the observed changes in cells involved in maintaining immune functions. The severity of lung tissue damage associated with high levels of ozone exposure increases when animals are exposed to a combination of ozone and NO₂.

Ozone (O₃): Ozone, a colorless gas with a sharp odor, is a highly reactive form of oxygen. High ozone concentrations exist naturally in the stratosphere. Some mixing of stratospheric ozone downward through the troposphere to the earth's surface does occur; however, the extent of ozone transport is limited. At the earth's surface in sites remote from urban areas, ozone concentrations are normally very low (e.g., from 0.03 ppm to 0.05 ppm).

While ozone is beneficial in the stratosphere because it filters out skin-cancer-causing ultraviolet radiation, it is a highly reactive oxidant. It is this reactivity that accounts for its damaging effects on materials, plants, and human health at the earth's surface.

The propensity of ozone for reacting with organic materials causes it to be damaging to living cells. Ozone enters the human body primarily through the respiratory tract and causes respiratory irritation and discomfort, makes breathing more difficult during exercise, and reduces the respiratory system's ability to remove inhaled particles and fight infection.

Individuals exercising outdoors, children, and people with preexisting lung disease, such as asthma and chronic pulmonary lung disease, are considered to be the most susceptible subgroups for ozone effects. Short-term exposures (lasting for a few hours) to ozone at levels typically observed in Southern California can result in breathing pattern changes, reduction of breathing capacity, increased susceptibility to infections, inflammation of the lung tissue, and some immunological changes. In recent years, a correlation between elevated ambient ozone levels and increases in daily hospital admission rates, as well as mortality, has also been reported. An increased risk for asthma has been found in children who participate in multiple sports and live in high-ozone communities. Elevated ozone levels are also associated with increased school absences.

Ozone exposure under exercising conditions is known to increase the severity of the abovementioned observed responses. Animal studies suggest that exposures to a combination of pollutants that includes ozone may be more toxic than exposure to ozone alone. Although lung volume and resistance changes observed after a single exposure diminish with repeated exposures, biochemical and cellular changes appear to persist, which can lead to subsequent lung structural changes.

Particulate Matter: Of great concern to public health are the particles small enough to be inhaled into the deepest parts of the lung. Respirable particles (particulate matter less than about 10 micrometers in diameter [PM₁₀]) consists of suspended particles or droplets 10 micrometers or smaller in diameter.

Some sources of PM_{10} , like pollen and windstorms, are naturally occurring. However, in populated areas, most PM_{10} is caused by road dust, diesel soot, combustion products, abrasion of tires and brakes, and construction activities. Sources of fine particulate matter (particulate matter less than about 2.5 micrometers in diameter [$PM_{2.5}$]) include fuel combustion from automobiles, power plants, wood burning, industrial processes, and diesel-powered vehicles such as buses and trucks. These fine particles are also formed in the atmosphere when gases such as sulfur dioxide, NO_x , and ROGs are transformed in the air by chemical reactions.

$PM_{2.5}$ and PM_{10} pose a greater health risk than larger-size particles. When inhaled, these tiny particles can penetrate the human respiratory system's natural defenses and damage the respiratory tract. $PM_{2.5}$ and PM_{10} can increase the number and severity of asthma attacks, cause or aggravate bronchitis and other lung diseases, and reduce the body's ability to fight infections. Children, the elderly, exercising adults, and those suffering from asthma are especially vulnerable to adverse health effects of PM_{10} and $PM_{2.5}$.

A consistent correlation between elevated ambient fine particulate matter (PM_{10} and $PM_{2.5}$) levels and an increase in mortality rates, respiratory infections, number and severity of asthma attacks, and the number of hospital admissions has been observed in different parts of the United States and various areas around the world. Studies have reported an association between long-term exposure to air pollution dominated by fine particles ($PM_{2.5}$) and increased mortality, reduction in lifespan, and an increased mortality from lung cancer.

Daily fluctuations in fine particulate matter concentration levels have also been related to hospital admissions for acute respiratory conditions, to school and kindergarten absences, to a decrease in respiratory function in normal children and to increased medication use in children and adults with asthma. Studies have also shown lung function growth in children is reduced with long-term exposure to particulate matter. In addition to children, the elderly, and people with preexisting respiratory and/or cardiovascular disease appear to be more susceptible to the effects of PM_{10} and $PM_{2.5}$.

Sulfates: Sulfates (SO_x) are chemical compounds which contain the sulfate ion and are part of the mixture of solid materials which make up PM_{10} . Most of the sulfates in the atmosphere are produced by oxidation of SO_2 . Oxidation of sulfur dioxide yields sulfur trioxide (SO_3) which reacts with water to form sulfuric acid, which contributes to acid deposition. The reaction of sulfuric acid with basic substances such as ammonia yields sulfates, a component of PM_{10} and $PM_{2.5}$.

Most of the health effects associated with fine particles and SO_2 at ambient levels are also associated with SO_x . Thus, both mortality and morbidity effects have been observed with an increase in ambient SO_x concentrations. However, efforts to separate the effects of SO_x from the effects of other pollutants have generally not been successful.

Clinical studies of asthmatics exposed to sulfuric acid suggest that adolescent asthmatics are possibly a subgroup susceptible to acid aerosol exposure. Animal studies suggest that acidic particles such as sulfuric acid aerosol and ammonium bisulfate are more toxic than nonacidic particles like ammonium sulfate. Whether the effects are attributable to acidity or to particles remains unresolved.

A key criteria pollutant, SO_2 (sulfur dioxide), is a type of sulfate. SO_2 is a colorless gas with a sharp odor. It reacts in the air to form sulfuric acid (H_2SO_4), which contributes to acid precipitation, and sulfates,

which are components of PM₁₀ and PM_{2.5}. Most of the SO₂ emitted into the atmosphere is produced by burning sulfur containing fuels.

Exposure of a few minutes to low levels of SO₂ can result in airway constriction in some asthmatics. All asthmatics are sensitive to the effects of SO₂. In asthmatics, increase in resistance to air flow, as well as reduction in breathing capacity leading to severe breathing difficulties, is observed after acute higher exposure to SO₂. In contrast, healthy individuals do not exhibit similar acute responses even after exposure to higher concentrations of SO₂.

Animal studies suggest that despite SO₂ being a respiratory irritant, it does not cause substantial lung injury at ambient concentrations. However, very high levels of exposure can cause lung edema (fluid accumulation), lung tissue damage, and sloughing off of cells lining the respiratory tract.

Some population-based studies indicate that the mortality and morbidity effects associated with fine particles show a similar association with ambient SO₂ levels. In these studies, efforts to separate the effects of SO₂ from those of fine particles have not been successful. It is not clear whether the two pollutants act synergistically or one pollutant alone is the predominant factor.

Vinyl Chloride: Vinyl chloride is a colorless, flammable gas at ambient temperature and pressure. It is also highly toxic and is classified by the American Conference of Governmental Industrial Hygienists (ACGIH) as A1 (confirmed carcinogen in humans) and by the International Agency for Research on Cancer (IARC) as 1 (known to be a human carcinogen). At room temperature, vinyl chloride is a gas with a sickly sweet odor that is easily condensed. However, it is stored as a liquid. Due to the hazardous nature of vinyl chloride to human health there are no end products that use vinyl chloride in its monomer form. Vinyl chloride is a chemical intermediate, not a final product. It is an important industrial chemical chiefly used to produce polymer polyvinyl chloride (PVC). The process involves vinyl chloride liquid fed to polymerization reactors where it is converted from a monomer to a polymer PVC. The final product of the polymerization process is PVC in either a flake or pellet form. Billions of pounds of PVC are sold on the global market each year. From its flake or pellet form, PVC is sold to companies that heat and mold the PVC into end products such as PVC pipe and bottles.

Diesel Particulate Matter (diesel PM): According to the California Air Resources Board (CARB), most toxic air emissions are from motor vehicles and the particulate matter from the exhaust of diesel-fueled engines.² In 1998, the OEHHA completed a comprehensive health assessment of diesel exhaust. This assessment formed the basis for a decision by the CARB to formally identify particles in diesel exhaust as a TAC that may pose a threat to human health.³

Diesel particulate matter is part of a complex mixture that makes up diesel exhaust. Diesel exhaust is commonly found throughout the environment and is estimated by EPA's National Scale Assessment to contribute to the human health risk in New England. Diesel exhaust is composed of two phases, either gas or particle, and both phases contribute to the risk. The gas phase is composed of many of the urban hazardous air pollutants, such as acetaldehyde, acrolein, benzene, 1,3-butadiene, formaldehyde, and

² California Air Resources Board. Accessed 8 September 2015. *Reducing Toxic Air Pollutants in California's Communities*. Available at: <http://www.arb.ca.gov/toxics/brochure.pdf>

³ Office of Environmental Health Hazard Assessment. Accessed 8 September 2015. *Health Effects of Diesel Exhaust*. Available at: http://oehha.ca.gov/public_info/facts/dieselfacts.html

polycyclic aromatic hydrocarbons. The particle phase also has many different types of particles that can be classified by size or composition. The size of diesel particulates that are of greatest health concern are those that are in the categories of fine, and ultra-fine particles. The composition of these fine and ultrafine particles may be composed of elemental carbon with absorbed compounds such as organic compounds, sulfate, nitrate, metals, and other trace elements. Diesel exhaust is emitted from a broad range of diesel engines: the on-road diesel engines of trucks, buses, and cars and the off-road diesel engines that include locomotives, marine vessels, and heavy-duty equipment.⁴ People living and working in urban and industrial areas are more likely to be exposed to this pollutant. Those spending time on or near roads and freeways, truck loading and unloading operations, operating diesel-powered machinery, or working near diesel equipment face exposure to higher levels of diesel exhaust and face higher health risks.⁵

The most common exposure pathway is breathing the air that contains the diesel particulate matter. The fine and ultrafine particles are respirable, which means that they can avoid many of the human respiratory system defense mechanisms and enter deeply into the lung. In the National Scale Assessment, there are several steps used to characterize public health risks. For diesel particulate matter, not all of the steps could be completed but a qualitative assessment was provided that provided modeling estimates of population exposures. The estimated population exposure concentrations for diesel particulate matter were the highest exposure concentrations in all of the New England states. EPA has medium confidence in the overall NATA estimate for diesel particulate exposure based on the emissions and exposure modeling. Exposure to diesel particulate matter comes from both on road and off road engine exhaust that is either directly emitted from the engines or aged through lingering in the atmosphere.⁶

Diesel exhaust causes health effects from both short-term or acute exposures and also long-term chronic exposures, such as repeated occupational exposures. The type and severity of health effects depends upon several factors including the amount of chemical you are exposed to and the length of time you are exposed. Individuals also react differently to different levels of exposure. There is limited information on exposure to just diesel particulate matter but there is enough evidence to indicate that inhalation exposure to diesel exhaust causes acute and chronic health effects.⁷

Acute exposure to diesel exhaust may cause irritation to the eyes, nose, throat, and lungs and some neurological effects such as lightheadedness. Acute exposure may also elicit a cough or nausea as well as exacerbate asthma. Chronic exposure in experimental animal inhalation studies have shown a range of dose-dependent lung inflammation and cellular changes in the lung, and there are also diesel exhaust immunological effects. Based upon human and laboratory studies, there is considerable evidence that diesel exhaust is a likely carcinogen. Human epidemiological studies demonstrate an association

⁴ U.S. Environmental Protection Agency. 24 April 2014. *Diesel Particulate Matter*. Available at: <http://www.epa.gov/region1/eco/airtox/diesel.html>

⁵ Office of Environmental Health Hazard Assessment. Accessed 8 September 2015. *Health Effects of Diesel Exhaust*. Available at: http://oehha.ca.gov/public_info/facts/dieselfacts.html

⁶ U.S. Environmental Protection Agency. 24 April 2014. *Diesel Particulate Matter*. Available at: <http://www.epa.gov/region1/eco/airtox/diesel.html>

⁷ U.S. Environmental Protection Agency. 24 April 2014. *Diesel Particulate Matter*. Available at: <http://www.epa.gov/region1/eco/airtox/diesel.html>

between diesel exhaust exposure and increased lung cancer rates in occupational settings.⁸ The elderly and people with emphysema, asthma, and chronic heart and lung disease are especially sensitive to fine-particle pollution. Numerous studies have linked elevated particle levels in the air to increased hospital admissions, emergency room visits, asthma attacks and premature deaths among those suffering from respiratory problems. Because children's lungs and respiratory systems are still developing, they are also more susceptible than healthy adults to fine particles. Exposure to fine particles is associated with increased frequency of childhood illnesses and can also reduce lung function in children. For the average Californian, 70 percent of cancer risk from breathing toxic air pollutants stem from diesel exhaust particles.⁹

EPA's National Scale Assessment uses several types of health hazard information to provide a quantitative "threshold of concern" or a health benchmark concentration at which it is expected that no adverse health effects occur at exposures to that level. Health effects information on carcinogenic, short- and long term non-carcinogenic end points are used to establish selective protective health levels to compare to the modeled exposures levels. Unfortunately the exposure response data in human studies are considered too uncertain to develop a carcinogenic unit risk for EPA's use. There is a Reference Concentration (RFC) that is used as a health benchmark protective of chronic noncarcinogenic health effects, but it is for diesel exhaust and not specifically set for diesel particulate matter, which is what was modeled in NATA. The RFC for diesel exhaust, which includes diesel particulate matter is 5 $\mu\text{g}/\text{m}^3$. This value is similar to the National Ambient Air Quality Standard established for fine particulate matter, which is 15 $\mu\text{g}/\text{m}^3$.¹⁰

Emissions: The quantity of pollutants released into the air, measured in pounds per day (ppd) or tons per day (tpd).

Fluorinated Gases: Synthetic, strong GHGs that are emitted from a variety of industrial processes. Fluorinated gases are sometimes used as substitutes for ozone-depleting substances. These gases are typically emitted in smaller quantities, but they are potent GHGs, sometimes referred to as high greenhouse warming potential gases.

Global Warming Potential (GWP): Metric used to describe how much heat a molecule of a GHG absorbs relative to a molecule of carbon dioxide (CO_2) over a given period of time (20, 100, and 500 years). CO_2 has a GWP of 1.

Greenhouse Gases (GHGs): GHGs are those compounds in the earth's atmosphere that play a critical role in determining the earth's surface temperature. Specifically, these gases allow high-frequency solar radiation to enter the earth's atmosphere but retain the low-frequency energy, which is radiated back from the earth to space, resulting in a warming of the atmosphere. This phenomenon is known as the greenhouse effect. Increased concentrations of GHGs in the earth's atmosphere are thought to be linked to global climate change, such as rising surface temperatures, melting icebergs and snowpack,

⁸ U.S. Environmental Protection Agency. 24 April 2014. *Diesel Particulate Matter*. Available at: <http://www.epa.gov/region1/eco/airtox/diesel.html>

⁹ Office of Environmental Health Hazard Assessment. Accessed 8 September 2015. *Health Effects of Diesel Exhaust*. Available at: http://oehha.ca.gov/public_info/facts/dieselfacts.html

¹⁰ U.S. Environmental Protection Agency. 24 April 2014. *Diesel Particulate Matter*. Available at: <http://www.epa.gov/region1/eco/airtox/diesel.html>

rising sea levels, and the increasing frequency and magnitude of severe weather.

GHGs include CO₂, CH₄, O₃, water vapor, N₂O, HFCs, PFCs, and SF₆. Carbon dioxide is the most abundant GHG. Other GHGs are less abundant, but have higher global warming potential than CO₂. (**Table 2-1, *Greenhouse Gases and Their Relative Warming Potential Compared to CO₂***).

**TABLE 2-1
GREENHOUSE GASES AND THEIR RELATIVE GLOBAL WARMING POTENTIAL
COMPARED TO CO₂**

GHG	Atmospheric Lifetime (years)	Global Warming Potential Relative to CO ₂ ^a
Carbon Dioxide (CO ₂)	50 to 100	1
Methane (CH ₄) ^b	12 (±3)	25
Nitrous Oxide	120	298
Hydrofluorocarbons:		
HFC-23	264	14,800
HFC-32	5.6	675
HFC-125	32.6	3,500
HFC-134a	14.6	1,100
HFC-143a	48.3	1,430
HFC-152a	1.5	124
HFC-227ea	36.5	3,220
HFC-236fa	209	9,810
HFC-43-10mee	17.1	1,640
Perfluoromethane: CF ₄	50,000	7,390
Perfluoroethane: C ₂ F ₆	10,000	12,200
Perfluorobutane: C ₄ F ₁₀	2,600	8,860
Perfluoro-2-methylpentane: C ₆ F ₁₄	3,200	9,300
Sulfur Hexafluoride (SF ₆)	3,200	22,800

NOTE:

- a. Based on 100-Year Time Horizon of the Global Warming Potential (GWP) of the air pollutant relative to CO₂.
b. The methane GWP includes the direct effects and those indirect effects due to the production of tropospheric ozone and stratospheric water vapor. The indirect effect due to the production of CO₂ is not included.

SOURCE:

Intergovernmental Panel on Climate Change (IPCC), Fourth Assessment Report (AR4). 4 April 2014. *Emission factors for greenhouse gas inventories*. Available at: <http://www.epa.gov/climateleadership/documents/emission-factors.pdf>

Thus, emissions of other GHGs are frequently expressed in the equivalent mass of CO₂, denoted as CO_{2e}. GHGs are the result of natural and anthropogenic activities. Forest fires, decomposition, industrial processes, landfills, and consumption of fossil fuels for power generation, transportation, heating, and cooking are the primary sources of GHG emissions.

Understanding of the fundamental processes responsible for global climate change has been improved over the past decade, and the predictive capabilities are advancing. However, there remain significant scientific uncertainties, for example, in predictions of local effects of climate change, occurrence of extreme weather events, effects of aerosols, changes in clouds, shifts in the intensity and distribution of precipitation, and changes in oceanic circulation. Due to the complexity of the earth's climate system, the uncertainty in its description and in the prediction of changes may never be completely eliminated. Because of these uncertainties, there continues to be significant debate over the extent to which increased concentrations of GHGs have caused or will cause climate change and over the appropriate actions to limit and/or respond to climate change.

Hydrofluorocarbons (HFCs): One of a class of fluorinated gases with a high greenhouse warming potential, HFCs contain only hydrogen, fluorine, and carbon atoms. They were introduced as alternatives to ozone-depleting substances to serve many industrial, commercial, and personal needs. HFCs are emitted as by-products of industrial processes and are also used in manufacturing. They do not significantly deplete the stratospheric ozone layer, but they are strong GHGs.

Hydrochlorofluorocarbons (HCFCs): One of a class of fluorinated gases with a high greenhouse warming potential, HCFCs contain hydrogen, fluorine, chlorine, and carbon atoms. Although ozone-depleting substances, they are less potent at destroying stratospheric ozone than CFCs. They have been introduced as temporary replacements for CFCs and are GHGs.

Methane (CH₄): Emitted during the production and transport of coal, natural gas, and oil. Methane emissions also result from livestock and other agricultural practices and from the decay of organic waste in municipal landfills and water treatment facilities.

MTCO_{2e}: Metric ton of CO_{2e}.

MMTCO_{2e}: Million metric tons of CO_{2e}.

Nitrous oxide (N₂O): Emitted during agricultural and industrial activities as well as during combustion of fossil fuels and solid waste.

Sulfur Hexafluoride (SF₆): One of a class of fluorinated gases with a high greenhouse warming potential, SF₆ is a colorless gas soluble in alcohol and ether, slightly soluble in water. SF₆ is a strong GHGs used primarily in electrical transmission and distribution systems as an insulator.

Perfluorocarbons (PFCs): One of a class of fluorinated gases with a high greenhouse warming potential, PFCs are a group of human-made chemicals composed of carbon and fluorine only. These chemicals (predominantly perfluoromethane [CF₄] and perfluoroethane [C₂F₆]) were introduced as alternatives, along with HFCs, to the ozone-depleting substances. In addition, PFCs are emitted as by-products of industrial processes and are also used in manufacturing. PFCs do not harm the stratospheric ozone layer, but they have a high global warming potential.

Toxic Air Contaminants (TACs): TACs, also referred to as hazardous air pollutants (HAPs), are generally defined as those contaminants that are known or suspected to cause serious health problems, but do not have a corresponding ambient air quality standard. TACs are also defined as an air pollutant that may increase a person's risk of developing cancer and/or other serious health effects; however, the emission of a toxic chemical does not automatically create a health hazard. Other factors, such as the amount of the chemical, its toxicity, how it is released into the air, the weather, and the terrain, all influence whether the emission could be hazardous to human health. Toxic air contaminants can result from manufacturing industries, automobile repair facilities, and diesel particulate emissions associated with heavy-duty equipment operations. TACs are emitted by a variety of industrial processes such as petroleum refining, electric utility and chrome plating operations, commercial operations such as gasoline stations and dry cleaners, and motor vehicle exhaust and may exist as PM₁₀ and PM_{2.5} or as vapors (gases). TACs include metals, other particles, gases absorbed by particles, and certain vapors from fuels and other sources.

TACs increase the likelihood of health problems and can cause ecological impacts. The resultant health effects depend on the pollutant, exposure level, site conditions, and characteristics of the populations affected. Human exposure to these pollutants at sufficient concentrations and durations can result in cancer, poisoning, and rapid onset of sickness, such as nausea or difficulty in breathing. Other less measurable effects include immunological, neurological, reproductive, developmental, and respiratory problems. Pollutants deposited onto soil or into lakes and streams affect ecological systems and eventually human health through consumption of contaminated food. The carcinogenic potential of TACs is a particular public health concern because many scientists currently believe that there is no “safe” level of exposure to carcinogens. Any exposure to a carcinogen poses some risk of contracting cancer.

Controlling air toxic emissions became a national priority with the passage of the Clean Air Act Amendments (CAAA) of 1990, whereby Congress mandated that the U.S. Environmental Protection Agency (EPA) regulate 188 air toxics, also known as hazardous air pollutants. The EPA has assessed this expansive list in their latest rule in 2007 on the Control of Hazardous Air Pollutants from Mobile Sources,¹¹ and identified a group of 93 compounds emitted from mobile sources that are listed in their Integrated Risk Information System (IRIS) (<http://www.epa.gov/iris/>). In addition, EPA identified seven compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers from their 1999 National Air Toxics Assessment (NATA) (<http://www.epa.gov/ttn/atw/nata1999/>). These are acrolein, benzene, 1,3-butadiene, diesel particulate matter plus diesel exhaust organic gases (diesel PM), formaldehyde, naphthalene, and polycyclic organic matter. While the Federal Highway Administration (FHWA) considers these the priority mobile source air toxics, the list is subject to change and may be adjusted in consideration of future EPA rules. The 2007 EPA rule mentioned above requires controls that will dramatically decrease Mobile Source Air Toxics (MSAT) emissions through cleaner fuels and cleaner engines.¹²

Visibility: With the exception of Lake County, which is designated in attainment, all of the air districts in California are currently designated as unclassified with respect to the California Ambient Air Quality Standards (CAAQS) for visibility reducing particles. (A pollutant is designated unclassified if the data are incomplete and do not support a designation of attainment or nonattainment.)

Since deterioration of visibility is one of the most obvious manifestations of air pollution and plays a major role in the public’s perception of air quality, the state of California has adopted a standard for visibility or visual range. Until 1989, the standard was based on visibility estimates made by human observers. The standard was changed to require measurement of visual range using instruments that measure light scattering and absorption by suspended particles. The visibility standard is based on the distance that atmospheric conditions allow a person to see at a given time and location. Visibility reduction from air pollution is often due to the presence of sulfur and nitrogen oxides, as well as particulate matter. Visibility degradation occurs when visibility reducing particles are produced in sufficient amounts such that the extinction coefficient is greater than 0.23 inverse kilometers (to reduce the visual range to less than 10 miles) at relative humidity less than 70 percent, 8-hour average (from 10:00 a.m. to 6:00 p.m.) according to the state standard.

¹¹ *Federal Register*. 26 February 2007. 72(37): 8430.

¹² Federal Highway Administration. 6 December 2012. *Memorandum. Information: Interim Guidance on Mobile Source Air Toxic Analysis in NEPA*. Available at: http://www.fhwa.dot.gov/environment/air_quality/air_toxics/policy_and_guidance/ajintguidmem.cfm

Volatile organic compounds (VOCs): Reactive organic gases (ROGs) are referred to as reactive organic compounds (ROCs) or volatile organic compounds (VOCs). ROGs are compounds composed primarily of hydrogen and carbon atoms. Internal combustion associated with motor vehicle usage is the major source of hydrocarbons. Adverse effects on human health are not caused directly by ROGs, but rather by reactions of ROGs to form secondary air pollutants, including ozone. ROGs themselves are not criteria pollutants; however, they contribute to formation of ozone. It should be noted that there are no state or national ambient air quality standards for VOCs because they are not classified as criteria pollutants. VOCs are regulated, however, because limiting VOC emissions reduces the rate of photochemical reactions that contribute to the formation of ozone. VOCs are also transformed into organic aerosols in the atmosphere, contributing to higher PM₁₀ and lower visibility levels.

Although health-based standards have not been established for VOCs, health effects can occur from exposures to high concentrations of VOCs because of interference with oxygen uptake. In general, ambient VOC concentrations in the atmosphere are suspected to cause coughing, sneezing, headaches, weakness, laryngitis, and bronchitis, even at low concentrations. Some hydrocarbon components classified as VOC emissions are thought or known to be hazardous. Benzene, for example, one hydrocarbon component of VOC emissions, is known to be a human carcinogen.

3.0 PROJECT DESCRIPTION

Project Location

SCAG is the federally designated Metropolitan Planning Organization (MPO) under Title 23, United States Code (USC) 134(d)(1). SCAG is a six-county region that includes the counties of Imperial, Los Angeles, Orange, Riverside, San Bernardino, and Ventura, and 191 cities (**Figure 3-1, SCAG Region**). To the north of the SCAG region are the counties of Kern and Inyo, to the east are the states of Nevada and Arizona, to the south is the U.S.-Mexico border, to the west is the county of San Diego, and to the northwest is the Pacific Ocean. The SCAG region also consists of 15 subregional entities that have been recognized by the Regional Council, SCAG's governing body, as partners in the regional policy planning process (**Figure 3-2, SCAG Subregions**). There are 16 federally recognized tribal sovereign nations located within the SCAG region (**Figure 3-3, Federally Recognized Tribal Sovereign Nations**).

SCAG is one of the 18 MPOs in the State of California. The total area of the SCAG region is approximately 38,000 square miles. The region includes the county with the largest land area in the nation, San Bernardino County, as well as the county with the highest population in the nation, Los Angeles County. The SCAG region is home to approximately 19 million people, or 49 percent of California's population, representing the largest and most diverse region in the country. If it were its own state, the SCAG region would be the fifth most populous in the nation, just behind Florida and ahead of Illinois. Between 2016 and 2040, SCAG forecasts that there will be an additional 3.88 million people added to this large and diverse area.

2016 RTP/SCS

The RTP/SCS is a long-range transportation plan that provides a vision for regional transportation investments over a 20-year period. In accordance with applicable federal and state laws, SCAG updates the RTP/SCS every four years to reflect changes to the transportation network, the most recent planning assumptions, economic trends, and population and jobs growth forecasts. The RTP/SCS is developed and implemented through a collaborative, continuous, and coordinated process that involves key stakeholders such as the six County Transportation Commissions (CTCs), California Department of Transportation (Caltrans), transit operators, airport and port authorities, air districts, and other agencies including local jurisdictions in our region. The 2016 RTP/SCS will be the culmination of a multi-year effort, which was initiated since the adoption of the 2012 RTP/SCS. The 2016 RTP/SCS will largely embody the goals, objectives, and transportation improvements that have been considered in the adopted 2012 RTP/SCS, as amended in September 2014.

As a blueprint for the region's growth through 2040, the 2016 RTP/SCS outlines the region's goals, policies, and strategies that improve the balance between land use and transportation systems, both current and future. It integrates the multi-modal transportation network and related strategies with an overall land use pattern that responds to projected population and employment growth, housing needs and changing demographics, and transportation demands, including transit and active transportation. It outlines improvements to the existing transportation system, as well as the strategic expansion of the transportation system. While the Sustainable Communities and Climate Protection Act of 2008 places a great deal of attention on meeting GHG emission reduction targets set forth by the California Air Resources Board (CARB), SCAG has also established other important goals that are aimed to improving the overall quality of life in the region. The 2016 RTP/SCS builds from the foundation of the adopted

2012 RTP/SCS, as amended in September 2014, as the baseline scenario to be utilized to review the progress in implementing strategies identified in the 2012 RTP/SCS.

The 2016 RTP/SCS is intended to meet the changing socioeconomic, transportation infrastructure, financial, technological, and environmental conditions of the region. Individual projects are preliminarily identified in the 2016 RTP/SCS. The PEIR is a programmatic level of analysis of the potential for the anticipated transportation improvements and sustainable communities strategies under consideration for the 2016 planning horizon to result in significant impacts on the environment and an assessment of the feasibility of measures and alternatives to avoid, reduce, or mitigate the anticipated significant direct, indirect, and cumulative impacts. Project-level analyses will be considered by implementing agencies on a project-by-project basis as projects proceed through the design and decision-making process. Project-specific planning and implementation undertaken by each implementing agency will depend on a number of issues, including: policies, programs and projects adopted at the local level; restrictions on federal, State and local transportation funds; the results of feasibility studies for particular corridors; and project-specific environmental review.

Objectives of the 2016 RTP/SCS

This 2016 RTP/SCS strives to support California's major initiatives for reducing climate change or GHG emissions as outlined in California Global Warming Solutions Act of 2006, 2005 action by then-Governor Arnold Schwarzenegger (EO S-3-05), and a related regulation to reduce passenger car GHG emissions. These efforts aim at reducing GHG emissions to 1990 levels by 2020—a reduction of approximately 30 percent, and then an 80 percent reduction below 1990 levels by 2050.

SCAG is also required to prepare an RTP and pursuant to Section 65080 of the California Government Code. The state requirements largely mirror the federal requirements and require each Regional Transportation Planning Agency (RTPA) in urban areas to adopt and submit an updated RTP to the CTC and Caltrans every four years. To ensure a degree of statewide consistency in the development of RTPs, the CTC under Government Code Section 14522 prepared RTP Guidelines. The adopted guidelines include a requirement for program level performance measures, which include objective criteria that reflect the goals and objectives of the RTP. In addition, the initial years of the plan must be consistent with the Federal Transportation Improvement Program (TIP). Pursuant to SB 375, SCAG is required to submit the SCS to CARB for the purpose of determining whether GHG targets have been met.

Under SB 375, California's Sustainable Communities and Climate Protection Act, SCAG is also required to prepare an SCS as part of the RTP that reduces GHG emissions by 8 percent per capita by 2020 and 13 percent per capita by 2035, as set by the CARB. According to Section 65080 of the California Government Code, in summary the SCS must:

- Identify existing land use;
- Identify areas to accommodate long-term housing needs;
- Identify areas to accommodate an eight-year projection of regional housing needs;
- Identify transportation needs and the planned transportation network;
- Consider resource areas and farmland;
- Consider state housing goals and objectives;
- Set forth a forecasted growth and development pattern; and
- Comply with federal law for developing an RTP.

SCAG's SCS demonstrates the region's ability to attain the GHG emissions reduction targets set forth by the CARB. The SCS outlines SCAG's plan for integrating the transportation network and related strategies with an overall land use pattern that responds to projected growth, housing needs and changing demographics, and transportation demands.

Prior to adopting the 2016 RTP/SCS, SCAG's Regional Council must certify the PEIR for the Plan. Local and state transportation agencies will use the 2016 RTP/SCS and the PEIR as a reference for their own planning purposes.

Goals

The goals of the 2016 RTP/SCS are expected to remain substantively the same as the goals established in the 2012 RTP/SCS (**Table 3-1, 2016 RTP/SCS Goals**). The regional goals reflect the wide-ranging challenges facing transportation planners and decision-makers in achieving the RTP/SCS vision. The goals demonstrate the need to balance many priorities in the most cost-effective manner.

**TABLE 3-1
2016 RTP/SCS GOALS**

1. Align the plan investments and policies with improving regional economic development and competitiveness.
2. Maximize mobility and accessibility for all people and goods in the region.
3. Ensure travel safety and reliability for all people and goods in the region.
4. Preserve and ensure a sustainable regional transportation system.
5. Maximize the productivity of our transportation system.
6. Protect the environment and health of our residents by improving air quality and encouraging Active Transportation (non-motorized transportation, such as bicycling and walking)
7. Actively encourage and create incentives for energy efficiency, where possible.
8. Encourage land use and growth patterns that facilitate transit and active transportation
9. Maximize the security of the regional transportation system through improved system monitoring, rapid recovery planning, and coordination with other security agencies.

In addition to meeting the GHG emissions reduction targets that the CARB has set for the SCAG region pursuant to SB 375, SCAG intends to address the goals set forth in EO S-3-05 (to reduce GHG emissions to 1990 levels by 2020, and to reduce GHG emissions to 80 percent below 1990 levels by 2050).

4.0 REGULATORY FRAMEWORK

International

U.S.-China Climate Agreement

In November 2014, the United States and China made a joint announcement to cooperate on combatting climate change and promoting clean energy. In the U.S., President Obama announced a climate target to reduce greenhouse gas emissions by 26 to 28 percent below 2005 levels by 2025. In China, President Xi Jinping announced a climate target to reduce peak CO₂ emissions by 2030 and to increase the renewable energy share across all sectors to 20 percent by 2030. China will need to build an additional 800 to 1,000 gigawatts of nuclear, wind, solar, and other zero emission generation capacity by 2030 to reach this target. Together, the United States and China have agreed to: expand joint clean energy research and development at the U.S.-China Clean Energy Research Center (CERC), advance major carbon capture, use and storage demonstrations, enhance cooperation on HFCs, launch a climate-smart/low-carbon cities initiative, promote trade in green goods, and demonstrate clean energy on the ground.¹³

United Nations Framework Convention on Climate Change (UNFCCC)

A new international climate change agreement will be adopted at the Paris UNFCCC climate conference in December 2015 and implemented from 2020. The last two climate conferences in Warsaw (2013) and Lima (2014) decided that countries shall submit their proposed emissions reduction targets for the 2015 conference as “intended nationally determined contributions” prior to the Paris conference. The European Union has committed to an economy-wide, domestic greenhouse gas reduction target of 40 percent below 1990 levels by 2030.¹⁴ The United States has set its intended nationally determined contribution to reduce its greenhouse gas emissions by 26 to 28 percent below its 2005 level in 2025 and to make best efforts to reduce its emissions by 28 percent. These targets are set with the goal of limiting global temperature rise to below 2 degrees Celsius and getting to the 80 percent emission reduction by 2050.¹⁵

Federal

Federal Clean Air Act

Congress passed the first major Clean Air Act (CAA) in 1970 (42 USC Sections 7401 et seq.). This Act

¹³ The White House. 11 November 2014. *Fact Sheet: U.S.-China Joint Announcement on Climate Change and Clean Energy Cooperation*. Available at: <https://www.whitehouse.gov/the-press-office/2014/11/11/fact-sheet-us-china-joint-announcement-climate-change-and-clean-energy-c>

¹⁴ European Commission. Accessed 13 October 2015. *The 2015 International Agreement*. Available at: http://ec.europa.eu/clima/policies/international/negotiations/future/index_en.htm

¹⁵ United Nations Framework Convention on Climate Change (UNFCCC). Accessed 14 October 2015. *United States Intended Nationally Determined Contribution*. Available at: <http://www4.unfccc.int/submissions/INDC/Published%20Documents/United%20States%20of%20America/1/U.S.%20Cover%20Note%20INDC%20and%20Accompanying%20Information.pdf>

gives the U.S. Environmental Protection Agency (EPA) broad responsibility for regulating motor vehicle emissions from many sources of air pollution from mobile to stationary sources. Pursuant to the CAA, the EPA is authorized to regulate air emissions from mobile sources like heavy-duty trucks, agricultural and construction equipment, locomotives, lawn and garden equipment, and marine engines; and stationary sources such as power plants, industrial plants, and other facilities. The CAA sets National Ambient Air Quality Standards (NAAQS) for the six most common air pollutants to protect public health and public welfare. These pollutants include particulate matter, ozone, carbon monoxide, sulfur oxides, nitrogen oxides, and lead. For each pollutant, the EPA designates an area as attainment for meeting the standard or nonattainment for not meeting the standard. A maintenance designation entails an area that was previously designated as nonattainment but is currently designated as attainment. The CAA directs states to develop state implementation plans (SIPs), applicable to appropriate industrial sources in the state, in order to achieve these standards.

CAA Section 111

Under Section 111 of the CAA, the EPA issues standards, regulations, and guidelines to reduce carbon pollution on new, modified and existing power plants. Section 111(b) creates a federal program to establish standards for new, modified, and reconstructed stationary sources. Section 111(d) is a state-based program for existing stationary sources where the EPA sets the guidelines and the states implement programs to meet those guidelines.

Clean Power Plan

On August 3, 2015, President Obama and the EPA announced the Clean Power Plan. The Clean Power Plan sets achievable standards to reduce carbon dioxide emissions by 32 percent from 2005 levels by 2030.¹⁶ This Plan establishes final emissions guidelines for states to follow in developing plans to reduce GHG emissions from existing fossil fuel-fired electric generating units (EGUs). Specifically, the EPA is establishing: (1) carbon dioxide emission performance rates representing the best system of emission reduction (BSER) for two subcategories of existing fossil fuel-fired EGUs, fossil fuel-fired electric utility steam generating units and stationary combustion turbines; (2) state-specific CO₂ goals reflecting the CO₂ emission performance rates; and (3) guidelines for the development, submittal and implementation of state plans that establish emission standards or other measures to implement the CO₂ emission performance rates, which may be accomplished by meeting the state goals. This final rule will continue progress already under way in the U.S. to reduce CO₂ emissions from the utility power sector.¹⁷

CAA Section 112(f) and 112(d): National Emission Standards for Hazardous Air Pollutants (NESHAPs)

Section 112 of the CAA addresses emissions of hazardous air pollutants. Prior to 1990, CAA established a risk-based program under which only a few standards were developed. The 1990 CAAA revised Section 112 to first require issuance of technology-based standards for major sources and certain area

¹⁶ The White House. Accessed 2 September 2015. *Climate Change and President Obama's Action Plan*. Available at: <https://www.whitehouse.gov/climate-change>

¹⁷ U.S. Environmental Protection Agency. 3 August 2015. *Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units*. Available at: <http://www2.epa.gov/sites/production/files/2015-08/documents/cpp-final-rule.pdf>

sources. “Major sources” are defined as a stationary source or group of stationary sources that emit or have the potential to emit 10 tons per year or more of a hazardous air pollutant or 25 tons per year or more of a combination of hazardous air pollutants. An “area source” is any stationary source that is not a major source.¹⁸

For major sources, Section 112 requires that EPA establish emission standards that require the maximum degree of reduction in emissions of hazardous air pollutants. These emission standards are commonly referred to as “maximum achievable control technology” or MACT standards. Eight years after the technology-based MACT standards are issued for a source category, EPA is required to review those standards to determine whether any residual risk exists for that source category and, if necessary, revise the standards to address such risk.¹⁹

The Risk and Technology Review (RTR) is a combined effort to evaluate both risk and technology as required by the CAA after the application of MACT standards. Section 112(f) of the CAA requires EPA to complete a report to Congress that includes a discussion of methods the EPA would use to evaluate the risks remaining after the application of MACT standards. These are known as residual risks. EPA published the Residual Risk Report to Congress (PDF) in March 1999. Section 112(f)(2) directs EPA to conduct risk assessments on each source category subject to MACT standards, and to determine if additional standards are needed to reduce residual risks. Section 112(d)(6) of the CAA requires EPA to review and revise the MACT standards, as necessary, taking into account developments in practices, processes and control technologies.²⁰

National Ambient Air Quality Standards (NAAQS)

The federal CAA required the EPA to establish NAAQS. The NAAQS set primary standards and secondary standards for specific air pollutants (**Table 4-1, National Ambient Air Quality Standards**). Primary standards define limits for the intention of protecting public health, which include sensitive populations such as asthmatics, children, and the elderly. Secondary standards define limits to protect public welfare to include protection against decreased visibility, damage to animals, crops, vegetation, and buildings.

¹⁸ U.S. Environmental Protection Agency. 13 March 2015. *Summary of the Clean Air Act*. Available at: <http://www2.epa.gov/laws-regulations/summary-clean-air-act>

¹⁹ U.S. Environmental Protection Agency. 13 March 2015. *Summary of the Clean Air Act*. Available at: <http://www2.epa.gov/laws-regulations/summary-clean-air-act>

²⁰ U.S. Environmental Protection Agency. Accessed 18 August 2015. *Risk and Technology Review*. Available at: <http://www.epa.gov/ttn/atw/rrisk/rtrpg.html>

**TABLE 4-1
NATIONAL AMBIENT AIR QUALITY STANDARDS**

Pollutant		Primary/Secondary	Averaging Time	Level
Carbon monoxide		Primary	8 hours	9 ppm
			1 hour	35 ppm
Lead		Primary and secondary	Rolling 3-month average	0.15 $\mu\text{g}/\text{m}^3$
Nitrogen dioxide		Primary	1 hour	100 ppb
		Primary and secondary	Annual	53 ppb
Ozone		Primary and secondary	8 hours	0.075 ppm
Particulate matter	PM _{2.5}	Primary	Annual	12 $\mu\text{g}/\text{m}^3$
		Secondary	Annual	15 $\mu\text{g}/\text{m}^3$
		Primary and secondary	24 hours	35 $\mu\text{g}/\text{m}^3$
	PM ₁₀	Primary and secondary	24 hours	150 $\mu\text{g}/\text{m}^3$
Sulfur dioxide		Primary	1 hour	75 ppb
		Secondary	3 hours	0.5 ppm

NOTE:

ppm = parts per million; ppb = parts per billion; $\mu\text{g}/\text{m}^3$ = micrograms per cubic meter.

SOURCE:

California Air Resources Board. 4 June 2013. *Ambient Air Quality Standards*. Available at: <http://www.arb.ca.gov/research/aaqs/aaqs2.pdf>

State Implementation Plan (SIP)/ Air Quality Management Plans (AQMPs)

An SIP is required by the EPA to ensure compliance with the NAAQS. States must develop a general plan to maintain air quality in areas of attainment and a specific plan to improve air quality for areas of nonattainment. SIPs are a compilation of new and previously submitted plans, programs (such as monitoring, modeling, permitting, etc.), district rules, state regulations, and federal controls. The SIP verifies that the state has a proper air quality management program that adheres to or strives to reach the most up to date emissions requirements. The 1990 amendments to the federal CAA set deadlines for attainment based on the severity of an area's air pollution problem. In adherence to CAA Section 172, states must adopt additional regulatory programs for nonattainment areas. Particularly in California, the SIP not only complies with NAAQS, but also the more stringent California Ambient Air Quality Standards (CAAQS).

Air Quality Management Plans (AQMPs) are required to ensure compliance with the state and federal requirements. AQMPs contain scientific information and use analytical tools to demonstrate a pathway towards achieving attainment for the criteria air pollutants. Within the SCAG region, five air districts—the Southern California Air Quality Management District (SCAQMD), Mojave Desert Air Quality Management District (MDAQMD), Imperial County Air Pollution Control District (ICAPCD), Antelope Valley Air Quality Management District (AVAQMD), and Ventura County Air Pollution Control District

(VCAPCD)—are responsible for developing the AQMPs.²¹ The approval process begins when the regional air districts submit their AQMPs to the CARB. CARB is the lead agency and responsible agency for submitting the SIP to the EPA. CARB forwards SIP revisions to the EPA for approval and publication in the *Federal Register*. The Code of Federal Regulations Title 40, Chapter I, Part 52, Subpart F, Section 52.220, lists all of the items included in the California SIP.

Transportation Conformity

Transportation conformity is required under federal CAA section 176(c) to ensure that federally supported highway and transit project activities are consistent with (“conform to”) the purpose and requirements of the SIP. Conformity currently applies to areas that are designated nonattainment, and those redesignated to attainment after 1990 (“maintenance areas” with plans developed under CAA section 175A) for the following transportation-related criteria pollutants: ozone, particulate matter (PM_{2.5} and PM₁₀), CO, and NO₂. Conformity to the purpose of the SIP means that transportation activities will not cause new air quality violations, worsen existing violations, or delay timely attainment of the relevant NAAQS. The transportation conformity regulation is found in 40 Code of Federal Regulations (CFR) Part 93. Conformity requires reporting on the timely implementation of Transportation Control Measures (TCMs) in ozone nonattainment areas designated as serious or worse, thus reinforcing the link between AQMP/SIPs and the transportation planning process. TCMs are expected to be given funding priority and to be implemented on schedule, and in the case of any delays, any obstacles to implementation have been or are being overcome. In the SCAG region, there are two areas for which the ozone SIPs contain TCMs: SCAB and the Ventura County portion of SCCAB. (It is noted that the Ventura County SIP does not claim emission reduction credits from TCM projects. They have been included to assist transportation and air quality agencies to identify projects that have the potential of reducing vehicle emissions, vehicle trips, and vehicle miles traveled.)

Federal CAA Rules

The mobile and stationary sources of emissions are subject to different rules and regulations. For the mobile sources, the rules apply to cars, trucks, buses, recreational vehicles, engines, generators, farm and construction machines, lawn and garden equipment, marine engines, and locomotives. In addition, the compositions of fuels used to operate mobile sources are regulated to help reduce harmful emissions. For stationary resources including factories and chemical plants, pollution control equipment are installed to meet specific emission limits set under the CAA. The New Source Review (NSR) and Prevention of Significant Deterioration (PSD) require large industrial operators such as coal-fired power, acid, glass, and cement plants and petroleum refineries to make modifications to existing facilities or install new controls resulted in emissions of pollutants on new facilities to reduce degradation and harm against public health. EPA works with its federal partners through CAA to ensure compliance with rules through active monitoring and to make sure that the regulated community obeys environmental laws/regulations through on-site inspections and record reviews that lead to enforcement in order to meet environmental regulatory requirements.

²¹ Southern California Association of Governments. Accessed 7 April 2015. *Air Quality Management Plans*. Available at: <http://www.scag.ca.gov/programs/Pages/ManagementPlans.aspx>

Mobile Source Air Toxics (MSAT) Modeling and Programs

MOVES2014. In 2010, the EPA released the emission model, the Motor Vehicle Emissions Simulator (MOVES). On February 8, 2011, EPA issued guidance on “Using the MOVES and Emission Factors (EMFAC) Models in NEPA Evaluation” that recommended a two-year grace period be applied to project-level emissions analysis for NEPA purposes. At the end of this grace period, that is, beginning December 20, 2012, lead agencies should use MOVES to conduct emissions analysis for NEPA purposes. To prepare for this transition, FHWA is updating the September 2009 Interim Guidance to incorporate the analysis conducted using MOVES. Based on FHWA's analysis using MOVES2010 diesel particulate matter (diesel PM) has become the dominant MSAT of concern. MOVES2014, the latest version of MOVES, was released in October 2014, and incorporates the Tier 3 Rule and other EPA rulemakings since the last MOVES release.

The U.S. EPA has adopted several mobile source emission control programs such as:²²

Control of Hazardous Air Pollutants from Mobile Sources. In February 2007, EPA finalized this rule to reduce hazardous air pollutants from mobile sources. The rule limits the benzene content of gasoline and reduces toxic emissions from passenger vehicles and gas cans. EPA estimates that in 2030 this rule would reduce total emissions of mobile source air toxics by 330,000 tons and VOC emissions (precursors to ozone and PM_{2.5}) by over 1 million tons.

Heavy-Duty Onboard Diagnostic Rule (74 FR 8310). In February 2009, the EPA published a final rule, requiring that these advanced emissions control systems be monitored for malfunctions via an onboard diagnostic system (OBD), similar to those systems that have been required on passenger cars since the mid-1990s. This final rule will require manufacturers to install OBD systems that monitor the functioning of emission control components and alert the vehicle operator to any detected need for emission related repair.

Small SI and Marine SI Engine Rule (73 FR 25098). Published October 2008, these exhaust emission standards applied starting in 2010 for new marine spark-ignition (SI) engines, including first-time EPA standards for sterndrive and inboard engines. The exhaust emission standards applied starting in 2011 and 2012 for different sizes of new land based, spark-ignition engines at or below 19 kilowatts (kW). These small engines are used primarily in lawn and garden applications. Estimated annual nationwide reductions are anticipated to be 604,000 tons of volatile organic hydrocarbon emissions, 132,200 tons of NO_x emissions, and 5,500 tons of directly emitted particulate matter (PM_{2.5}) emissions.

Locomotive and Commercial Marine Rule (66 FR 5002). Published May 2008, the controls apply to all types of locomotives, including line-haul, switch, and passenger, and all types of marine diesel engines below 30 liters per cylinder displacement, including commercial and recreational, propulsion and auxiliary. The near-term program, which started in 2009, includes new emission limits for existing locomotives and marine diesel engines that apply when they are remanufactured, and take effect as soon as certified remanufacture systems are available. The long-term emissions standards for newly-built locomotives and marine diesel engines are based on the application of high-efficiency catalytic after-treatment technology. These standards take effect in 2015 for locomotives and in 2014 for marine

²² U.S. Environmental Protection Agency. 26 June 2014. *Mobile Source Air Toxics*. Available at: <http://www.epa.gov/otaq/toxics.htm>

diesel engines.

Clean Air Nonroad Diesel Rule (65 FR 6698). Published June 2004, this comprehensive national program regulates nonroad diesel engines and diesel fuel as a system. New engine standards took effect in the 2008 model year, phasing in over a number of years. These standards are based on the use of advanced exhaust emission control devices.

Heavy-duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements (66 FR 5002). Published January 2001, the EPA established a comprehensive national control program to regulate the heavy-duty vehicle and its fuel as a single system. As part of this program, new emission standards took effect in model year 2007, and apply to heavy-duty highway engines and vehicles. These standards are based on the use of high-efficiency catalytic exhaust emission control devices or comparably effective advanced technologies.

New Source Performance Standards (NSPS) for Stationary Engines. Nonroad diesel engines are used in excavators and other construction equipment, farm tractors and other agricultural equipment, heavy forklifts, airport ground service equipment, and utility equipment such as generators, pumps, and compressors.²³ The first set of emission regulations, known as Tier 1, was published in 1996. With each successive tier of regulations, the permitted levels of nitrogen oxides and particulate matter, the two main pollutants from diesel engines, have gone down significantly. Tier 4 is a more than 95 percent reduction in tailpipe emission levels compared with nonregulated amounts. Tier 4 final requirements, which require manufactures to produce new engines with advanced emission control technologies, will be phased-in for all engines by 2017.²⁴

Energy Independence and Security Act of 2007

The Energy Independence and Security Act of 2007 (42 USC 17001) includes several key provisions that will increase energy efficiency and the availability of renewable energy, which will reduce greenhouse gas emissions as a result. First, the Act sets a Renewable Fuel Standard that requires fuel producers to use at least 36 billion gallons of biofuel by 2022. Second, it increased Corporate Average Fuel Economy (CAFE) Standards to require a minimum average fuel economy of 35 miles per gallon for the combined fleet of cars and light trucks by 2020. Third, the Act includes a variety of new standards for lighting and for residential and commercial appliance equipment. The equipment includes residential refrigerators, freezers, refrigerator-freezers, metal halide lamps, and commercial walk-in coolers and freezers.²⁵

Greenhouse Gas Reporting Program (GHGRP)

The EPA adopted the GHGRP (40 CFR Part 98), a mandatory GHG reporting rule in September 2009. The rule requires suppliers of fossil fuels or entities that emit industrial greenhouse gases, manufacturers of

²³ U.S. Environmental Protection Agency. 11 August 2014. *Nonroad Diesel Engines*. Available at: <http://www.epa.gov/otaq/nonroad-diesel.htm>

²⁴ Natekar, Aniruddha, and Matthew Menzel. Accessed 8 September 2015. *The Impact of Tier 4 Emission Regulations on the Power Generation Industry*. Available at: <https://www.cumminspower.com/www/literature/technicalpapers/PT-9010-Tier4EmissionRegImpact.pdf>

²⁵ U.S. Environmental Protection Agency. Accessed 14 October 2015. *Summary of the Energy Independence and Security Act*. Available at: <http://www2.epa.gov/laws-regulations/summary-energy-independence-and-security-act>

vehicles and engines, and facilities that emit 25,000 metric tons or more per year of GHG emissions to submit annual reports to the EPA beginning in 2011 (covering the 2010 calendar year emission). Vehicle and engine manufacturers were required to begin reporting GHG emissions for model year 2011. In January 2012, EPA made the first year of GHGRP reporting data available to the public through its interactive Data Publication Tool, called Facility Level Information on Greenhouse gases Tool (FLIGHT), EPA will continue to update the tool and release additional data each reporting year.²⁶

National Program to Improve Fuel Economy and Reduce GHGs

On September 15, 2009, the National Highway Traffic Safety Administration (NHTSA) and EPA announced a proposed joint rule that would explicitly tie fuel economy to GHG emissions reductions requirements. The proposed new CAFE Standards would cover automobiles for model years 2012 through 2016, and would require passenger cars and light trucks to meet a combined, per mile, carbon dioxide emissions level. It is estimated that by 2016, this GHG emissions limit could equate to an overall light-duty vehicle fleet average fuel economy of as much as 35.5 miles per gallon. The proposed standards would require model year 2016 vehicles to meet an estimated combined average emission level of 250 grams of carbon dioxide per mile under EPA's GHG program. On November 16, 2011, EPA and NHTSA issued a joint proposal to extend the national program of harmonized GHG and fuel economy standards to model year 2017 through 2025 passenger vehicles. In August 2012, President Obama finalized standards that will increase fuel economy to the equivalent of 54.5 mpg for cars and light-duty trucks by Model Year 2025.

Heavy-Duty National Program

The Heavy-Duty National Program was adopted on August 9, 2011, to establish the first fuel efficiency requirements for medium- and heavy-duty vehicles beginning with the model year 2014.

Proposed Rulemaking: Phase 2 Greenhouse Gas Emissions Standards and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles

As of June 2015, the EPA and the Department of Transportation's National Highway Traffic Safety Administration (NHTSA) are jointly proposing a national program that would establish the next phase of GHG emissions and fuel efficiency standards for medium- and heavy-duty vehicles. The Phase 2 program significantly reduces carbon emissions and improves the fuel efficiency of heavy-duty vehicles, helping to address the challenges of global climate change and energy security. Phase 2 would save the heavy duty vehicle industry billions of dollars' worth of fuel, reduce the cost of transporting goods, cut fuel consumption, and reduce GHG emissions by 1 billion metric tons. Fuel consumption of tractor trailers alone could decrease by 24 percent. The proposed Phase 2 standards, which begin in the model year 2021 (model year 2018 for trailers and 2021 for NHTSA's trailer standards) and culminate in standards for model year 2027, are the product of a comprehensive assessment of existing and advanced technologies and extensive stakeholder outreach.²⁷

²⁶ U.S. Environmental Protection Agency. Accessed 14 October 2015. *Greenhouse Gas Reporting Program*. Available at: <http://www2.epa.gov/ghgreporting>

²⁷ U.S. Environmental Protection Agency. June 2015. *Cutting Carbon Pollution, Improving Fuel Efficiency, Saving Money, and Supporting Innovation for Trucks*. Available at: <http://www3.epa.gov/otaq/climate/documents/420f15900.pdf>

President Obama's Climate Action Plan

On June 25, 2013, President Obama issued a Climate Action Plan. The three main goals are to cut carbon pollution, prepare the U.S. for the impacts of climate change, and lead international efforts to combat global climate change and prepare for its impacts. President Obama plans to cut carbon pollution by directing the EPA to complete carbon pollution standards in the power sector. This will reduce emissions from power plants and encourage renewable energy development. Other strategies to combat climate change are increasing energy efficiency, stricter vehicle and fuel standards, preserving forests as climate sinks, reducing energy waste, combating short-lived climate pollutants, mobilizing climate finance, and leading international negotiations on climate change.²⁸

Federal Highway Administration's Climate Change and Extreme Weather Vulnerability Assessment Framework

Published in December 2012, the Climate Change and Extreme Weather Vulnerability Assessment Framework is a guidance document for transportation agencies to assess their vulnerability to climate change and extreme weather events. Objectives for a vulnerability assessment may include siting new assets in areas less vulnerable to climate change, educating staff regarding overall climate risks to the agency's transportation system, or informing the development of adaptation strategies. Based on these objectives, an agency can then select and characterize relevant assets and identify climate variables for study. The vulnerability assessment is an iterative process; information gathered on assets may inform climate information needs and vice versa.²⁹

Executive Order 13693, Planning for Federal Sustainability in the Next Decade

Published June 10, 2015, EO 13693, *Planning for Federal Sustainability in the Next Decade*, revokes multiple prior EOs and memorandum including EO 13423 and EO 13514. The new EO outlines forward-looking goals for federal agencies in the area of energy, climate change, water use, vehicle fleets, construction, and acquisition. The goal is to maintain federal leadership in sustainability and GHG emission reductions. Federal agencies shall, where life-cycle cost-effective, beginning in FY 2016:³⁰

- Reduce agency building energy intensity as measured in Btu/ft² by 2.5 percent annually through FY 2025.
- Improve data center energy efficiency at agency buildings.
- Ensure a minimum percentage of total building electric and thermal energy shall be from clean energy sources.

²⁸ The White House. June 2013. *The President's Climate Action Plan*. Available at: <https://www.whitehouse.gov/sites/default/files/image/president27sclimateactionplan.pdf>

²⁹ Federal Highway Administration. December 2012. *Climate Change and Extreme Weather Vulnerability Assessment Framework*. Available at: http://www.fhwa.dot.gov/environment/climate_change/adaptation/publications_and_tools/vulnerability_assessment_framework/fhwahep13005.pdf

³⁰ Fed Center. 10 July 2015. *EO 13693*. Available at: <https://www.fedcenter.gov/programs/eo13693/>

- Improve agency water use efficiency and management (including stormwater management).
- Improve agency fleet and vehicle efficiency and management by achieving minimum percentage GHG emission reductions.

State

California Clean Air Act of 1988

The California CAA of 1988 (Chapter 1568, Statutes of 1988) requires all air pollution control districts in the state to aim to achieve and maintain state ambient air quality standards for ozone, carbon monoxide, and nitrogen dioxide by the earliest practicable date and to develop plans and regulations specifying how the districts will meet this goal. There are no planning requirements for the state PM₁₀ standard. The CARB, which became part of the California Environmental Protection Agency (Cal/EPA) in 1991, is responsible for meeting state requirements of the federal CAA, administering the California CAA, and establishing the California Ambient Air Quality Standards (CAAQS). The California CAA, amended in 1992, requires all AQMDs in the state to achieve and maintain the CAAQS. The CAAQS are generally stricter than national standards for the same pollutants, but there is no penalty for nonattainment. California has also established state standards for sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particles, for which there are no national standards.

California Ambient Air Quality Standards (CAAQS)

The federal CAA permits states to adopt additional or more protective air quality standards if needed. California has set standards for certain pollutants, such as particulate matter and ozone, which are more protective of public health than respective federal standards (**Table 4-2, California Ambient Air Quality Standards**). California has also set standards for some pollutants that are not addressed by federal standards.

**TABLE 4-2
CALIFORNIA AMBIENT AIR QUALITY STANDARDS**

Pollutant		Averaging Time	Level
Carbon monoxide		8 hours	9 ppm
		1 hour	20 ppm
Lead		30-day average	1.5 $\mu\text{g}/\text{m}^3$
Nitrogen dioxide		1 hour	0.18 ppm
		Annual	0.03 ppm
Ozone		8 hours	0.07 ppm
		1 hour	0.09 ppm
Particulate matter	PM _{2.5}	Annual	12 $\mu\text{g}/\text{m}^3$
	PM ₁₀	24 hours	50 $\mu\text{g}/\text{m}^3$
		Annual	20 $\mu\text{g}/\text{m}^3$
Sulfur dioxide		1 hour	0.25 ppm
		24 hours	0.04 ppm
Sulfates		24 hours	25 $\mu\text{g}/\text{m}^3$
Hydrogen sulfide		1 hour	0.03 ppm
Vinyl chloride		24 hours	0.01 ppm
Visibility Reducing Particles		Extinction coefficient of 0.23 per kilometer – visibility of 10 miles or more due to particles when relative humidity is less than 70 percent ³¹	

NOTE:

ppm = parts per million; $\mu\text{g}/\text{m}^3$ = micrograms per cubic meter.

SOURCE:

California Air Resources Board. 4 June 2013. *Ambient Air Quality Standards*. Available at: <http://www.arb.ca.gov/research/aaqs/aaqs2.pdf>

Toxic Air Contaminant Identification and Control Act

The Toxic Air Contaminant Identification and Control Act (AB 1807, Chapter 1047, Statutes of 1983) created the California Air Toxics Program in 1983. It established a two-step process of risk identification and risk management to address potential health effects associated with public exposure to toxic substances in the air. In the risk identification step, CARB and the OEHHA determine if a substance should be formally identified, or “listed,” as a TAC in California. Since inception of the program, a number of such substances have been identified and listed. In 1993, legislative amendments were enacted for the program to identify the 189 federal hazardous air pollutants (HAPs) as TACs.

³¹ South Coast Air Quality Management District. February 2013. *Final 2012 AQMP*. Available at: <http://www.aqmd.gov/home/library/clean-air-plans/air-quality-mgt-plan/final-2012-air-quality-management-plan>

In the risk management step, CARB reviews emission sources of an identified TAC to determine whether regulatory action is needed to reduce the risk. Based on results of that review, CARB has promulgated a number of airborne toxic control measures (ATCMs), both for mobile and stationary sources. In 2004, CARB adopted an ATCM to limit heavy-duty diesel motor vehicle idling in order to reduce public exposure to diesel PM and other TACs. The measure applies to diesel-fueled commercial vehicles with gross vehicle weight ratings greater than 10,000 pounds that are licensed to operate on highways, regardless of where they are registered. This measure does not allow diesel-fueled commercial vehicles to idle for more than 5 minutes at any given time. These diesel-related measures are critical in reducing the statewide cancer risk and creating healthier communities.

CARB Air Toxics “Hot Spots” Information and Assessment Act of 1987

The California Air Toxics Program is supplemented by the Air Toxics “Hot Spots” program, which became law (AB 2588, Statutes of 1987) in 1987. In 1992, the AB 2588 program was amended by SB 1731 to require facilities that pose a significant health risk to the community to perform a risk reduction audit and reduce their emissions through implementation of a risk management plan. Under this program, which is required under the Air Toxics “Hot Spots” Information and Assessment Act (Section 44363 of the California Health and Safety Code), facilities are required to report their air toxics emissions, assess health risks, and notify nearby residents and workers of significant risks when present. In March 2015, the OEHHA adopted “The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments” in accordance with the Health and Safety Code, Section 44300. The Final Guidance Manual incorporates the scientific basis from three earlier developed Technical Support Documents to assess risk from exposure to facility emissions. The 2015 OEHHA Final Guidance has key changes including greater age sensitivity in particular for children, decreased exposure durations, and higher breathing rate profiles. Because cancer risk could be up to three times greater using this new guidance, it may result in greater mitigation requirements, more agency backlog, and increased difficulty in getting air permits. Regardless of the change in calculation methodology, actual emissions and cancer risk within SCAB has declined by more than 50 percent since 2005.

The CARB provides a computer program, the Hot Spots Analysis and Reporting Program (HARP), to assist in a coherent and consistent preparation of a Health Risk Assessment (HRA). HARP2, an update to HARP, was released in March 2015. HARP2 has a more refined risk characterization in HRA and CEQA documents and incorporates the 2015 OEHHA Final Guidance. As of June 2015, HARP2 is not required by OEHHA on the state level, but it is required by SCAQMD.³²

Multiple Air Toxics Exposure Study (MATES-IV)

To date, the most comprehensive study of air toxics in the South Coast Air Basin (SCAB) is the Multiple Air Toxics Exposure Study (MATES-IV), conducted by Southern California Air Quality Management District (SCAQMD) in 2015. MATES combines monitoring of ambient air toxics, emissions inventories, and computer modeling to estimate the cancer risk from air pollution. The monitoring program measured over 30 air pollutants, including both gases and particulates. SCAQMD’s MATES IV found that the average cancer risk from air pollution across the region declined from 1,194 in 1 million during MATES III in 2005 to 418 in 1 million in 2012–2013 using similar methods of analysis. The risk reduction

³² South Coast Air Quality Management District. 5 June 2015. *Risk Assessment Procedures for Rules 1401, 1401.1 and 212*. Available at: <http://www.aqmd.gov/docs/default-source/planning/risk-assessment/riskassprocjune15.pdf?sfvrsn=2>

follows a trend of declining toxic emissions in the region since the first MATES study was conducted in 1987. MATES IV found that mobile sources are responsible for 90 percent of the risk.

Clean Car Standards (Assembly Bill 1493)

On September 24, 2009, CARB adopted AB 1493, which makes amendments to the Clean Car Standards (Chapter 200, Statutes of 2002), also known as the “Pavley” regulations that require reductions in GHG emissions in new passenger vehicles from 2009 through 2016. These amendments are part of California’s commitment toward a nation-wide program to reduce new passenger vehicle GHGs from 2012 through 2016. The Clean Car Standards required CARB to develop and adopt standards for vehicle manufacturers to reduce GHG emissions coming from passenger vehicles and light-duty trucks at a “maximum feasible and cost effective reduction” by January 1, 2005. Pavley I took effect for model years starting in 2009 to 2016; and Pavley II, which is now referred to as “LEV (Low Emission Vehicle) III GHG,” will cover 2017 to 2025. Fleet average emission standards would reach 22 percent reduction by 2012 and 30 percent by 2016.³³

As of January 2012, CARB adopted the Advanced Clean Cars program to extend AB 1493 through model years 2017 to 2025. This program will promote all types of clean fuel technologies such as plug-in hybrids, battery electric vehicles, CNG vehicles, and hydrogen powered vehicles while reducing smog and saving consumers’ money in fuel costs. Fuel savings may be as up to 25 percent by 2025.³⁴

Global Warming Solutions Act of 2006 (Núñez)

In September 2006, Governor Arnold Schwarzenegger signed the California Global Warming Solutions Act of 2006, also known as AB 32 (Núñez, Chapter 488, Statutes of 2006), into law. AB 32 focuses on reducing GHG emissions in California and requires the CARB to adopt rules and regulations that would achieve GHG emissions equivalent to statewide levels in 1990 by 2020. To achieve this goal, AB 32 mandates that the CARB establish a quantified emissions cap; institute a schedule to meet the cap; implement regulations to reduce statewide GHG emissions from stationary sources; and develop tracking, reporting, and enforcement mechanisms to ensure that reductions are achieved. Because the intent of AB 32 is to limit 2020 emissions to the equivalent of 1990, it is expected that the regulations would affect many existing sources of GHG emissions and not just new general development projects. SB 1368, a companion bill to AB 32, requires the California Public Utilities Commission and the California Energy Commission to establish GHG emission performance standards for the generation of electricity. These standards will also apply to power that is generated outside of California and imported into the state.

AB 32 charges CARB with the responsibility to monitor and regulate sources of GHG emissions in order to reduce those emissions. On June 1, 2007, CARB adopted three discrete early action measures to reduce GHG emissions. These measures involved complying with a low carbon fuel standard, reducing refrigerant loss from motor vehicle air conditioning maintenance, and increasing methane capture from

³³ California Air Resources Board. 6 May 2013. *Clean Car Standards – Pavley, Assembly Bill 1493*. Available at: <http://www.arb.ca.gov/cc/ccms/ccms.htm>

³⁴ California Air Resources Board. Accessed 19 July 2015. *California’s Advanced Clean Car Program*. Available at: http://www.arb.ca.gov/msprog/consumer_info/advanced_clean_cars/consumer_acc.htm

landfills.³⁵ On October 25, 2007, CARB tripled the set of previously approved early action measures. The approved measures include improving truck efficiency (i.e., reducing aerodynamic drag), electrifying port equipment, reducing PFCs from the semiconductor industry, reducing propellants in consumer products, promoting proper tire inflation in vehicles, and reducing sulfur hexafluoride emission from the non-electricity sector. CARB has determined that the total statewide aggregated GHG 1990 emissions level and 2020 emissions limit is 427 MMTCO_{2e}. The 2020 target reductions are currently estimated to be 174 MMTCO_{2e}.

The CARB AB 32 Scoping Plan contains the main strategies to achieve the 2020 emissions cap. The Scoping Plan was developed by the CARB with input from the Climate Action Team (CAT) and proposes a comprehensive set of actions designed to reduce overall carbon emissions in California, improve the environment, and reduce oil dependency. The GHG reduction strategies contained in the Scoping Plan include direct regulations, alternative compliance mechanisms, monetary and nonmonetary incentives, voluntary actions, and market-based mechanisms such as a cap-and-trade system. Key approaches for reducing GHG emissions to 1990 levels by 2020 include:

- Expanding and strengthening existing energy efficiency programs as well as building and appliance standards;
- Achieving a statewide renewable electricity standard 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 GHG emissions for regions throughout California, and pursuing policies and incentives to achieve those targets; and
- Adopting and implementing measures to reduce transportation sector emissions, including California's.

CARB has also developed the GHG mandatory reporting regulation, which required reporting beginning on January 1, 2008, pursuant to requirements of AB 32. The regulations require reporting for certain types of facilities that make up the bulk of the stationary source emissions in California. The regulation language identifies major facilities as those that generate more than 25,000 MTCO₂ per year. Cement plants, oil refineries, electric generating facilities/providers, co-generation facilities, and hydrogen plants and other stationary combustion sources that emit more than 25,000 MTCO₂ per year make up 94 percent of the point source CO₂ emissions in California.

Executive Order S-3-05 GHG Reduction Targets (2005)

Pursuant to AB 32, on June 1, 2005, EO S-3-05 set the following GHG emission reduction targets: by 2010, reduce GHG emissions to 2000 levels; by 2020, reduce GHG emissions to 1990 levels; and by 2050, reduce GHG emissions to 80 percent below 1990 levels. The EO establishes state GHG emission targets of 1990 levels by 2020 (the same as AB 32) and 80 percent below 1990 levels by 2050.³⁶ It calls for the

³⁵ California Air Resources Board. 20 April 2007. *Proposed Early Action Measures to Mitigate Climate Change in California*.

³⁶ CEQA review related to the EO is currently being considered before the California Supreme Court in *Cleveland National Forest Association et al v. San Diego Association of Governments*, 231 Cal.App. 4th 1056. Considering this pending litigation, and to fulfill the related CEQA requirements for the PEIR to serve as a full-disclosure document, EO S-03-05 and B-30-15 have been included in this regulatory framework, and the report addresses consistency of the RTP/SCS in relation to the GHG reduction targets set forth under such executive orders.

Secretary of Cal/EPA to be responsible for coordination of state agencies and progress reporting. A recent California Energy Commission report concludes, however, that the primary strategies to achieve this target should be major “decarbonization” of electricity supplies and fuels, and major improvements in energy efficiency.³⁷

In response to the EO, the Secretary of the Cal/EPA created the CAT. California’s CAT originated as a coordinating council organized by the Secretary for Environmental Protection. It included the Secretaries of the Natural Resources Agency and the Department of Food and Agriculture and the Chairs of the CARB, California Energy Commission, and Public Utilities Commission. The original council was an informal collaboration between the agencies to develop potential mechanisms for reductions in GHG emissions in the state. The council was given formal recognition in EO S-3-05 and became the CAT.

The original mandate for the CAT was to develop proposed measures to meet the emission reduction targets set forth in the executive order. The CAT has since expanded and currently has members from 18 state agencies and departments. The CAT also has 10 working groups that coordinate policies among their members. The working groups and their major areas of focus are:

- Agriculture: Focusing on opportunities for agriculture to reduce GHG emissions through efficiency improvements and alternative energy projects, while adapting agricultural systems to climate change.
- Biodiversity: Designing policies to protect species and natural habitats from the effects of climate change.
- Energy: Reducing GHG emissions through extensive energy efficiency policies and renewable energy generation.
- Forestry: Coupling GHG mitigation efforts with climate change adaptation related to forest preservation and resilience, waste to energy programs and forest offset protocols.
- Land Use and Infrastructure: Linking land use and infrastructure planning to efforts to reduce GHG from vehicles and adaptation to changing climatic conditions.
- Oceans and Coastal: Evaluating the effects sea level rise and changes in coastal storm patterns on human and natural systems in California.
- Public Health: Evaluating the effects of GHG mitigation policies on public health and adapting public health systems to cope with changing climatic conditions.
- Research: Coordinating research concerning impacts of and responses to climate change in California.
- State Government: Evaluating and implementing strategies to reduce GHG emissions resulting from state government operations.
- Water: Reducing GHG impacts associated with the state’s water systems and exploring strategies to protect water distribution and flood protection infrastructure.

The CAT is responsible for preparing reports that summarize the state’s progress in reducing GHG emissions. The most recent CAT Report was published in December 2010. The CAT Report discusses mitigation and adaptation strategies, state research programs, policy development, and future efforts.

³⁷ California Energy Commission. May 2011. *California’s Energy Future – The View to 2050*.

First Update to the Climate Change Scoping Plan (May 2014)

This First Update to California's Climate Change Scoping Plan (Update) was developed by the CARB in collaboration with the Climate Action Team and reflects the input and expertise of a range of state and local government agencies. The Update reflects public input and recommendations from business, environmental, environmental justice, and community-based organizations provided in response to the release of prior drafts of the Update, a Discussion Draft in October 2013 and a draft Proposed Update in February 2014.

This report highlights California's success to date in reducing its GHG emissions and lays the foundation for establishing a broad framework for continued emission reductions beyond 2020, on the path to 80 percent below 1990 levels by 2050. The First Update includes recommendations for establishing a mid-term emissions limit that aligns with the State's long-term goal of an emissions limit 80 percent below 1990 levels by 2050 and sector-specific discussions covering issues, technologies, needs, and ongoing State activities to significantly reduce emissions throughout California's economy through 2050. The focus areas include energy, transportation, agriculture, water, waste management, and natural and working lands.³⁸ With respect to the transportation sector, California has outlined several steps in the State's ZEV Action Plan to further support the market and accelerate its growth. Committed implementation of the actions described in the plan will help meet Governor Brown's 2012 Executive Order (EO) B-16-2012, which—in addition to establishing a more specific 2050 GHG target for the transportation sector of 80 percent from 1990 levels—called for 1.5 million ZEVs on California's roadways by 2025.

Achieving such an aggressive 2050 target will require innovation and unprecedented advancements in energy demand and supply.³⁹ Emissions from 2020 to 2050 will have to decline at more than twice the rate of that which is needed to reach the 2020 statewide emissions limit. In addition to our climate objectives, California also must meet federal clean air standards. Emissions of criteria air pollutants, including ozone precursors (primarily oxides of nitrogen, or NOx) and particulate matter, must be reduced by, a currently estimated, 90 percent by 2032 to comply with federal air quality standards. The scope and scale of emission reductions necessary to improve air quality is similar to that needed to meet long-term climate targets. Achieving both objectives will align programs and investments to leverage limited resources for maximum benefit.

CEQA: Greenhouse Gas Emissions (Senate Bill 97, Chapter 185, Statutes of 2007, Section 21083.05 of the PRC)

On August 24, 2007, the governor approved SB 97 required the Office of Planning and Research (OPR) to develop, and the Natural Resources Agency to adopt, amendments to the CEQA Guidelines addressing the analysis and mitigation of greenhouse gas emissions. Those CEQA Guidelines amendments clarified several points, including the following:

³⁸ California Air Resources Board. May 2014. *First Update to the Climate Change Scoping Plan*. Available at: http://www.arb.ca.gov/cc/scopingplan/2013_update/first_update_climate_change_scoping_plan.pdf

³⁹ California Air Resources Board. May 2014. *First Update to the Climate Change Scoping Plan*. Available at: http://www.arb.ca.gov/cc/scopingplan/2013_update/first_update_climate_change_scoping_plan.pdf

- Lead agencies must analyze the greenhouse gas emissions of proposed projects, and must reach a conclusion regarding the significance of those emissions (see CEQA Guidelines § 15064.4).
- When a project's greenhouse gas emissions may be significant, lead agencies must consider a range of potential mitigation measures to reduce those emissions (see CEQA Guidelines § 15126.4(c)).
- Lead agencies must analyze potentially significant impacts associated with placing projects in hazardous locations, including locations potentially affected by climate change (see CEQA Guidelines § 15126.2(a)).
- Lead agencies may significantly streamline the analysis of greenhouse gases on a project level by using a programmatic greenhouse gas emissions reduction plan meeting certain criteria (see CEQA Guidelines § 15183.5(b)).
- CEQA mandates analysis of a proposed project's potential energy use (including transportation-related energy), sources of energy supply, and ways to reduce energy demand, including through the use of efficient transportation alternatives (see CEQA Guidelines, Appendix F).

As part of the administrative rulemaking process, the Natural Resources Agency developed a Final Statement of Reasons explaining the legal and factual bases, intent, and purpose of the CEQA Guidelines amendments. Other rulemaking documents can be accessed on the Natural Resources Agency's rulemaking website. The amendments to the CEQA Guidelines implementing SB 97 became effective on March 18, 2010.⁴⁰

Sustainable Communities and Climate Protection Act of 2008 (SB 375, Chapter 728, Statutes of 2008)

The Sustainable Communities and Climate Protection Act of 2008 (SB 375, Chapter 728, Statutes of 2008), adopted September 30, 2008, provides an additional means for achieving AB 32 GHG emissions reduction goals. Building on AB 32, SB 375 seeks to coordinate land use decisions made at the local (city and county) level with regional transportation planning. By coordinating these efforts, it is envisioned that vehicle congestion and travel can be reduced resulting in a corresponding reduction in emissions. SB 375 directed CARB to set regional targets to reduce emissions; regional plans are required to identify how they will meet these targets.

SB 375 has three major components:

- Using the regional transportation planning process to achieve reductions in emissions consistent with AB 32's goals;
- Offering CEQA incentives to encourage projects that are consistent with a regional plan that achieves emissions reductions; and
- Coordinating the Regional Housing Needs Allocation Assessment (RHNA) process with the regional transportation process while maintaining local authority over land use decisions.

⁴⁰ Governor's Office of Planning and Research. 2011. *CEQA and Climate Change*. Available at: http://www.opr.ca.gov/s_ceqaandclimatechange.php

An SCS is a required component of the RTP. The SCS is an emissions reduction strategy for the region which, in combination with transportation policies and programs, strives to reduce emissions and, if feasible, helps meet CARB's targets for the region. An alternative planning strategy (APS) must be prepared if the SCS is unable to reduce emissions and achieve the emissions reduction targets established by CARB. EO B-16-2012, described further below, can help achieve these emissions reduction targets by encouraging zero emission vehicles (ZEVs) and related infrastructure.

Certain transportation planning and programming activities must be consistent with the SCS; however, SB 375 expressly provides that the SCS does not regulate the use of land, and further provides that local land use plans and policies (e.g., general plan) are not required to be consistent with either the RTP or SCS. CARB set the following reduction targets for SCAG: reduce per capita emissions 8 percent below 2005 levels by 2020 and 13 percent below 2005 levels by 2035.

Contractual Assessments: Energy Efficient Improvements

Contractual Assessments: Energy Efficient Improvements (AB 811, Chapter 159, Statutes of 2008) authorizes California cities and counties to designate districts within which willing property owners may enter into contractual assessments to finance the installation of renewable energy generation and energy efficiency improvements that are permanently fixed to the property.

Renewable Energy: California Renewables Portfolio Standard Program

Established in 2002 under SB 1078, accelerated in 2006 under SB 107, and expanded in 2011 under SB 2, California's Renewables Portfolios Standard (RPS) is one of the most ambitious renewable energy standards in the country. The RPS program requires investor-owned utilities (IOUs), electric service providers, and community choice aggregators to increase procurement from eligible renewable energy resources to 33 percent of total procurement by 2020. On September 12, 2002, then-Governor Gray Davis signed SB 1078. SB 1078 (Chapter 516, Statutes of 2002) requires retail sellers of electricity, including investor-owned utilities and community choice aggregators, to provide at least 20 percent of their supply from renewable sources by 2017. SB 107 (Chapter 464, Statutes of 2006) changed the target date to 2010.

In November 2008, Governor Arnold Schwarzenegger signed EO S-14-08, which expands the state's RPS to 33 percent renewable power by 2020. In September 2009, Governor Schwarzenegger continued California's commitment to the RPS by signing EO S-21-09, which directs the CARB under its AB 32 authority to enact regulations to help the state meet its RPS goal of 33 percent renewable energy by 2020.

The 33 percent by 2020 goal was codified in April 2011 with SB X1-2, which was signed by Governor Edmund G. Brown, Jr. This new RPS preempts the CARB 33 percent Renewable Electricity Standard and applies to all electricity retailers in the state, including publicly owned utilities (POUs), IOUs, electricity service providers, and community choice aggregators. All of these entities must adopt the new RPS goals of 20 percent of retail sales from renewables by the end of 2013 and 25 percent by the end of 2016, with the 33 percent requirement being met by the end of 2020.

Clean Energy and Pollution Reduction Act of 2015

The Clean Energy and Pollution Reduction Act of 2015 (SB 350, Chapter 547, Statutes of 2015) was approved by Governor Brown on October 7, 2015. SB 350 will (1) increase the standards of the California RPS program by requiring that the amount of electricity generated and sold to retail customers per year from eligible renewable energy resources be increased to 50 percent by December 31, 2030; (2) require the State Energy Resources Conservation and Development Commission to establish annual targets for statewide energy efficiency savings and demand reduction that will achieve a cumulative doubling of statewide energy efficiency savings in electricity and natural gas final end uses of retail customers by January 1, 2030; (3) provide for the evolution of the Independent System Operator (ISO) into a regional organization; and (4) require the state to reimburse local agencies and school districts for certain costs mandated by the state through procedures established by statutory provisions. Among other objectives, the Legislature intends to double the energy efficiency savings in electricity and natural gas final end uses of retail customers through energy efficiency and conservation.

Greenhouse Gases: Emissions Reduction

In June 2014, SB 862 (Chapter 36, Statutes of 2014) established long-term funding programs from the Cap and Trade program for transit, sustainable communities and affordable housing, and high speed rail. SB 862 allocates 60 percent of ongoing Cap and Trade revenues, beginning in 2015–2016, to these programs. The remaining 40 percent is to be determined by future legislatures.⁴¹ A minimum of 25 percent of Cap and Trade dollars must go to projects that provide benefits to disadvantaged communities, and a minimum of 10 percent must go to projects located within those disadvantaged communities. In addition, this bill established the CalRecycle Greenhouse Gas Reduction Revolving Loan Program and Fund.

Tire Pressure Regulation of 2010 (17 CCR Section 95550)

CARB promulgated this regulation to reduce GHG emissions from vehicles operating with under inflated tires by inflating them to the recommended tire pressure rating. Automotive service providers must meet the following requirements by September 1, 2010: check and inflate each vehicle's tires to the recommended tire pressure rating, indicate on the vehicle service invoice that a tire inflation service was completed and the tire pressure measurements after the services were performed, and perform the tire pressure service using a tire pressure gauge with a total permissible error no greater than ± 2 pounds per square inch (psi). Vehicle service invoices must be kept for a minimum of three years.⁴²

California Cap and Trade Program

Authorized by the California Global Warming Solutions Act of 2006 (AB 32), the cap-and-trade program is one of several strategies that California uses to reduce greenhouse gas emissions. CARB adopted the California Cap and Trade Program final regulations on October 20, 2011, and adopted amended

⁴¹ California Transit Association. 17 June 2014. *Overview of 2014 Cap and Trade Legislation and Opportunities for Public Transit: Implementing 2014-15 Appropriations and a Long-Term Cap And Trade Funding Program*. Available at: <http://www.calcog.org/DocumentCenter/View/313>

⁴² California Air Resources Board. Accessed 19 July 2015. *Regulation to Reduce Greenhouse Gas Emissions from Vehicles Operating With Under Inflated Tires*. Available at: <http://www.arb.ca.gov/regact/2009/tirepres09/tirefinalreg.pdf>

regulations on September 12, 2012, with the first auction for GHG allowances on November 14, 2012.⁴³ Funds received from the program are deposited into the Greenhouse Gas Reduction Fund and appropriated by the Legislature. Greenhouse Gas Reduction Funds are administered by state and local agencies for a variety of greenhouse-gas cutting programs, including energy efficiency, public transit, low-carbon transportation and affordable housing.⁴⁴ On June 20, 2014, Governor Brown signed the FY 2014–2015 California State Budget, which included a cap and trade expenditure plan for cap-and-trade revenues in the Greenhouse Gas Reduction Fund. The Cap and Trade Program is a market-based mechanism to reduce GHG emissions in a cost-effective and economically efficient manner. California is the first multisector cap and trade program in North America following the northeast Regional Greenhouse Gas Initiative (RGGI) and the European Union Emission Trading Scheme (EU-ETS). It sets a GHG emissions limit that will decrease by 2 percent each year until 2015, and then 3 percent from 2015 to 2020 to achieve the goals in AB 32. The program initially applies to large electric power plants and large industrial plants, but will include fuel distributors by 2015. By 2015, these rules will encompass 85 percent of all of California’s GHG emissions.

California Air Resources Board Mobile Source Programs

Emission Reduction Plan for Ports and Goods Movement

The CARB approved the 2006 Emission Reduction Plan for Ports and Goods Movement in California. The Plan is an essential component of California's effort to reduce community exposure to air pollution and to meet new federal air quality standards for ozone and fine particulate matter (PM_{2.5}). The plan goals are to:⁴⁵

- (1) Reduce total statewide international and domestic goods movement emissions to the greatest extent possible and at least back to 2001 levels by year 2010.
- (2) Reduce the statewide diesel PM health risk from international and domestic goods movement 85 percent by year 2020.
- (3) Reduce NO_x emissions from international goods movement in the South Coast 30 percent from projected year 2015 levels, and 50 percent from projected year 2020 levels based on preliminary targets for attaining federal air quality standards.
- (4) Apply the emission reduction strategies for ports and goods movement statewide to aid all regions in attaining air quality standards.
- (5) Make every feasible effort to reduce localized risk in communities adjacent to goods movement facilities as expeditiously as possible.

⁴³ California Air Resources Board. Accessed 15 October 2015. *Cap and Trade Program*. Available at: <http://www.arb.ca.gov/cc/capandtrade/capandtrade.htm>

⁴⁴ California Environmental Protection Agency (Cal/EPA). Accessed 9 February 2015. *Greenhouse Gas-Reduction Investments to Benefit Disadvantaged Communities*. Available at: <http://www.calepa.ca.gov/EnvJustice/GHGInvest/>

⁴⁵ California Air Resources Board. 20 April 2006. *Emission Reduction Plan for Ports Goods Movement in California*. Available at: http://www.arb.ca.gov/planning/gmerp/plan/final_plan.pdf

CARB Small Offroad Engine (SORE) Exhaust Emission Standards

SORE engines include off-road spark-ignition engines that produce 19 kW gross power or less (less than 25 horsepower), including lawn and garden, industrial, logging, airport ground support, and commercial utility equipment; golf carts; and specialty vehicles. These emission standards apply to HC, NO_x, CO, and PM emissions with increasingly stricter standards from 1995 to 2013.⁴⁶

CARB Offroad Compression-Ignition Diesel Engine Exhaust Emission Standards

These engines include new compression-ignition engines (aka diesel engines) that are found in a wide variety of off-road applications such as farming, construction, and industrial. Some familiar examples include tractors, excavators, dozers, scrapers, portable generators, transport refrigeration units (TRUs), irrigation pumps, welders, compressors, scrubbers, and sweepers. This category, however, does not include locomotives, commercial marine vessels, marine engines over 37 kW, or recreational vehicles. These standards adhere to the tier system as set by the EPA.⁴⁷

CARB On-Road Heavy-Duty Diesel Vehicles (In-Use) Regulation

This regulation requires diesel trucks and buses that operate in California to be upgraded to reduce emissions. Newer heavier trucks and buses must meet PM filter requirements beginning January 1, 2012. Lighter and older heavier trucks must be replaced starting January 1, 2015. By January 1, 2023, nearly all trucks and buses will need to have 2010 model year engines or equivalent. The regulation applies to nearly all privately and federally owned diesel fueled trucks and buses and to privately and publicly owned school buses with a gross vehicle weight rating (GVWR) greater than 14,000 pounds. Amendments were approved in April 2014.⁴⁸

CARB Smartway/Phase I Heavy Duty Vehicle Greenhouse Gas Regulation

This regulation applies to GHG emissions from heavy-duty trucks and engines sold in California. It establishes GHG emissions limits on truck and engine manufacturers and harmonizes with the recently adopted EPA rule for new trucks and engines nationally. Existing heavy-duty vehicle regulations in California include engine criteria emission standards, tractor-trailer GHG requirements to implement SmartWay strategies (i.e., the Heavy-Duty Tractor-Trailer Greenhouse Gas Regulation), and in-use fleet retrofit requirements such as the Truck and Bus Regulation.⁴⁹

⁴⁶ California Air Resources Board. Accessed 28 August 2015. *Small Off-Road Engine Exhaust Emission Standards*. Available at: <http://www.arb.ca.gov/msprog/offroad/sore.pdf>

⁴⁷ California Air Resources Board. 30 November 2012. *New Off-Road Compression-Ignition (Diesel) Engines and Equipment*. Available at: <http://www.arb.ca.gov/msprog/offroad/orcomp/orcomp.htm>

⁴⁸ California Air Resources Board. 11 May 2015. *Truck and Bus Regulation*. Available at: <http://www.arb.ca.gov/msprog/onrdiesel/onrdiesel.htm>

⁴⁹ California Air Resources Board. 9 December 2014. *Phase 1 GHG*. Available at: <http://www.arb.ca.gov/msprog/onroad/phase1ghg/phase1ghg.htm>

Safeguarding California Plan

Published in July 2014, the Safeguarding California Plan is a comprehensive strategy to protect the state's environment, economy, and people from climate threats. It addresses nine broad categories where California is particularly at risk: agriculture, biodiversity and habitat, emergency management, energy, forestry, ocean and coastal ecosystems and resources, public health, and transportation. The Plan identifies sector specific actions for California's climate adaptation initiatives to be implemented by state agencies.⁵⁰

Smartway/Phase I Heavy-Duty Vehicle Greenhouse Gas Regulation

Pursuant to the California Clean Air Act, this regulation applies to GHG emissions from heavy-duty trucks and engines sold in California effective March 21, 2011. It establishes GHG emission limits on truck and engine manufacturers and harmonizes with the recently adopted EPA rule for new trucks and engines nationally. Existing heavy-duty vehicle regulations in California include engine criteria emission standards, tractor-trailer GHG requirements to implement SmartWay strategies (i.e., the Heavy-Duty Tractor-Trailer Greenhouse Gas Regulation), and in-use fleet retrofit requirements such as the Truck and Bus Regulation.⁵¹

Executive Order S-20-06

On October 17, 2006, Governor Arnold Schwarzenegger signed EO S-20-06, which calls for continued efforts and coordination among state agencies to implement GHG emission reduction policies, AB 32, and the Health and Safety Code (Division 25.5) through a market-based compliance program. In addition, EO S-20-06 requires the development of GHG reporting and reduction protocols and a multistate registry through joint efforts among CARB, California Environmental Protection Agency (Cal/EPA), and the California Climate Action Registry (CCAR). EO S-20-06 directs the Secretary for Environmental Protection to coordinate with the CAT to plan incentives for market-based mechanisms that have the potential of reducing GHG emissions.

Executive Order S-01-07 Low Carbon Fuel Standard

On January 18, 2007, EO S-1-07 was issued, requiring a reduction of at least 10 percent in the carbon intensity of California's transportation fuels by 2020. Regulatory proceedings and implementation of the Low Carbon Fuel Standard have been directed to the CARB. The Low Carbon Fuel Standard has been identified by CARB as a discrete early action item in the Adopted Climate Change Scoping Plan. CARB expects the Low Carbon Fuel Standard to achieve the minimum 10 percent reduction goal; however, many of the early action items outlined in the Climate Change Scoping Plan work in tandem with one another. To avoid the potential for double-counting emission reductions associated with AB 1493, the Climate Change Scoping Plan has modified the aggregate reduction expected from the Low Carbon Fuel Standard to 9.1 percent.

⁵⁰ California Air Resources Board. 2015. *FAQ about EO B-30-15: 2030 Carbon Target and Adaptation*. Available at: http://www.arb.ca.gov/newsrel/2030_carbon_target_adaptation_faq.pdf

⁵¹ California Air Resources Board. 9 December 2014. *Phase 1 GHG*. Available at: <http://www.arb.ca.gov/msprog/onroad/phase1ghg/phase1ghg.htm>

Executive Order S-13-08

EO S-13-08, signed on November 14, 2008, directs California to develop methods for adapting to climate change impacts through preparation of a statewide plan. In response to this order, the California Natural Resources Agency coordinated with 10 state agencies, multiple scientists, a consulting team, and stakeholders to develop the first statewide, multisector adaptation strategy in the country. The resulting report, 2009 California Climate Adaptation Strategy, summarizes the best-known science to assess the vulnerability of the state to climate change impacts, and outlines possible solutions that can be implemented within and across state agencies to promote resiliency. This strategy is the first step in an evolving process to reduce California's vulnerability to climate change impacts.

Adaptation refers to efforts that prepare the state to respond to the impacts of climate change: adjustments in natural or human systems to actual or expected climate changes to minimize harm or take advantage of beneficial opportunities. California's ability to manage its climate risks through adaptation depends on a number of critical factors. These include its baseline and projected economic resources, technology, infrastructure, institutional support and effective governance, public awareness, access to the best available scientific information, sustainably managed natural resources, and equity in access to these resources.

Executive Order B-16-2012

In March 23, 2012, Governor Brown issued EO B-16-2012 to encourage ZEVs and related infrastructure. It orders the CARB, the California Energy Commission, the Public Utilities Commission and other relevant agencies work with the Plug-in Electric Vehicle Collaborative and the California Fuel Cell Partnership to establish benchmarks in regard to ZEVs. By 2020, the state's ZEV infrastructure should support up to one million vehicles. By 2025, EO B-16-2012 aims to put over 1.5 million ZEVs on California roads and displace at least 1.5 billion gallons of petroleum. The EO also directs state government to begin purchasing ZEVs. In 2015, 10 percent of state departments' light-duty fleet purchases must be ZEVs, climbing to 25 percent of light duty purchases by 2020. EO B-16-2012 sets a target for 2050 to reduce GHG emissions in the transportation sector by 80 percent below 1990 levels.⁵²

Zero Emission Vehicle Action Plan

Pursuant to EO B-16-2012, in February 2013, the Governor's Interagency Working Group on Zero Emission Vehicles published an Action Plan.⁵³ In compliance with B-16-2012, the ZEV Action Plan lays out specific strategies and actions to meet the milestones of the executive order. The four main goals of the state government to advance ZEVs are (1) complete needed infrastructure and planning, (2) expand consumer awareness and demand, (3) transform fleets, and (4) grow jobs and investment in the private sector.

⁵² Office of Governor Edmund G. Brown Jr. 23 March 2012. *Executive Order B-16-2012*. Available at: <http://gov.ca.gov/news.php?id=17472>

⁵³ Governor's Interagency Working Group on Zero-Emission Vehicles. February 2013. *ZEV Action Plan*. Available at: [http://opr.ca.gov/docs/Governor's_Office_ZEV_Action_Plan_\(02-13\).pdf](http://opr.ca.gov/docs/Governor's_Office_ZEV_Action_Plan_(02-13).pdf)

Executive Order B-30-15

On April 29, 2015, Governor Brown issued EO B-30-15, stating a new statewide policy goal to reduce GHG emissions 40 percent below their 1990 levels by 2030. The EO establishes GHG emissions reduction targets to reduce emissions to 80 percent below 1990 levels by 2050 and sets an interim target of emissions reductions for 2030 as being necessary to guide regulatory policy and investments in California and put California on the most cost-effective path for long-term emissions reductions. The EO orders “all State agencies with jurisdiction over sources of [GHG] emissions [to] ... implement measures, pursuant to statutory authority, to achieve reductions of [GHG] emissions to meet the 2030 and 2050 [GHG] emissions reductions targets.” It directs CARB to “update the Climate Change Scoping Plan to express the 2030 target in terms of million metric tons of carbon dioxide equivalent.” It directs the Natural Resources Agency to update “Safeguarding California” (the state’s climate adaptation strategy) every three years, as specified; directs state agencies to “take climate change into account in their planning and investment decisions, and employ full life-cycle cost accounting to evaluate and compare infrastructure investments and alternatives”; and orders the “state’s Five-Year Infrastructure Plan [to] take current and future climate change impacts into account in all infrastructure projects.” Among its other directives, the EO provides that “State agencies’ planning and investment shall be guided by the ... principle that priority should be given to actions that both build climate preparedness and reduce GHG emissions.”

Proposed California Global Warming Solutions Act of 2006: Emission Limit (Senate Bill 32)

Pursuant to EO B-30-15, if approved, this bill would require the state board to approve a statewide GHG emissions limit that is equivalent to limits that are the equivalent to 40 percent below the 1990 level to be achieved by 2030 and 80 percent below the 1990 level to be achieved by 2050, as specified. The bill would authorize the state board to adopt an interim GHG emissions level target to be achieved by 2030 and 2040. The bill also would state the intent of the Legislature for the Legislature and appropriate agencies to adopt complementary policies that ensure the long-term emissions reductions advance specified criteria. The bill would make conforming changes.

The California Global Warming Solutions Act of 2006 designates the CARB as the state agency charged with monitoring and regulating sources of emissions of GHGs. The state board is required to adopt a statewide GHG emissions limit equivalent to the statewide GHG emissions level in 1990 to be achieved by 2020 and to adopt rules and regulations in an open public process to achieve the maximum, technologically feasible, and cost-effective GHG emissions reductions.

As of September 11, 2015, SB 32 did not pass the 2015–2016 regular state legislative session. SB 32 passed in the State Senate and initially failed in the Assembly on September 4, 2015, and September 8, 2015, respectively. However, it received sufficient votes for reconsideration on September 9, 2015, and was amended and referred to the Committee on Natural Resources one day later on September 10, 2015. As a two-year bill, SB 32 could be considered again in the 2016 regular session. SB 32, as amended on September 10, 2015, would require the state board to approve a statewide GHG emissions limit that is equivalent to 40 percent below the 1990 level to be achieved by 2030. The bill also would state the intent of the Legislature and appropriate agencies to adopt complementary policies that ensure the long-term emissions reductions advance specified criteria.

Executive Order B-32-15, Sustainable Freight Transport Initiative

On July 17, 2015, Governor Brown issued Executive Order B-32-15, which directs the Secretary of the California State Transportation Agency, the Secretary of Cal/EPA, and the Secretary of the Natural Resources Agency to lead other relevant state departments including the CARB, the California Department of Transportation, the California Energy Commission, and the Governor’s Office of Business and Economic Development to improve freight efficiency, transition to zero-emission technologies, and increase competitiveness of California’s freight system. These state agencies will develop an integrated freight action plan by July 2016.⁵⁴

California Climate Action Registry (2001)

Established in 2001, the CCAR is a private nonprofit organization originally formed by the State of California.⁵⁵ CCAR serves as a voluntary GHG registry and led efforts to develop credible, accurate, and consistent GHG reporting standards and tools for businesses, government agencies, and nonprofit organizations to measure, monitor, and reduce GHG emissions. For instance, the CCAR General Reporting Protocol, Version 3.1, dated January 2009, provides the principles, approach, methodology, and procedures required for voluntary GHG emissions reporting by businesses, government agencies, and nonprofit organizations.

California Climate Adaptation Planning Guide

On July 2012, the California Emergency Management Agency and California Natural Resources Agency published the California Adaptation Planning Guide (APG). The APG is a set of four complementary documents.

- APG: Planning for Adaptive Communities—Presents the basis for climate change adaptation planning and introduces a step-by-step process for local and regional climate vulnerability assessment and adaptation strategy development. All communities should start with this document.
- APG: Defining Local and Regional Impacts—This supplemental document provides a more in-depth understanding of how climate change can affect a community. Seven “impact sectors” are included to support communities conducting a climate vulnerability assessment.
- APG: Understanding Regional Characteristics—The impact of climate change varies across the state. This supplemental document identifies climate impact regions, including their environmental and socioeconomic characteristics.
- APG: Identifying Adaptation Strategies—This supplemental document explores potential adaptation strategies that communities can use to meet adaptation needs. Adaptation strategies are categorized into the same impact sectors used in the APG: Defining Local and Regional Impacts document.

⁵⁴ California Air Resources Board. 10 August 2015. *Sustainable Freight Transport*. Available at: <http://www.arb.ca.gov/gmp/sfti/sfti.htm>

⁵⁵ The Climate Registry. Accessed 15 October 2015. *About Us*. Available at: <http://www.theclimateregistry.org/who-we-are/about-us/>

The APG provides guidance to support communities in addressing the unavoidable consequences of climate change. The APG introduces the basis for climate change adaptation planning and details a step-by-step process for local and regional climate vulnerability assessment and adaptation strategy development. The guide was developed to allow flexibility in the commitment of time, money, and scope.⁵⁶

California's Flood Future Report

In November 2013, the California Department of Water Resources and the U.S. Army Corps of Engineers developed *California's Flood Future: Recommendations for Managing the State's Flood Risk*. This document identifies the statewide exposure to flood risk and presents seven key recommendations to improve flood management. Consistent with the Integrated Water Management (IWM) approach, the recommendations include:⁵⁷

- Tools
 - Risk Assessments: Conduct regional flood risk assessments to understand statewide flood risk.
 - Flood Risk Awareness: Increase public and policymaker awareness about flood risks to facilitate informed decisions.
 - Flood Readiness: Increase support for flood emergency preparedness, response, and recovery programs to reduce flood impacts.
- Plans
 - Land Use Planning: Encourage land use planning practices that reduce the consequences of flooding.
 - Regional, Systemwide, and Statewide Planning: Implement flood management from regional, systemwide, and statewide perspectives to provide multiple resources.
- Actions
 - Increase Agency Collaboration: Increase collaboration among public agencies to improve flood management planning, policies, and investments. Actions also include the infrastructure improvements and other innovations conducted flood and water management agencies.
 - Establish Financial Investment Priorities: Public agencies at every level should prioritize short- and long-term flood management efforts, in accordance with a sound investment strategy based on sustainable funding sources.

California Coastal Commission Sea Level Rise Policy Guidance

On August 12, 2015, the California Coastal Commission adopted the Recommended Final Draft of the Sea Level Rise Policy Guidance as interpretive guidance to guide people on how to comply with PRC

⁵⁶ California Emergency Management Agency and California Natural Resources Agency. Accessed 9 September 2015. *California Adaptation Planning Guide*. Available at: http://resources.ca.gov/docs/climate/01APG_Planning_for_Adaptive_Communities.pdf

⁵⁷ California Department of Water Resources. 31 December 2014. *California's Flood Future Report*. Available at: <http://www.water.ca.gov/sfmp/flood-future-report.cfm>

30620 that specifies development guidelines within the coastal zone. It provides a planning process framework for addressing sea level rise and adaptation planning in Local Coastal Programs and Coastal Development Permits. Decisions are rooted in the best available science with the goal of minimizing coastal hazards and protecting public access, recreation and sensitive coastal resources. This Guidance is part of a larger statewide climate strategy alongside the 2014 Safeguarding California Plan, EO B-30-15, EO S-13-08, State Hazard Mitigation Plan, and other climate work done by research organizations and state agencies.

California Wellness Plan (2014)

The California Department of Public Health published a statewide Wellness Plan in 2014. The Plan acknowledges that many factors contribute to an individual's health. These factors include the physical environment (housing, neighborhood, healthy food access and environment), educational attainment and employment, economic status, social support, social norms and attitudes, culture, literacy, race/ethnicity. The physical environment is also an indicator of exposure to toxins and transportation where individuals are affected on a daily basis by the air quality of their surroundings.⁵⁸

CARB Air Quality and Land Use Handbook

In April 2005, CARB published the Air Quality and Land Use Handbook as a informational and advisory guide for evaluating and reducing air pollution impacts associated with new projects that go through the land use decision-making process. Studies have shown that diesel exhaust and other cancer-causing chemicals emitted from cars and trucks are responsible for much of the overall cancer risk from airborne toxics in California. Reducing diesel particulate emissions is one of CARB's highest public health priorities and the focus of a comprehensive statewide control program that is reducing diesel PM emissions each year. This document highlights the potential health impacts associated with proximity to air pollution sources so planners explicitly consider this issue in planning processes.⁵⁹

Regional

The SCAG region comprises four air basins and five air districts. The four air basins are South Coast Air Basin (SCAB), Mojave Desert Air Basin (MDAB), Salton Sea Air Basin (SSAB), and the Ventura County portion of South Central Coast Air Basin (SCCAB). The five air districts are MDAQMD, AVAQMD, VCAPCD, SCAQMD, and ICAPCD.

MDAQMD Federal 8-hour Ozone Attainment Plan (2008)

The EPA designated the Western Mojave Desert non-attainment area as non-attainment for the 8-hour ozone NAAQS pursuant to the provisions of the CAA. A portion of the MDAQMD is included in the Western Mojave Desert non-attainment area. The MDAQMD has adopted state and federal attainment

⁵⁸ California Department of Public Health. 2014. *Wellness Plan*. Available at: [http://www.cdph.ca.gov/programs/cdcb/Documents/CDPH-CAWellnessPlan2014%20\(Agency%20Approved\).FINAL.2-27-14\(Protected\).pdf](http://www.cdph.ca.gov/programs/cdcb/Documents/CDPH-CAWellnessPlan2014%20(Agency%20Approved).FINAL.2-27-14(Protected).pdf)

⁵⁹ California Air Resources Board. April 2005. *Air Quality and Land Use Handbook: A Community Health Perspective*. Available at: <http://www.arb.ca.gov/ch/handbook.pdf>

plans for the region within its jurisdiction. The portion of the MDAQMD designated as a federal 8-hour ozone non-attainment area will be in attainment of the 8-hour NAAQS for ozone by 2021.⁶⁰

AVAQMD Federal 8-hour Ozone Attainment Plan (2008)

The AVAQMD has adopted a single attainment plan for ozone. The AVAQMD Federal 8-hour Ozone Attainment Plan, adopted in May 2008, demonstrates that the AVAQMD will meet the primary required federal ozone planning milestones by June 2021, presents the progress the AVAQMD will make towards meeting all required ozone planning milestones, and discusses the newest 0.075 part per million 8-hour ozone NAAQS.⁶¹

VCAPCD Air Quality Management Plan (2008)

This plan presents a strategy for attaining the federal 8-hour ozone standard of 0.08 parts per million. It contains control measures to reduce emissions and bring the County into attainment of the standard. The County is designated as an ozone nonattainment area for both the state and federal standards. New plans are updated and written as required by federal law.⁶²

SCAQMD 2012 Air Quality Management Plan

The most recent update to the AQMP was adopted in 2012 by the SCAQMD Board and the CARB.⁶³ The AQMP demonstrates attainment of the federal 24-hour PM_{2.5} standard by 2014 in the SCAB through adoption of all feasible measures. The current AQMP also updates the EPA-approved 8-hour ozone control plan with new measures designed to reduce reliance on the CAA Section 182(e)(5) long-term measures for NO_x and VOC reductions. In addition, the AQMP addresses several state and federal planning requirements, incorporating new scientific information, primarily in the form of updated emissions inventories, ambient measurements, and new meteorological air quality models.

SCAQMD is in the development process for the 2016 AQMP, which will be a comprehensive and integrated plan primarily focused on addressing the ozone standards. The Plan will be a regional and multiagency effort (SCAQMD, CARB, SCAG, and EPA). State and federal planning requirements include developing control strategies, attainment demonstrations, reasonable further progress, and maintenance plans. The 2016 AQMP will incorporate the latest scientific and technical information and planning assumptions, including the latest applicable growth assumptions, transportation control measures and strategies, and updated emission inventory methodologies for various source categories.⁶⁴

⁶⁰ Mojave Desert Air Quality Management District. 2008. *MDAQMD Federal 8-hour Ozone Attainment Plan*. Available at: <http://www.mdaqmd.ca.gov/Modules/ShowDocument.aspx?documentid=40>

⁶¹ Antelope Valley Air Quality Management District. 20 May 2008. *AVAQMD Federal 8-hour Ozone Attainment Plan*.

⁶² Ventura County Air Pollution Control District. Accessed 8 September 2015. *Destination Clean Air*. Available at: <http://www.vcapcd.org/pubs/PublicInformation/DestinationCleanAir.pdf>

⁶³ South Coast Air Quality Management District. 2014. *Air Quality Management Plan (AQMP)*. Available at: <http://www.aqmd.gov/home/library/clean-air-plans/air-quality-mgt-plan>

⁶⁴ South Coast Air Quality Management District. 2014. *Air Quality Management Plan (AQMP)*. Available at: <http://www.aqmd.gov/home/library/clean-air-plans/air-quality-mgt-plan>

ICAPCD Air Plans

At a public meeting held on December 18, 2014, CARB approved the Imperial County 2013 SIP for the 2006 24-hour PM_{2.5} Moderate Nonattainment Area. At a public meeting held on November 18, 2010, CARB approved the 2009 Imperial County 1997 8-Hour Ozone Modified Air Quality Management Plan and 2009 Reasonably Available Control Technology SIP. In 2009, the EPA determined that the County attained the 1997 8-hour ozone standard.⁶⁵

Fugitive Dust Regulations: SCAQMD, AVAQMD, and MDAQMD Rule 403; VCAPCD Rule 55, Fugitive Dust; ICAPCD Rule 800, ICAPCD Rule 801

The SCAQMD, AVAQMD, and MDAQMD have adopted Rule 403, *Fugitive Dust*, which requires the implementation of best available fugitive dust control measures during construction and operational activities capable of generating fugitive dust emissions from on-site earth-moving activities, construction/demolition activities, and mobile equipment traveling on paved and unpaved roads. Similarly, VCAPCD has adopted Rule 55, *Fugitive Dust*, and ICAPCD has adopted Rule 800, *General Requirements for Control of Fine Particulate Matter (PM10)*, and Rule 801, *Construction and Earthmoving Activities*, to reduce fugitive dust.

SCAQMD, AVAQMD Rule 1401; MDAQMD Rule 1320; VCAPCD Rule 36; ICAPCD Rule 207 and SCAQMD, AVAQMD Rule 1402; MDAQMD Rule 1520; VCAPCD Rule 73; ICAPCD Rule 403

The SCAQMD has adopted two rules for TACs to limit cancer and non-cancer health risks from facilities located within its jurisdiction. Rule 1401, New Source Review of Toxic Air Contaminants, regulates new or modified facilities; and Rule 1402, Control of Toxic Air Contaminants from Existing Sources, regulates facilities that are already in operation. Rule 1402 incorporates requirements of the AB 2588 program, including implementation of risk reduction plans for significant risk facilities. In 2015, SCAQMD revised Rule 1401 and 1402 to include more equipment types and industry categories. Under the revised Rule 1401, no permit would be issued for new and modified equipment unless the cancer risk is less than ten in a million using Toxics Best Available Control Technology (TBACT) or less than one in a million without TBACT or if near a school. For Rule 1402, existing facilities under AB 2588 must reduce facility-wide risk if maximum individual cancer risk is greater than 25 in a million. AVAQMD, MDAQMD, VCAPCD, and ICAPCD have adopted similar rules to limit health risks from toxic air contaminants from new, modified, and existing sources.

SCAG Sustainability Planning Grant Program

Formerly known as the Compass Blueprint Grant Program, SCAG's Sustainability Program works actively with Southern California communities and stakeholders to create a dynamic regional growth vision based on the principles of mobility, livability, prosperity, and sustainability. The program's work focuses on implementing the region's Sustainable Communities Strategy, the state-mandated plan for reducing

⁶⁵ California Air Resources Board. 21 April 2015. *Imperial County Air Quality Management Plans*. Available at: <http://www.arb.ca.gov/planning/sip/planarea/imperial/imperialsip.htm>

GHG emissions from cars and light trucks through integrated transportation, land use, housing and environmental planning.⁶⁶

SCAQMD Policies and Guidance

Policy on Global Warming and Stratospheric Ozone Depletion

SCAQMD adopted a “Policy on Global Warming and Stratospheric Ozone Depletion” on April 6, 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.⁶⁷

Draft Guidance Regarding Interim CEQA GHG Significance Thresholds

SCAQMD released draft guidance regarding interim CEQA GHG significance thresholds. In its October 2008 document, the SCAQMD proposed the use of a percent emission reduction target (e.g., 30 percent) to determine significance for commercial/residential projects that emit greater than 3,000 metric tons per year. On December 5, 2008, the SCAQMD Governing Board adopted the staff proposal for an interim GHG significance threshold for stationary source/industrial projects where the SCAQMD is lead agency. However, SCAQMD has yet to adopt a GHG significance threshold for land use development projects (e.g., residential/commercial projects) and has formed a GHG Significance Threshold Working Group to further evaluate potential GHG significance thresholds.⁶⁸

SCAQMD has convened a GHG CEQA Significance Threshold Working Group to provide guidance to local lead agencies on determining significance for GHG emissions in their CEQA documents. Members of the working group include government agencies implementing CEQA and representatives from various stakeholder groups that will provide input to the SCAQMD staff on developing CEQA GHG significance thresholds. The working group is currently discussing multiple methodologies for determining project significance. These methodologies include categorical exemptions, consistency with regional GHG budgets in approved plans, a numerical threshold, performance standards, and emissions offsets.

Counties

Los Angeles County

The Los Angeles County Office of Sustainability was created within the Internal Services Department by the Board of Supervisors in October 2009 to respond to legislation, regulation, and policy related to Climate Change and serve as a central hub to coordinate Energy Efficiency, Conservation and Sustainability Programs within the County, its facilities, and the region. The County Office of

⁶⁶ Southern California Association of Governments. Accessed 1 September 2015. *Sustainability*. Available at: <http://www.scag.ca.gov/programs/Pages/Programs/Sustainability.aspx>

⁶⁷ South Coast Air Quality Management District. November 2010. *Draft Environmental Assessment*. Available at: <http://www.aqmd.gov/docs/default-source/ceqa/documents/aqmd-projects/2010/final-environmental-assessment-for-proposed-amended-rule-1415-and-proposed-rule-1415-1.pdf?sfvrsn=4>

⁶⁸ South Coast Air Quality Management District. Accessed August 2011. *Greenhouse Gases (GHG) CEQA Significance Thresholds*. Available at: <http://www.aqmd.gov/ceqa/handbook/GHG/GHG.html>

Sustainability develops and implements programs that impact and benefit the constituents of Los Angeles County, such as the Energy Upgrade California in Los Angeles County energy efficiency home improvement and rebate program, countywide Environmental Service Centers, the SolarMap LACounty.gov and Green.LACounty.gov websites, and the Los Angeles Regional Collaborative for Climate Action and Sustainability. In addition, the County Office of Sustainability is the lead in coordinating and implementing Energy and Environmental policy programs and activities by all County departments.

As of March 2015, Los Angeles County Board of Supervisors approved the first CCAP. The CCAP will be a roadmap to reduce GHGs in Los Angeles County by 11 percent by 2020. This target can be achieved through cool roofs, solar, tree canopies, and more active transportation and public transit use. The County of Los Angeles Department of Regional Planning will implement the CCAP and work to develop climate adaptation strategies beyond 2020.⁶⁹

Orange County

In early 2010, a joint committee with equal representation from the Orange County Council of Governments (COG) and the Orange County Transportation Authority (OCTA) was formed to develop the Orange County SCS. The Orange County COG/OCTA SCS Joint Working Committee led overall efforts to develop a subregional Orange County SCS to meet the requirements of SB 375 and the mutual agreements with SCAG with a plan that all local jurisdictions in Orange County could support. As a result of this collaborative effort, the Orange County SCS was adopted unanimously by the OCTA and Orange County COG Boards of Directors in June of 2011. Orange County SCS utilizes the transportation system along with land use and Best Management Practices strategies to help the County to achieve the state-mandated emissions reduction targets.

Riverside County

Riverside County has created a Green Action Plan to establish a clear path to sustainability and GHG reduction. The Green Action Plan focuses on seven key areas: energy, GHG emissions, waste, urban design, urban nature, transportation, and water. The Energy section of the guidebook includes a goal to increase the use of non-GHG-emitting energy to 70 percent with at least 50 percent coming from renewable sources by 2020. The Plan has established a target to reduce GHG emissions by 7 percent below 1990 baseline and 15 percent below the baseline by 2020. The County aims to reduce waste by 75 percent by 2020 based on the 2007 per capita baseline. The Plan also provides incentives to increase green development and encourage the planting of at least 3,000 shade trees on private property and 1,000 trees in parks annually. For transportation, the Plan envisions a 15 percent decrease in vehicle miles traveled by 2015 based on the 2009 baseline. The waters section specifies a 20 percent water usage reduction by 2020 while increasing the use of recycled water by 30 percent by 2020 based on the 2008 baseline.⁷⁰

In September 2014, Western Riverside Council of Governments (WRCOG) published the Subregional Climate Action Plan. The major goals of the Climate Action Plan are to create local jobs, promote

⁶⁹ Climate Resolve. 26 March 2015. *Approved: LA County's Community Climate Action Plan*. Available at: <http://climateresolve.org/countyclimateactionplan/>

⁷⁰ Green Riverside. Accessed August 2011. *Green Action Plan*. Available at: <http://www.greenriverside.com/About-Green-Riverside-4/Green-Action-Plan-190>

healthier communities, achieve energy self-sufficiency, enhance social equity, reduce emissions, improve air quality, protect natural systems, and save money. WRCOG aims to reduce GHG emissions to 15 percent below 2010 levels by 2020, and 49 percent below 2010 levels by 2035.⁷¹

San Bernardino County

Santa Bernardino County launched *Green County San Bernardino* in August 2007 to promote the use of environmentally friendly technologies and practices among business owners, developers, and residents in the County. All San Bernardino County cities are encouraged to join the Green Valley Initiatives to pledge to address five or more policy areas that aim to reduce GHG emissions. The policy areas to select from are Green Building Program, Buy Green/Buy Local, Green Business Programs, Conservation and Recycling, Solar and Alternative Energy, Encourage Green Economic Development, Green Valley Land Use, and Green Valley Coordinators.⁷²

In March 2014, San Bernardino County released the final version of the San Bernardino County Greenhouse Gas Reduction Plan and Final EIR to be certified by the SANBAG Board of Directors. The plan is in accordance with AB 32 and other regional and general plans.⁷³

Ventura County

In April 2010, the County of Ventura General Services Agency (GSA) released an Energy Action Plan to minimize energy intensities in GSA-maintained buildings, improve operational energy and water efficiencies, reduce energy and water use, pursue LEED and Energy Star certifications, and educate GSA employees. As of April 2012, the County of Ventura released a Climate Protection Plan to reduce GHG emissions by 15 percent by 2020. The six action areas include climate protection leadership, countywide responsibility, facilities, vehicle (fleet) operations, employee commute, and expanded sustainability goals.⁷⁴

Cities

Many cities in the SCAG region have incorporated climate change and GHG policies into their planning and permitting programs. Many cities in the SCAG region have developed or are developing city-level Climate Action Plans, climate milestones, GHG reduction plans, and/or GHG inventories. Please refer to the Governor's Office of Planning and Research for a full list of California cities/counties that have taken climate change actions.⁷⁵

⁷¹ Western Riverside Council of Governments. Accessed 25 August 2015. *Subregional Climate Action Plan*. Available at: http://www.wrcog.cog.ca.us/uploads/media_items/wrcog-climate-action-plan-final-draft-april-2014.original.pdf

⁷² San Bernardino County. Accessed August 2011. *Green Valley Initiative Cities*. Available at: http://www.sbcounty.gov/greencountysb/green_valley_initiative_cities.aspx

⁷³ San Bernardino Associated Governments. Accessed 19 July 2015. *Regional Greenhouse Gas Reduction Plan*. Available at: http://www.sanbag.ca.gov/planning2/plan_greenhouse.html

⁷⁴ Ventura County. Accessed 19 July 2015. *Working & Living Sustainably*. Available at: <http://www.ventura.org/sustain/for-community/climate-protection/>

⁷⁵ California Governor's Office of Planning and Research. Updated 17 June 2014. *California Jurisdictions Addressing Climate Change*. Available at: http://www.opr.ca.gov/docs/California_Jurisdictions_Addressing_Climate_Change_PDF.pdf

5.0 EXISTING CONDITIONS

Air quality in the SCAG region is a function of the topography, climate, population, and land use. While improved from the 1970s, Southern California has some of the worst air quality in the nation. The American Lung Association's *State of the Air Report*, released in 2015, ranks the Los Angeles-Long Beach metropolitan area as fifth worst in the nation for people at risk for 24-hour PM_{2.5}, fifth worst for annual PM_{2.5}, and worst for most ozone-polluted cities.⁷⁶ Both ozone and particulate matter are known to have negative public health impacts especially for sensitive populations, like children, the elderly, and those with respiratory or cardiovascular health problems. Therefore, the potential for the 2016 RTP/SCS to adversely affect public health was evaluated using cancer risk from diesel particulate matter as a corollary for respiratory health. The analysis of cancer risk was evaluated using the Hot Spots Analysis and Reporting Program (HARP) (version 2) or HARP2 model, consistent with the guidance provided by the California Office of Environmental Health Hazard Assessment (OEHHA) for Human Health Risk Assessment.⁷⁷ Low-income and minority populations are more at risk because they are more likely to live near major sources of pollution such as power plants or large freeways. Similarly, the analysis acknowledges applicable California legislation and initiatives to improve public health, particularly respiratory health in light of *Research Results on Land Use, Transportation, and Community Design*.⁷⁸

- Residents in walkable neighborhoods are more likely to meet physical activity guidelines.
- Public transit users are more likely to meet Surgeon General recommendations for physical activity.

Greater health benefits can be achieved by increasing the amount (duration, frequency, or intensity) of physical activity.

Topography, Climate, and Meteorology

The SCAG region has a greatly varied topography from lakes to mountains, valleys, hills, basins, and urban areas. The topography and meteorological conditions define the climate of the region because air quality is a function of the rate and location of pollutant emissions. Atmospheric conditions such as wind speed, wind direction, and air temperature gradients, along with local topography, influence the movement and dispersal of pollutants and thereby provide the link between air pollutant emissions and air quality. Southern California has strong temperature inversions in the lower atmosphere that can trap pollutants near the surface. Meteorology affects air quality trends that may mask emission reduction benefits. Meteorology also affects different pollutants differently. Warm and sunny weather, which is typical of Southern California, leads to higher ozone days because sunlight aids the chemical reactions that form ozone. On the other hand, windy weather will spread primary particulate matter from direct emissions leading to high PM concentrations in the air. Secondary PM, including particulate nitrates and sulfates, is more prevalent in the air during cold, calm, and humid weather conditions. Rain

⁷⁶ American Lung Association. 2015. *State of the Air 2015*. Available at: http://www.stateoftheair.org/2015/assets/ALA_State_of_the_Air_2015.pdf

⁷⁷ Office of Environmental Health Hazard Assessment. Accessed 19 October 2015. *Air Toxicology and Epidemiology*. Available at: http://oehha.ca.gov/air/hot_spots/hotspots2015.html

⁷⁸ Active Living Research. Accessed 7 September 2015. *Research Results on Land Use, Transportation, and Community Design*. Available at: <http://activelivingresearch.org/land-use-transportation-and-community-design-research-summary-slides>

and wind reduce PM concentration in the air.⁷⁹ The local topography and climate conditions are described in greater detail specific to each air basin as listed below. These air basins are geographically defined because the travel of air pollution can be trapped by natural barriers like mountains unless the prevailing winds are powerful enough to disperse it to other areas.⁸⁰

South Coast Air Basin

The SCAB incorporates approximately 12,000 square miles, consisting of Orange County and the urbanized areas of San Bernardino, Riverside, and Los Angeles Counties. In May 1996, the boundaries of the SCAB were changed by the CARB to include the Beaumont-Banning area. The distinctive climate of the SCAB is determined by its terrain and geographic location. The SCAB is a coastal plain with connecting broad valleys and low hills, bounded by the Pacific Ocean to the southwest and high mountains around the rest of its perimeter. The general region lies in the semipermanent high-pressure zone of the eastern Pacific, resulting in a mild climate tempered by cool sea breezes with light average wind speeds. The usually mild climatological pattern is interrupted occasionally by periods of extremely hot weather, winter storms, or Santa Ana winds.⁸¹

The vertical dispersion of air pollutants in the SCAB is hampered by the presence of persistent temperature inversions. High-pressure systems, such as the semipermanent high-pressure zone in which the SCAB is located, are characterized by an upper layer of dry air that warms as it descends, restricting the mobility of cooler marine-influenced air near the ground surface, and resulting in the formation of subsidence inversions. Such inversions restrict the vertical dispersion of air pollutants released into the marine layer and, together with strong sunlight, can produce worst-case conditions for the formation of photochemical smog. The basin-wide occurrence of inversions at 3,500 feet above sea level or less averages 191 days per year.⁸²

The atmospheric pollution potential of an area is largely dependent on winds, atmospheric stability, solar radiation, and terrain. The combination of low wind speeds and low inversions produces the greatest concentration of air pollutants. On days without inversions, or on days of winds averaging over 15 miles per hour, smog potential is greatly reduced.⁸³

Mojave Desert Air Basin

The MDAB encompasses approximately 21,480 square miles and includes the desert portions of San Bernardino County, Palo Verde Valley, Palmdale, and Lancaster in the Antelope Valley. The MDAB is bordered by the SCAB and the Riverside County line to the south, Kern County line to the west, the Arizona and Nevada borders to the north and east, and the eastern portion of Riverside County to the southeast. The Kern County portion of MDAB is not in the SCAG region.

⁷⁹ *The California Almanac of Emissions and Air Quality*. 2013. Available at: <http://www.arb.ca.gov/aqd/almanac/almanac13/almanac2013all.pdf>

⁸⁰ South Coast Air Quality Management District. Accessed 24 August 2015. *Southern California Air Basins*. Available at: <http://www.aqmd.gov/docs/default-source/default-document-library/map-of-jurisdiction.pdf>

⁸¹ South Coast Air Quality Management District. April 1993. *CEQA Air Quality Handbook*. P. A8-1.

⁸² South Coast Air Quality Management District. April 1993. *CEQA Air Quality Handbook*. P. A8-2.

⁸³ South Coast Air Quality Management District. April 1993. *CEQA Air Quality Handbook*. P. A8-2.

The MDAB is an assemblage of mountain ranges interspersed with long broad valleys that often contain dry lakes.⁸⁴ Many of the lower mountains that dot the vast terrain rise from 1,000 to 4,000 feet above the valley floor. Prevailing winds in the MDAB are out of the west and southwest. These prevailing winds are due to the proximity of the MDAB to coastal and central regions and the blocking nature of the Sierra Nevada Mountains to the north; air masses pushed onshore in Southern California by differential heating are channeled through the MDAB. The MDAB is separated from the Southern California coastal and central California valley regions by mountains (highest elevation approximately 10,000 feet), whose passes form the main channels for these air masses. The Antelope Valley is bordered in the northwest by the Tehachapi Mountains, separated from the Sierra Nevadas in the north by the Tehachapi Pass (3,800 feet elevation). The Antelope Valley is bordered in the south by the San Gabriel Mountains, bisected by Soledad Canyon (3,300 feet). The Mojave Desert is bordered in the southwest by the San Bernardino Mountains, separated from the San Gabriel Mountains by the Cajon Pass (4,200 feet). A lesser channel lies between the San Bernardino Mountains and the Little San Bernardino Mountains (the Morongo Valley).

The Palo Verde Valley portion of the Mojave Desert lies in the low desert, at the eastern end of a series of valleys (notably the Coachella Valley) whose primary channel is the San Gorgonio Pass (2,300 feet) between the San Bernardino and San Jacinto Mountains.

During the summer, the MDAB is generally influenced by a Pacific subtropical high cell that sits off the coast, inhibiting cloud formation and encouraging daytime solar heating. The MDAB is rarely influenced by cold air masses moving south from Canada and Alaska, as these frontal systems are weak and diffuse by the time they reach the desert. Most desert moisture arrives from infrequent warm, moist, and unstable air masses from the south. The MDAB averages between 3 and 7 inches of precipitation per year (from 16 to 30 days with at least 0.01 inch of precipitation). The MDAB is classified as a dry-hot desert climate, with portions classified as dry-very hot desert, to indicate at least three months have maximum average temperatures over 100.4 degrees Fahrenheit (° F).

Salton Sea Air Basin

The SSAB includes all of Imperial County and the desert portion of Riverside County between the SCAB and the MDAB (known as the Coachella Valley area). Imperial County extends over 4,597 square miles, bordering on Mexico to the south, Riverside County to the north, San Diego County on the west, and the State of Arizona on the east.⁸⁵

The southern portion of the SSAB is a part of the larger physiographic province of the Salton Trough. This province is a very flat basin surrounded by mountains: the Peninsular Ranges to the west and the Chocolate, Orocopia, and Cargo Muchaco Mountains to the east. Most of the trough is below sea level and consists generally of desert, with agricultural land uses located at the north and south of the Salton Sea.

Climatic conditions in the SSAB are governed by the large-scale sinking and warming of air in the semipermanent subtropical high-pressure center of the Pacific Ocean. The high-pressure ridge blocks

⁸⁴ Mojave Desert Air Quality Management District. February 2009. *CEQA and Federal Conformity Guidelines*.

⁸⁵ Imperial County Air Pollution Control District. 13 July 2010. *Final 2009 1997 8-Hour Ozone Modified Air Quality Management Plan*.

out most mid-latitude storms except in the winter when the high is weakest and farthest south. Similarly, the coastal mountains prevent the intrusion of any cool, damp marine air found in California coastal environs. Because of the weakened storms and the orographic barrier, the SSAB experiences clear skies, very low humidity, extremely hot summers, mild winters, and little rainfall. The flat terrain of the valley and the strong temperature differentials created by intense solar heating produce moderate winds and deep thermal convection.

The combination of subsiding air, protective mountains, and distance from the ocean severely limits precipitation. Rainfall is highly variable, with heavy precipitation occurring from single storms followed by periods of dry air. Humidity is typically low throughout the year, ranging from 28 percent in summer to 52 percent in winter.

The SSAB occasionally experiences periods of high winds. Wind speeds exceeding 31 miles per hour (mph) occur most frequently in April and May. On an annual basis, strong winds over 31 mph are observed 0.6 percent of the time, and speeds of less than 6.8 mph account for more than one-half of the observed winds. Wind statistics indicate prevailing winds are from the west-northwest through southwest; a secondary flow maximum from the southeast is also evident. Imperial County, in particular, experiences surface inversions almost every day of the year. Due to strong surface heating, these inversions are usually broken, allowing pollutants to more easily disperse. Weak surface inversions are caused by cooling of air in contact with the cold surface of the earth at night. In valleys and low-lying areas, this condition is intensified by the addition of cold air flowing downslope from the hills and pooling on the valley floor.

The presence of the Pacific high-pressure cell can cause the air mass aloft to sink. As the air descends, compressional heating warms it to a temperature higher than the air below. This highly stable atmospheric condition, termed a subsidence inversion, can act as a nearly impenetrable lid to the vertical mixing of pollutants. The strength of these inversions makes them difficult to disrupt. Consequently, they can persist for one or more days, causing air stagnation and the buildup of pollutants. Highest or worst-case ozone levels are often associated with the presence of this type of inversion. Subsidence inversions are common from November through June, but appear to be relatively absent July through October.

South Central Coast Air Basin

The SCAG region includes the Ventura County portion of the SCCAB. Ventura County is made up of coastal mountain ranges, the coastal shore, the coastal plain, and several inland valleys.⁸⁶ The northern half of the county (Los Padres National Forest) is extremely mountainous with altitudes up to 8,800 feet. Consequently, the climate in the northern half of the county varies a great deal depending on elevation. Therefore, the climatological and meteorological description presented for Ventura County focuses on the southern half of the county where violations of federal and state ozone standards occur. In the winter, low-pressure systems originating in the northern Pacific Ocean bring clouds, rain, and wind into Ventura County.

The average annual temperature in the coastal and inland valleys of the southern half of Ventura County ranges from the upper 50s at the coast (Point Mugu) to the mid-60s in Simi Valley. The difference

⁸⁶ Ventura County Air Pollution Control District. November 1996. *1994 Air Quality Management Plan*.

between the maximum and minimum temperatures becomes greater as the distance increases from the coast. The average minimum and maximum temperatures at Point Mugu are 50° F and 60° F, respectively, while at the inland location of Simi Valley, the averages are 52° F and 77° F. The smaller range of temperatures at Point Mugu demonstrates the moderating influence of the ocean on air temperature. The ocean's ability to warm and cool the air while its temperature remains relatively unchanged produces the moderating effect. Inland area temperatures are more prone to rapid fluctuations. Almost all rainfall in Ventura County falls during the winter and early spring (November through April). Summer rainfall is normally restricted to scattered thundershowers in lower elevations and somewhat heavier activity in the mountains. Humidity levels vary throughout the County. The range of humidity is primarily influenced by proximity to the ocean. Although the County's climate is semiarid, average humidity levels are relatively high due to the marine influence. Coastal areas are more humid than inland areas during typical fair weather. The reverse is true during stormy periods. The lowest humidity levels are recorded during Santa Ana wind conditions.

Ventura County winds are dominated by a diurnal land-sea breeze cycle. The land-sea breeze regime is broken only by occasional winter storms and infrequent strong northeasterly Santa Ana wind flows. Since the sea breeze is stronger than the land breeze, the net wind flow during the day is from west to east. Under light land-sea breeze regimes, recirculation of pollutants can occur as emissions move westward during morning hours, and eastward during the afternoon. This can cause a buildup of pollutants over several days.

The vertical dispersion of air pollutants in Ventura County is limited by the presence of persistent temperature inversions. Approximately 60 percent of all inversions measured at Point Mugu are surface-based, with most occurring during the morning hours.

Regional Air Quality

In Southern California, the American Lung Association consistently gives counties within the SCAG region failing grades in the amount of ozone and particulate pollution in the air. The American Lung Association has assigned grades to each of the Counties in the SCAG region for 2015 (**Table 5-1, American Lung Association Report Card for SCAG Region**). Grades were calculated from a weighted average based on the total number of days in each air quality index level. The weighted average was derived by counting the number of days in each unhealthy range in each year (2011–2013), multiplying the total in each range by the assigned standard weights, and calculating the average. All six counties in the SCAG region received a failing grade for ozone, which means there were a significant number of unhealthy air days relative to the ozone standard. For ozone, an "F" grade was set to generally correlate with the number of unhealthy air days that would place a county in nonattainment for the ozone standard. For short-term particle pollution, fewer unhealthy air days are required for an F than for nonattainment under the PM_{2.5} standard. For PM_{2.5}, the national standard allows 2 percent of days in a three-year period to exceed 35 µg/m³, which is roughly 21 unhealthy days in three years, but the American Lung Association uses a more restrictive 1 percent or 99th percentile limit to protect the public from short term spikes in pollution.

**TABLE 5-1
AMERICAN LUNG ASSOCIATION REPORT CARD FOR SCAG REGION**

County	Ozone Grade	Particle Pollution Grade
Imperial	F	D
Los Angeles	F	F
Orange	F	F
Riverside	F	F
San Bernardino	F	D
Ventura	F	B

SOURCE:

American Lung Association. 2015. *State of the Air 2015*. Available at:
http://www.stateoftheair.org/2015/assets/ALA_State_of_the_Air_2015.pdf

Particle Pollution

In December 2009, the EPA linked fine particle pollution (PM_{2.5}) to public health impacts. The EPA determined that fine particle pollution could cause early death, cardiovascular harm, respiratory harm, cancer, and reproductive and developmental harm. In the short term, particle pollution reduces lung function and increases lung tissue inflammation in young, healthy adults. Short-term exposure increases emergency room visits for patients with acute respiratory illnesses, increases number of heart attacks, increases school absenteeism, increases hospitalization of children with asthma, and can even result in deaths on days of high levels of particle pollution.⁸⁷ Asthma in the SCAG region ranges from 28 to 74 per 10,000 people (**Table 5-2, Population-Weighted Asthma Rate per 10,000**). Asthma rates are a good indicator of population sensitivity to environmental stressors because asthma is both caused by and exacerbated by pollutants.

**TABLE 5-2
POPULATION WEIGHTED ASTHMA RATE PER 10,000**

County	Asthma Rate per 10,000
Imperial	74
Los Angeles	44
Orange	28
Riverside	40
San Bernardino	57
Ventura	34
SCAG region	42

SOURCE:

CalEnviroScreen - age-adjusted rate of emergency department (ED) visits for asthma per 10,000 (averaged over 2007-2009).

In 2013, the World Health Organization's International Agency for Research on Cancer linked long-term

⁸⁷ American Lung Association. 2015. *State of the Air 2015*. Available at:
http://www.stateoftheair.org/2015/assets/ALA_State_of_the_Air_2015.pdf

exposure to particle pollution to increased risk of developing lung cancer. Other studies have shown long-term particle pollution exposure increases hospitalization of children with asthma living near busy roads with heavy truck traffic, reduces lung function in children and teenagers, damages small airways of the lungs, increases risk of death from cardiovascular disease, and increases risk of lower birth weight and infant mortality.⁸⁸

Particle pollution particularly has a detrimental effect on sensitive populations including children, elderly, and those with respiratory or cardiovascular illnesses. In March 2015, OEHHA amended their Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments to consider the impact of age, breathing rates, and exposure levels into their cancer risk calculation methodology.

Figure 5-1, Annual Average Concentration of PM_{2.5}, shows the average annual exposure to PM_{2.5} in the SCAG region for years 2009 to 2011. Similar to the 2012 RTP/SCS PEIR, south Los Angeles County, northeast Orange County, southwest San Bernardino County, and northwest Riverside County experienced the highest average annual exposure to PM_{2.5}. The metropolitan area by El Centro and Calexico in Imperial County also show high average annual exposure to PM_{2.5}. Average concentrations in these high exposure areas range from 11.0 to 13.9 micrograms of PM_{2.5} per cubic meter of air. This is below the federal 15 µg/m³ standard, but partially above the state standard of 12 µg/m³, hence resulting in the nonattainment designations in parts of Imperial, Los Angeles, and Riverside Counties and complete nonattainment for PM_{2.5} in Orange and San Bernardino Counties.

Ozone

Ozone is formed when sunlight reacts with NO_x, VOCs, and/or CO. These compounds are typically found in vehicle exhaust, but can also be released into the atmosphere from other sources like chemical solvents, power plants, gas stations, paints, and refineries. In February 2013, the EPA published the “Integrated Science Assessment for Ozone and Related Photochemical Oxidants.” The report concluded that ozone pollution causes respiratory harm, is likely to cause early death and cardiovascular harm, may cause harm to the central nervous system, and may cause reproductive and developmental harm.⁸⁹ High levels of ozone can result in premature death and stroke, acute breathing problems like shortness of breath, wheezing, and coughing, asthma attacks, increase in risk of respiratory infection, increase susceptibility to pulmonary inflammation, and increase in hospitalization and emergency room visits for those with asthma, chronic obstructive pulmonary disease, cardiovascular disease and lung disease. Long term ozone exposure is connected to higher risk of death from respiratory diseases, higher risk of hospitalization for children with asthma especially those that are also low income, higher risk of developing asthma, lower birth weight and decreased lung function in newborns.⁹⁰ Similar to particle pollution, ozone has a detrimental effect on sensitive populations including children, elderly, and those with respiratory or cardiovascular illnesses.

Figure 5-2, Average Daily Ozone Exposure in Excess of the National 8-hr Standard (0.75 ppm), shows

⁸⁸ American Lung Association. 2015. *State of the Air 2015*. Available at: http://www.stateoftheair.org/2015/assets/ALA_State_of_the_Air_2015.pdf

⁸⁹ American Lung Association. 2015. *State of the Air 2015*. Available at: http://www.stateoftheair.org/2015/assets/ALA_State_of_the_Air_2015.pdf

⁹⁰ American Lung Association. 2015. *State of the Air 2015*. Available at: http://www.stateoftheair.org/2015/assets/ALA_State_of_the_Air_2015.pdf

the average daily O₃ exposure in the SCAG region that is in excess of the national 8-hour standard (0.075 ppm) in the SCAG region for years 2009 to 2011. Although the region as a whole largely experiences average daily ozone exposure exceeding the federal standard, the highest concentration of ozone exposure can be seen mostly in southwest San Bernardino and northwest Riverside Counties, and also in northwest Los Angeles County.

Sensitive Receptors

There are many sensitive receptors located throughout the SCAG region (**Figure 5-3, Sensitive Receptors**, and **Table 5-3, Sensitive Receptors by County**). Some persons, such as those with respiratory illnesses or impaired lung function due to other illnesses, people with cardiovascular diseases or diabetes, the elderly over 65 years of age, and children under 14 years of age, can be particularly sensitive to emissions of criteria pollutants. These are the populations most at risk to poor air quality. Facilities and structures where sensitive people live or spend considerable amounts of time are known as sensitive receptors. Land uses identified by SCAQMD in the CEQA Air Quality Handbook to be sensitive receptors include residences, schools, playgrounds, child care centers, athletic facilities, long-term health care facilities, rehabilitation centers, convalescent centers, and retirement homes.

**TABLE 5-3
SENSITIVE RECEPTORS BY COUNTY**

County	Total Sensitive Receptors Count
Imperial	37,329
Los Angeles	1,749,992
Orange	589,844
Riverside	621,196
San Bernardino	556,706
Ventura	219,644

Attainment Status

NAAQS

The federal CAA sets NAAQS for the main criteria air pollutants: NO_x, VOC, PM_{2.5}, PM₁₀, SO_x, CO, and lead. Attainment and nonattainment of the NAAQS is variable throughout the counties within the SCAG region (**Table 5-4, 2015 Nonattainment in Counties in the SCAG Region for All Criteria Pollutants**).

TABLE 5-4
2015 NONATTAINMENT AREAS IN THE SCAG REGION FOR ALL CRITERIA POLLUTANTS BY
COUNTY BY NAAQS

Imperial County	
PM-10 (1987)	Imperial Valley, CA - (Serious)
PM-2.5 (2006)	Imperial Co, CA - (Moderate)
PM-2.5 (2012)	Imperial Co, CA - (Moderate)
8-Hr Ozone (2008)	Imperial County, CA - (Marginal) (Proposed by U.S. EPA to be reclassified to Moderate)
Los Angeles County	
Lead (2008)	Los Angeles County-South Coast Air Basin, CA
PM-2.5 (1997)	Los Angeles-South Coast Air Basin, CA - (Moderate)
PM-2.5 (2006)	Los Angeles-South Coast Air Basin, CA - (Moderate) (requested by SCAQMD to be reclassified to Serious)
PM-2.5 (2012)	Los Angeles-South Coast Air Basin, CA - (Moderate)
8-Hr Ozone (2008)	Los Angeles-San Bernardino Counties (West Mojave Desert), CA - (Severe 15)
8-Hr Ozone (2008)	Los Angeles-South Coast Air Basin, CA - (Extreme)
Orange County	
PM-2.5 (1997)	Los Angeles-South Coast Air Basin, CA - (Moderate)
PM-2.5 (2006)	Los Angeles-South Coast Air Basin, CA - (Moderate)
PM-2.5 (2012)	Los Angeles-South Coast Air Basin, CA - (Moderate)
8-Hr Ozone (2008)	Los Angeles-South Coast Air Basin, CA - (Extreme)
Riverside County	
PM-10 (1987)	Coachella Valley, CA - (Serious)
PM-2.5 (1997)	Los Angeles-South Coast Air Basin, CA - (Moderate)
PM-2.5 (2006)	Los Angeles-South Coast Air Basin, CA - (Moderate)
PM-2.5 (2012)	Los Angeles-South Coast Air Basin, CA - (Moderate)
8-Hr Ozone (2008)	Los Angeles-South Coast Air Basin, CA - (Extreme)
8-Hr Ozone (2008)	Riverside Co, (Coachella Valley), CA - (Severe 15)
San Bernardino County	
PM-10 (1987)	San Bernardino Co, CA - (Moderate)
PM-10 (1987)	Trona, CA - (Moderate)
PM-2.5 (1997)	Los Angeles-South Coast Air Basin, CA - (Moderate)
PM-2.5 (2006)	Los Angeles-South Coast Air Basin, CA - (Moderate)
PM-2.5 (2012)	Los Angeles-South Coast Air Basin, CA - (Moderate)
8-Hr Ozone (2008)	Los Angeles-San Bernardino Counties (West Mojave Desert), CA - (Severe 15)
8-Hr Ozone (2008)	Los Angeles-South Coast Air Basin, CA - (Extreme)
Ventura County	
8-Hr Ozone (2008)	Ventura County, CA - (Serious)

SOURCE:

U.S. Environmental Protection Agency. 30 January 2015. *U.S. EPA Green Book. Current Nonattainment Counties For All Criteria Pollutants*. Available at: <http://www.epa.gov/oaqps001/greenbk/ancl.html>

CAAQS

CAAQS are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations. California has set standards for certain pollutants, such as particulate matter and ozone, which are more protective of public health than respective federal standards. California has also set standards for some pollutants that are not addressed by federal standards such as visibility reducing particles and vinyl chloride (**Table 5-5, CAAQS Area Designations**).

**TABLE 5-5
CAAQS AREA DESIGNATIONS**

County	Ozone	PM _{2.5}	PM ₁₀	CO	NO ₂	SO ₂	Sulfates	HS	Pb	Visibility Reducing Particles
Imperial	N	City of Calexico (N), Remainder of County (A)	N	A	A	A	A	U	A	U
Los Angeles	N	South Coast Air Basin (N), Mojave Desert Air Basin (U)	N	A	A	A	A	U	A	U
Orange	N	N	N	A	A	A	A	U	A	U
Riverside	N	South Coast Air Basin (N), Mojave Desert Air Basin (U), Salton Sea Air Basin (A)	N	A, Mojave Desert Air Basin (U)	A	A	A	U	A	U
San Bernardino	N	N	N	A	A	A	A	U, Searles Valley Planning Area (N)	A	U
Ventura	N	A	N	A	A	A	A	U	A	U

NOTE:

Designation Categories: A = Attainment; N = Nonattainment; T = Nonattainment-Transitional; U = Unclassified.

SOURCE:

California Air Resources Board. 9 January 2015. *Area Designations (Activities and Maps)*. Available at: <http://www.arb.ca.gov/desig/changes.htm#summaries>

Criteria Pollutant Emissions under Existing Conditions

The existing conditions (base year 2012) of the criteria pollutant emissions for the six counties in the SCAG region are shown in **Table 5-6, Criteria Pollutant Emissions by County—Existing Conditions (Base Year 2012)**.

**TABLE 5-6
CRITERIA POLLUTANT EMISSIONS BY COUNTY—EXISTING CONDITIONS (BASE YEAR 2012)**

County	(Tons/Day)								
	ROG		NOx			CO	PM10	PM2.5	SOx
	Summer	Annual	Summer	Annual	Winter	Winter	Annual	Annual	Annual
Imperial	4	4	10	11	11	28	1	0	0
Los Angeles	103	101	179	194	190	851	17	9	1
Orange	28	28	42	46	45	225	5	2	0
Riverside	26	23	66	70	69	183	5	3	0
San Bernardino	32	28	81	86	84	225	6	3	0
Ventura	9	8	12	14	14	70	1	1	0

The SCAG region is encompassed by the CARB's air quality monitoring program. The air monitoring stations collect ambient level measurements for criteria pollutants. The data generated are used to define the nature and severity of pollution in California; determine which areas of California are in attainment or non-attainment; identify pollution trends in the state; support agricultural burn forecasting; and develop air models and emission inventories.⁹¹ There are 64 active air monitoring stations in the SCAG region: nine in Imperial County, 15 in Los Angeles County, five in Orange County, 15 in Riverside County, 14 in the San Bernardino County, and six in Ventura County. These monitoring stations are shown in **Figure 5-4, Air Quality Basins and Monitoring Stations**.⁹²

Health Risk Assessment

The HRA (**Appendix D** to the PEIR) assesses the potential carcinogenic risk to persons potentially exposed to harmful diesel exhaust emissions near freeways within the SCAG region. Using EMFAC 2014, only exhaust diesel particulate matter (DPM, modeled as PM_{2.5} and PM₁₀) and select toxics (i.e., acetaldehyde, benzene, 1,3-butadiene, and formaldehyde) are modeled because these pollutants have carcinogenic health effects. Cancer risk will be used as a corollary for overall health effects in this assessment. Discussed in more detail in **Appendix D** and **Section 4.0, Alternatives**, of this PEIR, the model simulates five conditions: a base year condition representing Existing Conditions, a future condition with the 2016 RTP/SCS, and three future conditions assuming if the 2016 RTP/SCS were not adopted. Comparison between the existing conditions and Plan is described in **Section 3.3.4, Impact Analysis**, in the PEIR.

⁹¹ California Air Resources Board. 1 July 2015. *Ambient Air Quality Monitoring*. Available at: <http://www.arb.ca.gov/aaqm/aaqm.htm>

⁹² California Air Resources Board. 24 September 2014. *Quality Assurance Air Monitoring Site Information*. Available at: <http://www.arb.ca.gov/qaweb/site.php>

The emissions and cancer risk are evaluated along 16 different transportation corridors that were determined according to proximity to sensitive receptors and population, traffic, and vehicle miles traveled (VMT). Heavy duty diesel trucks (HDDT) comprise the majority of DPM emissions. An AERMOD dispersion model was used to project the DPM concentrations at pre-identified receptors out to 1,000 meters away from the freeway. Cancer risk from the DPM was escalated by 5 percent to account for other select toxics. (This percentage was identified as a good approximation in a MOVES2014 analysis.) Risk calculations are included for worker, residential, and sensitive receptors. **Table 1-1, Summary Maximum Exposed Individual Residential 30-year Exposure Cancer Risk**, in the HRA (**Appendix D**), contains a summary of the cancer risk per million exposed persons for each of the five scenarios and 16 freeway segments.

Ambient Air Quality

The five air districts in the SCAG region each monitor air quality conditions in their region. The characterization of the ambient air quality in relation to criteria pollutants was based on peak readings of criteria pollutants in the SCAG air basins (**Table 5-7, Peak Criteria Pollutants Readings for the SCAG Region Air Basins**). The data shows that O₃, PM_{2.5}, and PM₁₀ readings consistently exceeded the standards in each of the air basins.

**TABLE 5-7
PEAK CRITERIA POLLUTANTS READINGS FOR THE SCAG REGION AIR BASINS**

Pollutant	Period	Pollutant Standards		2011 Peak Criteria Reading		Days in Excess of Standards 2011		2012 Peak Criteria Reading		Days in Excess of Standards 2012		2013 Peak Criteria Reading		Days in Excess of Standards 2013	
		CA	Federal	CA	Federal	CA	Federal	CA	Federal	CA	Federal	CA	Federal	CA	Federal
South Coast Air Basin															
Ozone (O ₃)	1-hour	0.09 ppm (180 µg/m ³)	—	0.160		90	16	0.147		97	12	0.151		70	5
	8-hour	0.07 ppm (137 µg/m ³)	0.075 ppm (147 µg/m ³)	0.136		125	106	0.112		140	111	0.122		119	88
Respirable Particulate Matter (PM ₁₀)	24-hour	50 µg/m ³	150 µg/m ³	CA 119.7	Federal 152.9	23	0	CA 90.9	Federal 104.8	97	0	CA 199.2	Federal 286	86	2
Fine Particulate Matter (PM _{2.5})	24-hour	—	35 µg/m ³	CA 97.4	Federal 94.6	—	17	CA 182.2	Federal 58.7	—	17	CA 170.8	Federal 60.3	—	13
Carbon Monoxide (CO)	8-hour	9.0 ppm (10 mg/m ³)	9 ppm (10 mg/m ³)	4.67		0	0	3.96		0	0	—		0	0
Nitrogen Dioxide (NO ₂)	1-hour	0.18 ppm (339 µg/m ³)	100 ppb (188 µg/m ³)	CA 109	Federal 109.6	0	1	CA 97	Federal 97.8	0	0	CA 104	Federal 104.6	0	1
Mojave Desert Air Basin															
Ozone (O ₃)	1-hour	0.09 ppm (180 µg/m ³)	—	0.132		57	1	0.119		44	0	0.120		22	0

**TABLE 5-7
PEAK CRITERIA POLLUTANTS READINGS FOR THE SCAG REGION AIR BASINS**

Pollutant	Period	Pollutant Standards		2011 Peak		Days in Excess of Standards 2011		2012 Peak		Days in Excess of Standards 2012		2013 Peak		Days in Excess of Standards 2013	
		CA	Federal	Criteria Reading		CA	Federal	Criteria Reading		CA	Federal	Criteria Reading		CA	Federal
		µg/m ³													
	8-hour	0.070 ppm (137 µg/m ³)	0.075 ppm (147 µg/m ³)	CA 0.114	Federal 0.113	138	95	CA 0.108	Federal 0.108	123	81	CA 0.097	Federal 0.097	105	66
Respirable Particulate Matter (PM ₁₀)	24-hour	50 µg/m ³	150 µg/m ³	CA 138.7	Federal 143.4	18	0	CA 96.6	Federal 181.6	18	1	CA 173.4	Federal 305.2	26	1
Fine Particulate Matter (PM _{2.5})	24-hour	—	35 µg/m ³	CA 50	Federal 50	—	1	CA 49.5	Federal 67.7	—	2	CA 76.2	Federal 76.2	—	6
Carbon Monoxide (CO)	8-hour	9.0 ppm (10 mg/m ³)	9 ppm (10 mg/m ³)	1.51		0	0	1.83		0	0	—		0	0
Nitrogen Dioxide (NO ₂)	1-hour	0.18 ppm (339 µg/m ³)	100 ppb (188 µg/m ³)	CA 77	Federal 77	0	0	CA 146	Federal 146	0	7	CA 84	Federal 84.9	0	0
Salton Sea Air Basin															
Ozone (O ₃)	1-hour	0.09 ppm (180 µg/m ³)	—	0.124		29	0	0.126		27	1	0.113		20	0

**TABLE 5-7
PEAK CRITERIA POLLUTANTS READINGS FOR THE SCAG REGION AIR BASINS**

Pollutant	Period	Pollutant Standards		2011 Peak		Days in Excess of Standards 2011		2012 Peak		Days in Excess of Standards 2012		2013 Peak		Days in Excess of Standards 2013	
		CA	Federal	Criteria Reading	CA	Federal	Criteria Reading	CA	Federal	Criteria Reading	CA	Federal	CA	Federal	
	8-hour	0.070 ppm (137 µg/m³)	0.075 ppm (147 µg/m³)	CA 0.099	Federal 0.098	81	59	CA 0.101	Federal 0.100	93	58	CA 0.104	Federal 0.104	89	53
Respirable Particulate Matter (PM ₁₀)	24-hour	50 µg/m³	150 µg/m³	CA 324	Federal 396.9	93	2	CA 387.3	Federal 406.2	103	2	CA 385.7	Federal 255.2	144	3
Fine Particulate Matter (PM _{2.5})	24-hour	—	35 µg/m³	CA 103.5	Federal 80.3	—	3	CA 78.5	Federal 64.7	—	2	CA 70.8	Federal 36.3	—	1
Carbon Monoxide (CO)	8-hour	9.0 ppm (10 mg/m³)	9 ppm (10 mg/m³)	9.01		0	0	4.47		0	0	—		0	0
Nitrogen Dioxide (NO ₂)	1-hour	0.18 ppm (339 µg/m³)	100 ppb (188 µg/m³)	CA 130	Federal 130	0	2	CA 91	Federal 91	0	0	CA 156	Federal 156.9	0	2
South Central Coast Air Basin															
Ozone (O ₃)	1-hour	0.09 ppm (180 µg/m³)	—	0.110		4	0	0.106		4	0	0.104		3	0
	8-hour	0.070 ppm (137 µg/m³)	0.075 ppm (147 µg/m³)	CA 0.091	Federal 0.090	30	11	CA 0.088	Federal 0.087	52	22	CA 0.089	Federal 0.089	23	7

TABLE 5-7
PEAK CRITERIA POLLUTANTS READINGS FOR THE SCAG REGION AIR BASINS

Pollutant	Period	Pollutant Standards		2011 Peak		Days in Excess of Standards 2011		2012 Peak		Days in Excess of Standards 2012		2013 Peak		Days in Excess of Standards 2013	
		CA	Federal	Criteria Reading	CA	Federal	Criteria Reading	CA	Federal	Criteria Reading	CA	Federal			
Respirable Particulate Matter (PM ₁₀)	24-hour	50 µg/m ³	150 µg/m ³	CA 140.4	Federal 134.2	68	0	CA 186.4	Federal 180.9	69	3	CA 595.6	Federal 218.1	95	1
Fine Particulate Matter (PM _{2.5})	24-hour	—	35 µg/m ³	CA 34.6	Federal 34.6	—	0	CA 41.9	Federal 41.9	—	4	CA 39.6	Federal 39.6	—	2
Carbon Monoxide (CO)	8-hour	9.0 ppm (10 mg/m ³)	9 ppm (10 mg/m ³)	1.89		0	0	1.11		0	0	—		0	0
Nitrogen Dioxide (NO ₂)	1-hour	0.18 ppm (338 µg/m ³)	100 ppb (190 µg/m ³)	CA 90	Federal 90	0	0	CA 58	Federal 58	0	0	CA 139	Federal 139	0	1

SOURCE:

California Air Resources Board. Accessed 8 May 2015. *Top 4 Summary: Select Pollutant, Years, & Area*. Available at: <http://www.arb.ca.gov/adam/topfour/topfour1.php>

6.0 METHODS OF ANALYSIS

The methodology for determining the significance of air quality impacts compares the existing conditions to the future 2016 RTP/SCS, as required in CEQA Section 15126.2(a). Analysis of the potential air quality impacts of the Plan was conducted based on SCAG's Regional Travel Demand Model, evaluation of relevant AQMPs/SIPs, and a Mobile Source Health Risk Assessment (HRA).

The HRA evaluated the emissions and potential health risks associated with vehicle traffic on 16 different freeway segments. Eight of these segments were evaluated in a previous PEIR associated with the 2012-2035 RTP/SCS. Eight additional segments were also selected based on 2012 vehicle miles traveled (VMT) data and sensitive receptor locations. Qualifying freeway segments identified as having at least one sensitive receptor within 500 meters were then ranked based on heavy duty truck (HDT) VMT, considering the amount of truck traffic in both directions. Segments were not considered that were considered distant from populated areas with minimal (i.e., less than two) sensitive receptors (e.g., near the base of the Grapevine on I-5) or where the additional segment was an extension of the one of the original eight segments. In these cases, the next most appropriate segment was chosen following the criteria above and some subjective considerations based on population density, anticipation of future growth in the HRA study area. For each of the 16 freeway segments, five HRA simulations were analyzed:

- Simulation 1: Represents Existing Conditions (or baseline simulation);
- Simulation 2: Represents future (2040) conditions under the No Project Alternative;
- Simulation 3: Represents future (2040) conditions under the 2016 RTP/SCS or the Proposed Project;
- Simulation 4: Represents future (2040) conditions under the 2012 RTP/SCS with Local Input Alternative;
- Simulation 5: Represents future (2040) conditions under the Intensified Land Use Alternative.

The HRA used dispersion modeling from CARB-approved AERMOD dispersion model (Version 15181), meteorology data from South Coast, Imperial, and Ventura Air Districts' monitoring sites, and EMFAC 2014 for the emission factors from 2016 to 2040. The cancer risk was determined by the diesel particulate matter (DPM) emissions from heavy duty trucks (HDT) and was scaled upward by 5 percent to account for other select toxics, as determined by a prior sample calculation. Since only DPM is being evaluated with only the inhalation pathway, risk calculations were prepared in a spreadsheet using the OEHHA Guidance risk calculation procedures and default parameters. This cancer risk analysis is consistent with February 2015 Air Toxic Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments published by the OEHHA.

GHG emissions were analyzed based off of the Scenario Planning Model (SPM) and SCAG's Regional Travel Demand Model, completed in 2015 (see **Table 6-1, Scenario Planning Model Metrics Assumptions**). The SPM includes model run data for energy, water, non-transportation GHG emissions, and public health data. GHG emissions and transportation data were projected to 2040 using SCAG's Regional Travel Demand Model, and ARB's EMFAC2014 emissions model.

**TABLE 6-1
SCENARIO PLANNING MODEL METRICS ASSUMPTIONS**

	Baseline	Adopted		
		2020	2035	2040
TRANSPORTATION				
Vehicle efficiency (mi/gal)	22.0 mpge	28.0 mpge	28.0 mpge	28.0 mpge
Fuel price (\$/gal, 2014 dollars)	\$4.00	\$4.40	\$5.60	\$6.00
Auto ownership and maintenance (\$/mile, 2014 dollars)	\$0.35	\$0.35	\$0.35	\$0.35
Tank-to-Wheels Fuel Emissions (lbs CO ₂ e/gal)	19.62 lbs/gal	17.66 lbs/gal	17.66 lbs/gal	17.66 lbs/gal
BUILDINGS				
Residential & commercial building electricity emissions (lbs CO ₂ e/kWh)	0.74 lbs/kWh	0.58 lbs/kWh	0.58 lbs/kWh	0.58 lbs/kWh
Residential & commercial building natural gas emissions (lbs CO ₂ e/therm)	11.66 lbs/thm	11.66 lbs/thm	11.66 lbs/thm	11.66 lbs/thm
Electricity price (\$/kWh)	\$0.15	\$0.17	\$0.23	\$0.25
Natural gas price (\$/kWh)	\$1.18	\$1.40	\$2.08	\$2.30
Water price (\$/acre foot)	\$1,200	\$1,267	\$1,493	\$1,577
Indoor water energy use (kWh) - Supply, conveyance, treatment, water and wastewater distribution	13,021 kWh/MG	13,021 kWh/MG	13,021 kWh/MG	13,021 kWh/MG
Outdoor water energy use (kWh) - Supply, conveyance, treatment, distribution	11,110 kWh/MG	11,110 kWh/MG	11,110 kWh/MG	11,110 kWh/MG
Effective average residential building energy efficiency (-10/25/30% new, -10/20/25% existing)		-3%	-9%	-13%
Effective average commercial building energy efficiency (-10/25/30% new, -10/20/25% existing)		-3%	-9%	-13%
Effective average residential building water efficiency (-10/25/30% new, -10/20/25% existing)		-3%	-9%	-14%
Effective average commercial building water efficiency (-10/25/30% new, -10/20/25% existing)		-3%	-9%	-14%
PUBLIC HEALTH (Pollution-related)				
GHG (Social Cost of Carbon) 1				\$41
NO _x 2				\$1,773
SO _x 2				\$0
CO 2				\$0
VOC 2				\$1,773
PM _{2.5} 3, 4				\$813,900
Indirect PM: NO _x 3, 4				\$63,313
Indirect PM: SO _x 3, 4				\$66,051
Indirect PM: VOC 3, 4				\$8,369
Public health cost inflation factor (2010\$ to 2015\$)				1.08

SOURCE:

SCAG Scenario Planning Model, 2015.

Analysis of the potential GHG impacts of the Plan was conducted based on detailed modeling of on-road and gross estimates of stationary sources. It is anticipated that future conservation (as a result of increased pressure to conserve and increased prices) will result in reduced demand. As energy providers and water suppliers respond to AB 32 and the Scoping Plan emission rates associated with

power and water delivery are anticipated to decrease. However, in order to present a conservative analysis and without specific information on future demand factors, only modest reductions in demand are assumed.

7.0 AIR QUALITY AND GREENHOUSE GAS EMISSIONS ANALYSIS

Air Quality Analysis

The 2016 RTP/SCS would have a significant impact related to air quality if it would:

- Conflict with or obstruct implementation of the applicable air quality plan
- Violate any air quality standard or contribute substantially to an existing or projected air quality violation
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under applicable NAAQS or CAAQS
- Expose sensitive receptors to substantial pollutant concentrations and harm public health outcomes substantially
- Expose a substantial number of people to objectionable odors

Even though public health is not a CEQA issue area, this impact analysis was conducted from a public health lens as air quality is closely related to public health. The analysis relies primarily on the results of the HRA, as a corollary for public health. EPA has established a cancer risk threshold that has been accepted by the air districts within the SCAG region. Diesel particulate matter has been documented to affect respiratory health especially in the very young and senior populations. OEHHA has established a model for calculating the cancer risk that is primarily driven by diesel particulate matter. Therefore, SCAG prepared an HRA to evaluate the cancer risk associated with the Plan. Particular emphasis was placed on selecting transportation corridors that evaluated impacts to at risk populations. The results of that analysis have been used to characterize the impacts to public health with respect to the changes in air quality.

IMPACT Air-1: Potential to conflict with or obstruct implementation of the applicable air quality plan.

Less than Significant Impact

The 2016 RTP/SCS would result in a less than significant impact to air quality related to the potential to conflict with or obstruct implementation of the adopted SIPs/AQMPs/Attainment Plans in the SCAG region because the projected long-term emissions are in alignment with the local SIPs/AQMPs as demonstrated in the transportation conformity analysis, found in the appendices to the 2016 RTP/SCS. The emissions resulting from the Plan are within the applicable emissions budgets as stated in the SIPs/AQMPs for each nonattainment or maintenance area for all milestone, attainment, and planning horizon years.

As described in the Regulatory Framework, above, when a region is in nonattainment for any of the six criteria air pollutants relative to the NAAQS, the federal CAA requires states to develop SIPs to achieve the federal standard. The AQMPs are required as part of the SIP. Within the SCAG region, the 8-hour federal ozone standard is designated nonattainment for all the six counties. The only other of the six criteria pollutants designated nonattainment are PM_{2.5} and PM₁₀. As a result, all the SIPs in the SCAG region focus on reducing ozone emissions and may also focus on particle pollution. The following air quality plans applicable to the 2016 RTP/SCS are: 2012 SCAQMD Air Quality Management Plans (AQMP),

MDAQMD Federal 8-hour Ozone Attainment Plan (2008), Imperial County 2013 SIP, ICAPCD 1997 8-Hour Ozone Modified Air Quality Management Plan (2009), AVAQMD Federal 8-hour Ozone Attainment Plan (2008), and the VCAPCD Air Quality Management Plan (2008).

The goals of the air quality management plans and attainment plans are to establish a strategy for achieving the standards by a set date by listing all feasible control measures. These control measures help advance the attainment date and are financially, economically, and socially feasible. As standards become more stringent with time, achieving the standards becomes a moving target that the air quality districts and air-related plans must continue to chase. At this current snapshot in time (2015), the Plan would be not in conflict with the existing air-related plans if it was aligned with the feasible control measures. For example, the 2012 SCAQMD AQMP was written in alignment with the 2012 RTP/SCS, incorporating the latest scientific, technological, and regulatory information and planning assumptions as of December 7, 2012.

The 2016 RTP/SCS would result in more aggressive regional transportation and land use strategies than the 2012 RTP/SCS with respect to achieving emission reductions as it has a greater emphasis on more compact development in existing urbanized areas and opportunity areas, higher investments and more integrated strategies for active transportation, higher investments for transit and passenger rail, and a greater emphasis on building a balanced regional blueprint for improving public health and ensuring quality of life (as discussed in **Section 2.0, Project Description**, of this PEIR). This is evident by the 2016 RTP/SCS transportation project types that allocate funding and planning efforts on trail access, regional greenway network, regional and local bikeway network, and pedestrian improvements by using a “complete street” approach; transit (rail, bus) improvements and new facilities; rideshare/vanpool programs; high-occupancy vehicle (HOV) lanes; traffic calming and signal improvements; and streetscape/landscape projects. The mission and resultant project list from the 2016 RTP/SCS strive to reduce emissions in both mobile and stationary sources by increasing density and reducing VMT. Additionally, land use strategies proposed in the Plan seek to balance the region’s strategic transportation investments and land use choices and are coordinated with the committed and projected transportation investments in the region that emphasize system preservation and enhancement, active transportation, and land use integration. These efforts are in alignment with the attainment plans and air quality management plans’ goals to reduce emissions of pollutants in nonattainment areas. Therefore, the Plan is expected to have a less than significant impact to conflict with or obstruct implementation of the applicable air quality plan, and the consideration of mitigation measures is not warranted.

IMPACT Air-2: Potential to violate any air quality standard or contribute substantially to an existing or projected air quality violation.

Significant Impact

The construction and operation of individual transportation projects and anticipated development as result of the proposed transportation and land use strategies in the 2016 RTP/SCS are expected to have the potential to violate air quality standards or contribute substantially to an air quality violation, thus requiring the consideration of mitigation measures.

Long Term. Under the 2016 RTP/SCS, air emissions were estimated in 2040 (with the Plan) and compared to existing conditions (2012 base year). The calculated emissions were compiled for ROG,

NO_x, CO, PM₁₀, PM_{2.5}, and SO_x for each county in the SCAG region. For every criteria pollutant in every county in the SCAG region, there are air pollutant emission reductions or no change between the Plan in 2040 and existing conditions (**Table 7-1 Criteria Pollutant Emissions by County— Plan [2040] vs. Existing Conditions [2015]**). There is a less than significant impact to Impact Air-2 in the long term.

**TABLE 7-1
CRITERIA POLLUTANT EMISSIONS BY COUNTY— PLAN (2040) VS. EXISTING CONDITIONS (2015)**

County		(Tons/Day)								
		ROG		NO _x			CO	PM ₁₀	PM _{2.5}	SO _x
		Summer	Annual	Summer	Annual	Winter	Winter	Annual	Annual	Annual
Imperial	Existing	4	4	10	11	11	28	1	0	0
	Plan	2	2	3	3	3	13	1	0	0
	Difference	-2	-2	-7	-7	-7	-14	0	0	0
Los Angeles	Existing	103	101	179	194	190	851	17	9	1
	Plan	21	21	35	37	36	141	14	6	1
	Difference	-81	-80	-144	-157	-154	-711	-3	-3	0
Orange	Existing	28	28	42	46	45	225	5	2	0
	Plan	7	7	8	8	8	44	5	2	0
	Difference	-21	-21	-35	-38	-37	-181	0	-1	0
Riverside	Existing	26	23	66	70	69	183	5	3	0
	Plan	8	7	14	15	15	42	5	2	0
	Difference	-19	-17	-52	-55	-55	-141	0	-1	0
San Bernardino	Existing	32	28	81	86	84	225	6	3	0
	Plan	8	7	22	22	22	46	6	2	0
	Difference	-24	-21	-59	-64	-63	-179	0	-1	0
Ventura	Existing	9	8	12	14	14	70	1	1	0
	Plan	2	2	2	2	2	11	1	0	0
	Difference	-7	-7	-10	-11	-11	-59	0	0	0

SOURCE:

SCAG Transportation Modeling, 2015.

NOTE: Please note that 2012 base year network includes projects in the 2015 Federal Transportation Improvement Program (FTIP) adopted in September 2014 and projects in the 2012 RTP/SCS as last amended in September 2014.

The analysis of air quality also includes a comparison between the expected future conditions with the Plan and the expected future conditions if no Plan (No Project Alternative) were adopted. This evaluation is not included in the determination of the significance of impacts (which is based on a comparison of future conditions with the Plan to existing conditions); however, it provides a meaningful perspective on the effects of the Plan. **Figure 7-1, PM_{2.5} Emissions Change**, and **Figure 7-2, CO Emissions Change**, compare the Baseline (2040) emissions with the Plan (2040) emissions for PM_{2.5} and CO. The classification in the figures range from ≤ 2.5 standard deviations (SD), -2.5 to -1.5 SD, -1.5 to -0.5 SD, -0.5 to 0.5 SD, 0.5 to 1.5 SD, 1.5 to 2.5 SD, and >2.5 SD. CO and PM_{2.5} emissions mainly originate from vehicle exhaust, so their emissions are closely tied to transportation patterns and total VMT. In 2040, the Plan has less PM₁₀, PM_{2.5}, and CO emissions relative to Baseline, which could be attributed to policies that increase density in urban areas and active transportation (e.g., walking and

biking) in the urban areas. Additionally, heavy duty vehicles which would incorporate emission reducing technology would also result in reduced emissions in nearby sensitive receptors. Since urban areas are responsible for most of the CO and PM_{2.5} emissions, the Plan has less PM_{2.5} and CO emissions relative to the No Project Alternative.

Short Term. The 2016 RTP/SCS would result in construction of transportation projects, buildings, and general development as the region grows. These construction activities would result in short-term emissions of air pollutants including ROG, NO_x, PM₁₀, PM_{2.5} and fugitive dust. The sources associated with these emissions include construction equipment, employee and vendor vehicles, demolition, grading and other ground-disturbing activities, application of paint and other coatings, paving, and others. Typically larger projects are associated with larger emissions during construction.

Since the 2016 RTP/SCS documents transportation projects in the six-county area, it is more than likely that multiple simultaneous construction projects would occur, resulting in greater cumulative emissions. While construction is transient in nature, short-term emissions from construction have the potential to contribute substantially to localized and daily thresholds. The SCAQMD sets mass daily thresholds for both construction and operation for the six main criteria pollutants and lead. All the air districts in the SCAG region also have a relevant fugitive dust rule that applies to construction activities. Therefore, the 2016 RTP/SCS would have the potential to result in a significant impact in the short term.

IMPACT Air 3: Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under applicable NAAQS or CAAQS.

Less than Significant Impact

The 2016 RTP/SCS would not result in a cumulatively considerable net increase of any criteria pollutant for which the region is designated nonattainment because the projected long-term emissions are in alignment with the local AQMPs/SIPs as demonstrated in the conformity analysis. The criteria pollutants that have a violation under the NAAQS are summarized in **Table 5-3**. The SCAG region is currently in nonattainment for PM_{2.5}, PM₁₀, and ozone. These pollutants are the same ones that violate the CAAQS as well (**Table 5-5**). The Plan when compared to existing conditions, would result in either no change or a decrease for PM_{2.5} and PM₁₀ (**Table 5-6**). Ozone is assessed using the emissions for the ozone precursors which include ROG and NO_x. Since ROG and NO_x emissions show a decrease from the existing conditions to the Plan, they will not contribute to a net increase in ozone.

Pursuant to the U.S. EPA's Transportation Conformity Regulations, the regional emissions tests are met if plan emissions are within the applicable emissions budgets for each nonattainment or maintenance area for all milestone, attainment, and planning horizon years and, if no emissions budgets have been established, the Plan/build emissions are less than the no-build emissions or the base-year emissions. The emissions budgets that were established in the AQMPs/SIPs in the SCAG region and have been approved by the U.S. EPA function as the applicable emission budgets for the conformity analysis for the respective nonattainment and maintenance areas. Federal conformity regulations also require the regional emissions analysis to be based on the Latest Planning Assumptions that include the latest vehicle data (fleet, age, activity) and latest socioeconomic growth forecast. A conformity determination must be made for each nonattainment and maintenance area in the region. In addition to the regional emissions analysis, the Plan is also required to pass (1) the timely implementation of the Transportation

Control Measures (TCM) test, (2) the Financial Constraint test, and (3) the Interagency Consultation and Public Involvement test.

The regional emissions analysis serves as a reasonable analysis of cumulative air quality impacts of the Plan. The 2016 RTP/SCS meets the regional emissions tests for each nonattainment and maintenance area and for all milestone, attainment, and planning horizon years. The Transportation Conformity analysis can be found in the appendices of the 2016 RTP/SCS. The analysis concludes that the Plan meets all federal and state requirements for meeting attainment goals throughout the SCAG region as demonstrated by no net increase in any of the criteria pollutants that are currently in non-attainment according to the Plan (**Table 5-6**). Therefore, there would be less than significant impact, and the consideration of mitigation measures is not warranted.

IMPACT Air-4: Expose sensitive receptors to substantial pollutant concentrations and harm public health outcomes substantially.

Significant Impact

Despite diesel emission reductions, the cancer risk as measured along the freeways is above the threshold with the 2016 RTP/SCS, a significant impact to sensitive receptors and public health exists, thus requiring the consideration of mitigation measures.

Sensitive Receptors. Substantial concentrations of air pollutants are linked to adverse health effects especially when located in proximity to sensitive receptors. Because certain populations such as children and elderly are more sensitive to air pollution, it is critical to identify the effect of the 2016 RTP/SCS has on these populations. Sensitive receptors are identified as locations where people reside as they spend a significant amount of time in that location as well as schools, medical facilities, senior centers, nursing homes, etc. CARB recommends that local governments avoid locating new sensitive land uses within 500 feet of freeways. Consistent with CARB and public input, the 2016 RTP/SCS limits placing new growth within 500 feet.

As shown in **Table 7-2, Sensitive Receptors by County**, only a small portion of the total number of existing sensitive receptors in the six counties are affected by the transportation projects listed in the 2016 RTP/SCS.

**TABLE 7-2
SENSITIVE RECEPTORS BY COUNTY**

County	Sensitive Receptors Count within 500-Foot Buffer of Projects	Total Sensitive Receptors Count	% Sensitive Receptors within 500-Foot Buffer of Projects
Imperial	829	37,329	2%
Los Angeles	92,491	1,749,992	5%
Orange	31,516	589,844	5%
Riverside	14,311	621,196	2%
San Bernardino	11,910	556,706	2%
Ventura	2,839	219,644	1%

To assess public health risks caused by emissions, a Health Risk Assessment (HRA) was prepared

(**Appendix D**) for this PEIR. The HRA evaluates potential carcinogenic health risks from emissions of diesel particulate matter (DPM) and other air toxics from motor vehicles on major freeways and transportation corridors. Ambient PM_{10} and $PM_{2.5}$, of which DPM is one component, have been associated with acute (short-term) and chronic (long-term) health effects, such as the worsening of heart and lung diseases. Elevated levels of ambient particulate matter have also been identified as one of many aggravating factors for childhood asthma. PM_{10} and $PM_{2.5}$ are a health concern, particularly at levels above the federal and State ambient air quality standards. $PM_{2.5}$ is thought to have greater effects on health because smaller particles are able to penetrate to the deepest parts of the lungs.

Scientific studies have suggested links between fine particulate matter and numerous health problems, including asthma, bronchitis, and acute and chronic respiratory symptoms such as shortness of breath and painful breathing.⁹³ Children are more susceptible to the health risks of $PM_{2.5}$ because their immune and respiratory systems are still developing. Very small particles of certain substances (e.g., sulfates and nitrates) can also directly cause lung damage or can contain absorbed gases (e.g., chlorides or ammonium) that may be injurious to health.⁹⁴

The HRA quantitatively analyzed the potential to expose people to increased cancer and other health risks, based on using the potential for increased cancer risk from diesel particulate matter from heavy-duty diesel trucks traveling on major freeways. Cancer risk is used as a corollary for general respiratory health. Only motor vehicle emissions on freeways were quantitatively evaluated because emissions from other transportation corridors are much less than emissions on major freeways. The declines in cancer risk across all freeway segments are the result of continued decreases in per-vehicle mile fleet emissions projected to occur due to continued emission control technology improvements in new vehicles.

The HRA evaluated 16 freeway segments (as shown on **Figure 3.3.4-3, Overview Freeway Segments to Be Evaluated**). Emissions of DPM from each segment were calculated using the SCAG Transportation Demand Model VMT data for 2012 base year and projections for 2040 Plan. The potential cancer risk for residences was evaluated for a 30-year exposure, 9-year exposure and 70-year exposure. SCAG VMT data was provided for heavy duty vehicles and light/medium duty vehicles. The most current version of the California Air Resources Board (CARB) mobile source emissions model (EMFAC 2014) was used to obtain emission factors of particulate matter less than 10 microns diameter in diesel-fueled vehicles, which were assumed equal to DPM emission factors.

The potential impacts of emissions from a representative 1-mile long portion of the freeway segment were evaluated with CARB-approved AERMOD dispersion model (Version 15181) and meteorological data obtained from South Coast, Imperial, and Ventura Air District monitoring sites. The calculated DPM concentration was then used to calculate the potential carcinogenic risk using the most current HRA guidelines published by the California Office of Environmental Health Hazard Assessment (OEHHA). The potential cancer risk calculated for DPM was increased by 5 percent to account for the additional organic gases of acetaldehyde, benzene, 1-3-butadiene, and formaldehyde based on observations of past data.

⁹³ *Research Results on Land Use, Transportation, and Community*. November 2011. Available at: <http://activelivingresearch.org/land-use-transportation-and-community-design-research-summary-slides>

⁹⁴ *Id.*

To analyze potential cancer risk with respect to DPM, a baseline threshold of 10 per one million was utilized.⁹⁵ To clarify, the cancer risk in a given area is a measure of any one person's likelihood (chance) of contracting cancer due to exposure from a particular carcinogen; it is not a measure of how many people would actually contract cancer. This threshold is supported by air quality management districts in California, CARB and OEHHA. A 30-year exposure cancer risk was used in this analysis for a highly conservative scenario. This timeframe was selected as the typical resident lives in a home for approximately 30 years. Additionally, the analysis also assumed that the person would stay in the same place for 30 years, 7 days a week, 24 hours a day. As shown on **Table 7-3, Summary Maximum Exposed Individual Residential 30-Year Exposure Cancer Risk** (see also **Appendix D**), the maximum 30-year exposure to residential cancer risk for each transportation segment is significantly reduced when compared to existing conditions. While the VMT would rise under the Plan, the maximum potential cancer risk is on the order of 50 to 90 percent less than existing conditions. This is due to the dramatic reduction in emissions that are expected due to the federal and state regulations that require reduced emissions from on-road heavy-duty diesel trucks (HDDT). It is important to note that despite the reduction in cancer risk compared to existing conditions, the Plan would still result in minor exposure sensitive receptors to substantial pollutant concentrations and would slightly exceed the cancer risk threshold (10 in a million). As shown on **Table 7-3**, 15 of the 16 freeway segments exceeds the 10 in a million threshold, with the exception of Segment 2 (IMP SR-78, Imperial/Westmoreland), which is at 9 in a million. Despite the significant reduction in DPM emissions, impacts are still above the cancer risk threshold and are significant.

⁹⁵ South Coast Air Quality Management District. March 2015. *SCAQMD Air Quality Significance Thresholds*. Available at: <http://www.aqmd.gov/docs/default-source/ceqa/handbook/scaqmd-air-quality-significance-thresholds.pdf?sfvrsn=2>

TABLE 7-3
SUMMARY MAXIMUM EXPOSED INDIVIDUAL RESIDENTIAL 30-YEAR EXPOSURE CANCER RISK

Segment No.	Transportation Segment	County/Region	Existing Conditions	2016 RTP/SCS	Exceed Thresholds?
1	IMP I-8	Imperial / El Centro	125	19	Yes
2	IMP SR-78	Imperial / Westmoreland	82	9	No
3	LA I-110	Los Angeles / Carson	664	46	Yes
4	LA I-710	Los Angeles / Compton	847	55	Yes
5	LA SR-60 DB	Los Angeles / Diamond Bar	1,101	60	Yes
6	LA SR-60 SEM	Los Angeles / South El Monte	763	44	Yes
7	ORA I-5	Orange / Orange	455	33	Yes
8	ORA I-405	Orange / Seal Beach	1,142	78	Yes
9	RIV I-10	Riverside / Banning	152	15	Yes
10	RIV I-15	Riverside / Temecula	366	38	Yes
11	RIV SR-91	Riverside / Corona	937	55	Yes
12	SB I-15 ONT	San Bernardino / Ontario	236	25	Yes
13	SB I-15 VIC	San Bernardino / Victorville	524	64	Yes
14	SB SR-60	San Bernardino / Ontario	810	39	Yes
15	VEN US-101 SB	Ventura / San Buenaventura	165	11	Yes
16	VEN US-101 TO	Ventura / Thousand Oaks	832	48	Yes

SOURCE:Health Risk Assessment (**Appendix D**).**NOTE:**

Cancer Risk Threshold is 10 per 1 million.

Public Health. In addition to emissions, multiple social, economic, and lifestyle factors could contribute to the detriment to the public health of a region. Built upon the public health emphasis of the 2012 RTP/SCS, the 2016 RTP/SCS places an even greater emphasis on public health. SCAG has evaluated social determinants including the community context, availability of health care, neighborhood and surrounding built environment, education, and economic health to see how these factors shape public health. With nearly half of U.S. adults living with a chronic disease, SCAG recognizes improving public health is vital to the community. The Surgeon General promotes increasing physical activity as one strategy to improve public health. While VMT from heavy duty trucks would increase, SCAG's Plan would decrease personal vehicle usage and increase active transportation. There is a growing support for increasing active transportation throughout the communities in the region. These changes can only be met if there is also a change in the built environment that enables people to walk safely in their communities. Proposed land use strategies and transportation investments such as provision of additional investments in active transportation networks including first/last mile improvements, Safe Routes to School projects, and regional bikeways infrastructures are expected to increase the number of short trips and improve physical activity outcomes. The statewide Affordable Housing and Sustainable Communities (AHSC) program, as noted in the Plan, would help to lower VMT traveled and AQ/GHG emissions by funding housing and transportation improvements. The program focuses on creating HQTAs.

The 2016 SCAG RTP/SCS includes regional strategies that may contribute to improving public health. As discussed in **Section 2.0, Project Description**, of this PEIR, these strategies include, for example, increased transportation investments in active transportation opportunities and facilities, transit and

passenger rail use, and land use strategies that create more opportunities for walking and biking or other physical activities. The RTP/SCS projects that daily VMT will increase in all counties above baseline conditions in the 2040 Plan Year (**Table 7-4, Daily VMT by County**). While per capita VMT is expected to decline, the net increase in population results in net increases in VMT in all counties. These strategies are linked to relevant performance measures in the outcome categories of economic wellbeing, investment effectiveness, environmental quality, location efficiency, mobility and accessibility, safety and health, system sustainability, and environmental justice. Incorporation of active transportation modes such as expanded regional greenway network and local and regional bikeway networks for

**TABLE 7-4
DAILY VMT BY COUNTY**

County	2012 Base Year	2040 Baseline	2040 Plan
Imperial	5,000	9,000	9,000
Los Angeles	226,000	249,000	228,000
Orange	77,000	84,000	79,000
Riverside	58,000	86,000	80,000
San Bernardino	62,000	89,000	86,000
Ventura	20,000	23,000	21,000
SCAG total	448,000	540,000	504,000

biking and walking allow for more physical activities and greater health.

SOURCE:

SCAG GIS modeling and data, 2015.

In addition, SCAG is working on its community outreach and leadership through its Public Health Work Program. This program, expressed in the 2016 SCAG RTP/SCS, relies on leadership and collaboration, policy and analysis, and regional support. SCAG would build partnerships among government agencies, nonprofits, educational institutions, foundations, and other stakeholders to increase regional engagement. Synergies developed among the stakeholders improve data sharing and resource pooling for more comprehensive and integrated regional policy planning. This regional-level cooperation will lead to more standardized metrics and in turn help assist local agencies take advantage of Sustainability Planning Grants and other grant funding to promote public health.

The 2016 RTP/SCS would provide strategies to improve public health and develop walkable and transit friendly communities. The cancer risk would exceed thresholds, though it would be significantly reduced when compared to existing conditions. Impacts would remain significant and unavoidable.

IMPACT Air-5: Expose a substantial number of people to objectionable odors.

Less than Significant Impact

The 2016 RTP/SCS would result in a less than significant impact to air quality in relation to exposing a substantial number of people to objectionable odors. Odor sources within the SCAG region, such as wastewater treatment facilities, landfills, and agricultural operations, are controlled by county and city odor ordinances and air district rules that prohibit nuisance odors and identify enforcement measures to reduce odor impacts to nearby receptors. These ordinances and rules are enforced by the air pollution control districts and local law enforcement. For example, SCAQMD/MDAQMD/AVAQMD Rule 1113, VCAPCD Rule 74.2 and ICAPCD Rule 101, Rule 424, *Architectural Coatings*, limit the amount of volatile

organic compounds from architectural coatings and solvents to further reduce the potential for odiferous emissions. However, transportation improvement projects in 2040 would not be expected to result in substantial odor emissions or affect a substantial number of people when compared to existing conditions. Therefore, the impact would be less than significant, and the consideration of mitigation measures is not warranted.

Construction. In accordance with federal and state regulations, diesel emissions from heavy duty trucks are projected to decrease with the Plan (see the HRA, **Appendix D**), and construction activities associated with the Plan would occur away from sensitive receptors in adherence to CARB's guidelines and response to public input gathered during the public outreach period. Construction of transportation projects listed in the Plan, as well as anticipated growth and development in the SCAG region have the potential to cause an increase in construction activities. From 2015 to 2040, construction would occur from transportation network improvements and land use development projects. Activities associated with the operation of construction equipment, diesel, the application of asphalt, the application of architectural coatings and other interior and exterior finished, and roofing may produce discernible odors typical of most construction sites. SCAQMD/MDAQMD/AVAQMD Rule 1113, VCAPCD Rule 74.2 and ICAPCD Rule 101, Rule 424, *Architectural Coatings*, limit the amount of volatile organic compounds from architectural coatings and solvents to further reduce the potential for odiferous emissions. Similar odor reducing rules apply to the other air quality districts in the SCAG region. Although these odors could be a source of nuisance to adjacent uses, odors from construction are temporary and intermittent in nature. Construction-related emissions also decrease with distance from the project site and quickly dissipate.

Land Use. The regional growth and anticipated land use changes reflected in the RTP/SCS would have the potential to result in nuisance odors. The level of exposure and number of receptors affected can only be determined through project-level analysis once facility designs of individual projects are available. Therefore, odor analyses related to regional growth and land use change in 2020 would be analyzed at the project level. However, projects would be required to comply with applicable odor regulations. Regional growth and land use change projects in 2020 would not be expected to result in substantial odor emissions or affect a substantial number of people when compared to existing conditions. Therefore, the impact would be less than significant, and the consideration of mitigation measures is not warranted.

Transportation Improvements. Transportation projects that involve roadway expansions or realignments could result in the transfer of vehicle emissions and/or could result in odor emissions sources being located closer to receptors. In addition, some projects (e.g., rail stations) could result in localized traffic congestion that generates odor concentrations. The level of exposure and number of receptors affected can only be determined through project-level analysis once facility designs of individual projects are available. Therefore, the odor analyses related to transportation improvements in 2020 for the 2050 RTP/SCS would be completed at the project level. However, projects would be required to comply with applicable odor regulations. Transportation projects in 2040 would not be expected to result in substantial odor emissions or affect a substantial number of people when compared to existing conditions. Therefore, the impact would be less than significant, and the consideration of mitigation measures is not warranted.

Greenhouse Gas Emissions Analysis

The 2016 RTP/SCS would have a significant impact related to GHG emissions if it would:

- Increase GHG emissions compared to existing conditions (2015);
- Conflict with SB 375 GHG emission reduction targets; or
- Conflict with AB 32, or other applicable plan, policy or regulation adopted for the purpose of reducing emissions of GHGs

Impact GHG-1: Potential to directly or indirectly result in an increase in GHG emissions compared to existing conditions (2015).

Less than Significant Impact

The GHG emissions resulting from the Plan would be considered significant if the Plan is to cause an increase over existing (2015) levels. This impact threshold is based on CEQA's requirement that project impacts be compared to existing conditions.

Across the six counties in the SCAG region, the 2016 RTP/SCS would result in an approximately 24 percent decrease in GHG emissions by 2040, with the largest losses occurring in Los Angeles, Orange, and Ventura Counties (**Table 7-5, Greenhouse Gas Emissions from Transportation by County**). **Table 7-5** includes CO₂ instead of CO_{2e} because CO₂ is the primary GHG emitted by human activities. Thereby analyzing CO₂ emissions is representative of the GHG emissions.⁹⁶

**TABLE 7-5
GREENHOUSE GAS EMISSIONS FROM TRANSPORTATION BY COUNTY***

County	CO ₂ Emissions (tons/day)				
	2005	2012 Base Year	2020 Plan	2040 Plan	2040 Plan vs. 2012 Base Year
Imperial	3,806.6	3,500.7	3,809.5	4,683.4	34%
Los Angeles	133,629.0	120,929.1	106,253.9	78,830.9	-35%
Orange	40,202.9	38,664.1	34,199.4	24,082.5	-38%
Riverside	32,937.6	33,447.2	33,593.3	32,489.4	-3%
San Bernardino	36,397.3	36,690.1	35,595.0	39,019.9	6%
Ventura	10,416.1	9,920.4	8,813.9	6,413.2	-35%
SCAG total	257,389.5	243,151.7	222,265.0	185,519.2	-24%

NOTE:

*Light and medium duty vehicles and heavy duty truck

SOURCE:

SCAG modeling, 2015.

As part of the transportation strategies, the 2016 RTP/SCS includes transportation investments which promote more active transportation opportunities and facilities. Between 2015 and 2040, the region is

⁹⁶ U.S. EPA. Overview of Greenhouse Gases. Accessed November 12, 2015. <http://www3.epa.gov/climatechange/ghgemissions/gases/co2.html>

anticipated to experience substantial increases in population, households and jobs (see **Section 2, Project Description**, and **Section 3.14, Population, Housing, and Employment**). The 2016 RTP/SCS also includes land use strategies that seek to balance the region's land use choices and transportation investments. This means the Plan focuses new growth and development in existing urbanized areas and opportunity areas such as the high quality transit corridors (HQTAs) and incorporates strategies to increase walking, biking or other forms of active transportation. To complement the integrated land use and transportation strategies is the implementation of technology. The integration of technology would include location-based land use strategies, increasing the efficiency to Plug-in Hybrid Electric Vehicles (PHEV) in the region and proposing a regional charging network. Because of the anticipated increase in compact and higher density development, less energy (e.g., multi-family housing units are insulated by each other as compared to single-family units and, therefore, require less heating and cooling) and less water (e.g., multi-family units have less landscaping requiring irrigation as compared to single-family units) is expected to be used and will contribute to the reduction in GHG emissions.

GHG emissions result from direct and indirect sources. Direct emissions derive from fuel combustion in vehicles (i.e., autos, trucks, trains, buses, planes, ships and trains) and natural gas combustion from stationary sources. Indirect sources include off-site emissions occurring as a result of electricity, water consumption and solid waste. County-level GHG emissions from transportation were estimated for the GHG Baseline (2005), Year 2012 (Base Year), Year 2020 with Plan, and Year 2040 with Plan (**Table 5-6**). The transportation emissions include light and medium duty vehicles and heavy duty trucks. Emissions from other transportation sources such as planes, buses, ships, and trains are not quantified in this analysis.

In the absence of reliable 1990 GHG emissions estimates, ARB's Climate Change Scoping Plan recommends an equivalent metric of 15 percent below 2005 GHG emissions. On-road transportation emissions include fuel consumption from passenger vehicles, heavy-duty trucks, buses, and other motor vehicles. Transportation accounts for the greatest proportion of GHG emissions on a regional and state level. As part of the Plan, transportation network improvements would be included, and more compact, infill, walkable and mixed-use development strategies to accommodate new region's growth would be encouraged to accommodate increases in population, households, employment, and travel demand. Across the six counties in the SCAG region, GHG emissions from transportation are expected to decrease by approximately 24 percent by 2040 compared to existing conditions (2012 Base Year) with the largest losses in Orange, Los Angeles, and Ventura counties (**Table 5-6**).

In order to determine an increase or decrease in total GHG emissions, emissions from other major sectors including building energy and water-related consumption must be considered. Population and job growth would induce land use change (development projects) and increase VMT, and would result in direct and indirect GHG emissions. The Plan supports sustainable growth through a more compact, infill, and walkable development pattern. As stated previously, the Plan focuses growth in existing urban regions and opportunity areas, where transit and infrastructure are already in place. Locating new growth near bikeways, greenways, and transit would active transportation options and the use of other transit modes (public transit, carpooling), thereby reducing number of vehicle trips and trip lengths and associated emissions. Land use strategies included in the 2016 RTP/SCS encourage higher density development in existing urban cores and opportunity areas which would encourage more multi-family and/or mixed-use projects, via vertical development, instead of the traditional single-family home develop. Compact development and utilization of conservation strategies (i.e. Title 24 building codes, LEED certification), if implemented, would limit energy and water consumption.

Building energy emissions were computed in the SCAG model using a factor of 11.66 pounds (lb) CO_{2e}/therm for natural gas emissions from 2012 to 2040. Electricity emissions used a baseline (2040 No Project) of 0.74 lb CO_{2e}/kilowatt-hour (kWh) in all future years (2020, 2035 and 2040). Water-related energy assumed a factor of 13,021 kWh/MG for indoor water energy use and 11,110 kWh/MG for outdoor water energy use. As shown in **Table 7-6, Greenhouse Gas Emissions Summary for the SCAG Region**, transportation, building and water-related energy, shows a net decrease by 18 percent with the Plan in 2040 compared to existing conditions (2012 Base Year). These three sectors account for approximately 70 percent of the total GHG emissions in the SCAG region. It is important to note that the Plan is not responsible for addressing sectors beyond transportation, building, and water-related energy consumption. This is due to the fact that the Plan is primarily a transportation plan with land use development strategies. SCAG does not collect information beyond their requirements and cannot assess the GHG impacts to the remaining contributing sectors. Given this limited scope, the Plan would result in a less than significant impact with respect to GHG emissions compared to existing conditions, and mitigation measures would not be required.

**TABLE 7-6
GREENHOUSE GAS EMISSIONS SUMMARY FOR THE SCAG REGION**

Area	CO _{2e} Emissions (MMT CO _{2e} per year)			
	2012 Base Year	2020 Plan	2040 Plan	2040 vs. 2012
Transportation*	88.75	81.62	67.71	-24%
Building energy**	53.68	40.51	49.99	-7%
Water-related energy**	7.41	3.84	4.79	-35%
Total	149.84	125.97	122.49	-18%

NOTE:

* Light and medium duty vehicles and heavy duty trucks.

** Scenario Planning Model is a scenario planning tool used for developing scenarios for the Plan during the scenario planning process to compare relative differences among scenarios.

SOURCE:

SCAG Modeling, 2015.

Impact GHG-2: Potential to conflict with SB 375 GHG Emission Reduction Targets.

Less than Significant Impact

As indicated by CEQA Appendix G, a significant GHG impact is identified if the Plan could conflict with applicable GHG reduction plans, policies, or regulations. As described in the Regulatory Framework, SB 375 requires CARB to develop regional GHG emission reduction targets for cars and light trucks for 2020 and 2035 (compared to 2005 emissions) for each of the State MPOs on a per capita basis. Each MPO is required to prepare an SCS in conjunction to with the RTP in order to meet these GHG emissions reduction targets by aligning transportation, land use, and housing strategies with respect to AB 375. For SCAG, the targets are to reduce per capita GHG emissions by 8 percent below 2005 levels by 2020 and 13 percent below 2005 levels by 2035. Determining the per capita CO₂ emissions requires modeling vehicle miles traveled (VMT) by passenger vehicles and light trucks that emit CO₂ (see **Table 7-4**) and

dividing that number by the total population.

SCAG estimates that the per capita 2005 emissions from cars and light-duty trucks as 23.8 pounds CO₂ per person per day (**Table 7-7, SB 375 Analysis**).

**TABLE 7-7
SB 375 ANALYSIS**

	2005 (Baseline)	2020 (Plan)	2035 (Plan)	2040 (Plan)
Resident population (per 1,000)	17,161	19,060	21,475	22,116
CO ₂ emissions (per 1,000 tons)	204.0*	203.6**	206.0**	203.0**
Per capita emissions (pounds/day)	23.8	21.4	19.5	18.7
% difference from Plan (2020) to Baseline (2005)				-8%*
% difference from Plan (2035) to Baseline (2005)				-18%***
% difference from Plan (2040) to Baseline (2005)				-22%***

NOTE:

* Based on EMFAC2007

** Based on EMFAC2014

***Included off-model adjustments for 2035 and 2040

SOURCE:

SCAG modeling, 2015

Southern California Association of Governments. 5 November 2015. *Item No. 1 Staff Report: 2016-2040 Regional Transportation Plan/Sustainable Communities Strategy (2016 RTP/SCS) – Proposed Major Components*. Available at: <http://www.scag.ca.gov/committees/CommitteeDocLibrary/jointRCPC110515fullagn.pdf>

As shown in **Table 7-7**, per capita CO₂ emissions from cars and light duty trucks (only) are calculated to be 21.4 pounds per day in 2020 with the Plan. The result of the Plan is an 8 percent decrease in per capita CO₂ emissions from 2005 to 2020. The percent decrease would achieve the 8 percent emissions reduction target by 2020 for the region set by SB 375. By 2035, the 2016 RTP/SCS projects 19.5 pounds per day for per capita CO₂ emissions from cars and light duty trucks (only). This represents an approximately 18 percent decrease in per capita CO₂ emissions from 2005 to 2035. This 18 percent decrease would meet and exceed the 13 percent emissions reduction target set by CARB for 2035. Furthermore, although there is no per capita GHG emission reduction targets for passenger vehicles set by CARB for 2040, the Plan's GHG emission reduction trajectory shows that more robust GHG emission reductions are projected for 2040 (**Table 7-7**). The Plan would result in an estimated 22 percent decrease in per capita GHG emissions by 2040 (**Figure 7-3, SB 375 GHG (per capita) Reduction Trajectory**). By meeting and exceeding the SB 375 targets for 2020 and 2035, as well as achieving an approximately 22 percent decrease in per capita GHG emissions by 2040 (an additional 4 percent reduction in the five years between 2035 [18 percent] and 2040 [22 percent]), the Plan is expected to fulfill and exceed its portion of SB 375 compliance with respect to meeting the State's GHG emission reduction goals. As such, the Plan would not conflict with SB 375 GHG emission reduction targets and would result in a less-than-significant impact, and mitigation measures would not be required.

Impact GHG-3: Potential to conflict with AB 32 or any applicable plan, policy or regulation adopted for the purpose of reducing emissions of GHGs.

Less than Significant Impact

AB 32 Discussion. As indicated by CEQA Appendix G, a significant GHG impact is identified if the Plan

could conflict with applicable GHG reduction plans, policies, or regulations. AB 32 calls for GHG emissions to be reduced to 1990 levels by 2020. CARB's Scoping Plan functions as a roadmap to achieve AB 32 GHG reductions. Because the Plan focuses on a portion of the transportation sector (i.e., automobiles and light duty trucks pursuant to SB 375) and land use strategies, it does not incorporate implementation of all the AB 32 Scoping Plan strategies that address a broad range of economic sectors. GHG emissions reductions achieved through SCS land use strategies are incorporated into the analysis of the transportation network improvement emissions reductions. The Plan includes proposed transportation improvements to be integrated and coordinated with proposed land use changes that would lead to reduced congestion, reduced VMT, and increased transit, walking, and biking options.

The Plan alone is not intended to meet the AB 32 emissions reduction targets. By meeting the SB 375 targets, the Plan has contributed its share, if not greater, to meeting the AB 32 target. The Plan has demonstrated that it met and exceeded CARB's targets for greenhouse gas emissions from light duty passenger vehicles for 2020 and 2035, respectively. Specifically, as shown in **Figure 7-1**, the Plan is showing a GHG emission reduction trajectory that would meet and exceed SB 375 between 2020 and 2040, and beyond. Given that the primary statutory responsibility of the 2016 RTP/SCS is to achieve SB 375 targets, which it does, and the goals set forth by AB 32 are intended to be achieved by all the responsible sectors, the Plan has successfully contributed its share, if not greater, to meeting the AB 32 target. Additionally, "California is on track to meet the near-term 2020 greenhouse gas limit and is well positioned to maintain and continue reductions beyond 2020 as required by AB 32."⁹⁷ The compact land use patterns of the Plan provide more efficient use of water and energy of building operations, among others. This efficiency leads to GHG emissions reduction beyond SB 375 and ensures the region to be on track with AB 32 goals. The assurance for meeting statewide AB 32 goals as outlined in the Plan as well as in the First Update to the Climate Change Scoping Plan provide a pathway towards meeting the State's long-term GHG emissions reduction goals as set forth in Executive Orders. Therefore, the Plan is not in conflict with AB 32.

In summary, the proposed Plan would not conflict with applicable recommendations in the ARB's Scoping Plan Update for the Transportation focus area. The 2014 Scoping Plan Update identified several recommended actions within the Transportation sector to achieve future GHG reductions, with the recommendations primarily focused on achieving major technological and regulatory changes in order to reduce GHG emissions from all types of vehicles and transportation fuels, including more efficient vehicles, low carbon fuels like electricity and hydrogen, and supporting infrastructure. The Update also identified the following applicable recommendations for transportation:

- - Caltrans and regional transportation agencies will increase investment in expanded transit and rail services, active transportation, and other VMT reduction strategies in their next regional transportation plans.
 - ARB, Caltrans, the Strategic Growth Council, and the Department of Housing and Community

Development, along with other State, local and regional agencies, would coordinate planning and support to ensure that the expected GHG emission reductions from approved SCS are achieved or exceeded. The Plan would not conflict with the recommendation to increase investment in expanded transit and rail services, active transportation, and other VMT reduction strategies in the Scoping Plan

⁹⁷ California Air Resources Board. May 2014. *First Update to the Climate Change Scoping Plan*. Available at: <http://www.ourenergypolicy.org/wp-content/uploads/2014/05/cali-scoping.pdf>

Update. From 2016 to 2040, the Plan includes increased investment in transit and rail services, active transportation, and other VMT reduction strategies.

Climate-Related Plans Discussion. The 2016 RTP/SCS is in alignment with the goals and objectives set by the county and city climate-related plans. While the specific targets may vary by city/county, the 2016 RTP/SCS takes a look at the programmatic level to assess consistency with these plans. Both on the regional and local levels, the climate-related plans lay out efforts to increase energy efficiency, promote energy conservation, design green buildings, reduce VMT, encourage transit-oriented developments, and integrate renewable energies. As described in **Section 2.0, Project Description**, of this PEIR, the Plan includes integrated transportation and land use strategies to promote active transportation opportunities, compact development, car sharing and ride sourcing, and technology in zero-emission vehicles and neighborhood electric vehicles. Additionally, the 2016 RTP/SCS includes a regional charging network that will increase the number of Plug-in Hybrid Electric Vehicles (PHEV) miles driven on electric power, thereby resulting in a potential to double the electric range of PHEVs and reducing vehicle miles traveled that produce tail-pipe GHG emissions. With aligned goals, the 2016 RTP/SCS is expected to result in a less than significant impact on city and county climate-related plans.

Executive Orders Discussion. On April 29, 2015, Governor Brown issued Executive Order (EO) B-30-15, which established a new statewide interim GHG emissions reduction target of 40 percent below 1990 GHG emissions levels by 2030. The EO B-30-15 also reiterated the GHG emissions reduction target to reduce emissions to 80 percent below 1990 levels by 2050 set forth by EO S-3-05 in 2005 by Governor Schwarzenegger. Executive Order B-16-2012 also set the same target for 2050 for the transportation sector: 80 percent less than 1990 levels. This 2050 target is also incorporated in the CARB Scoping Plan Update.

The following discussion is for illustrative purposes as the Executive Orders are not plans, policies or regulations adopted for the purpose of reducing GHG emissions. As stated above, the 2016 RTP/SCS alone is not intended to meet the AB 32 target or the targets set by EO B-30-15, EO B-16-2012, and EO S-3-05. By meeting the SB 375 targets (see **Impact GHG-2: Potential to conflict with SB 375 GHG Emission Reduction Targets**), the Plan has successfully contributed its share, if not greater, to meeting the AB 32 target. The 2016 RTP/SCS is currently required to meet the GHG reduction targets set by CARB, i.e., 8% reduction by 2020 and 13% by 2035, both on per capita basis relative to 2005 levels. The GHG reduction trajectory of the 2016 RTP/SCS is consistent with and is more aggressive than the ARB GHG Reduction Target Trajectory for the SCAG region, as the Plan's trajectory shows aggressive GHG reductions between 2020 and 2040 (**Figure 7-1**). It should be noted that CARB has not established a 2030 target or a 2050 target for the transportation sector to meet the targets set by EO B-30-15, EO B-16-2012, and EO S-3-05. However, the new statewide interim 2030 target set forth under EO B-30-15 suggests that an accelerated timeline would be necessary. In order to address this new interim 2030 target, the 2016 RTP/SCS accelerates the reduction of GHG emissions such that by 2030, the Plan is expected to achieve a 14.7% reduction. This reduction would exceed SCAG's current target of 13% by 2035.

In addition, by 2040, the horizon year of the 2016 RTP/SCS, the Plan is expected to achieve a 22% reduction in the GHG emissions of cars and light trucks. As shown on **Figure 7-1**, the 2016 RTP/SCS has met and exceeded the CARB's targets for 2020 and 2035, respectively. The GHG reduction trajectory of the 2016 RTP/SCS is much more aggressive than CARB's targets between 2020 and 2035. Additionally, the GHG reduction trajectory of the 2016 RTP/SCS beyond 2030 is consistent, if not more aggressive,

with the accelerated pace established in the recent Executive Order B-30-15. Further, it should be noted that the goals set forth by AB 32 and the Executive Orders are intended to be achieved by all the responsible sectors. Yet, the 2016 RTP/SCS is demonstrated to contribute the Plan's share, if not more, comparing to the accelerated pace. Therefore, the Plan itself is not in conflict with the State long-term GHG emissions reduction goals as set forth in Executive Orders.

Cumulative Impacts under Air Quality

The 2016 RTP/SCS contains transportation projects and strategies to integrate transportation investments with land use. These transportation projects, provided by county transportation commissions during the bottom-up planning process, are included in SCAG's transportation model. Transportation projects and anticipated development as part of the forecasted regional growth and land use strategies of the Plan have the potential to generate emissions for all six criteria air pollutants during both construction and operation.

The 2016 RTP/SCS includes transportation projects and strategies that are consistent with air-related plans in the region and would not result in a cumulative impact with respect to conflicting with or obstructing implementation of an applicable air quality plan. Air quality plans are written for the applicable air basin(s) it covers. Because air basins are distinct geographical areas, the pollutants emitted beyond those air basins analyzed in this PEIR would not conflict with or obstruct implementation of those air quality management plans or attainment plans in the SCAG region. The cumulative impact would then be less than significant with regard to conflicting with the applicable air quality plans.

Implementation of the transportation projects included in the 2016 RTP/SCS, when taken into consideration with other development and infrastructure projects within the SCAG region and surrounding areas, would have the potential to result in a significant cumulative impact to violating an air quality standard or contributing substantially to an existing or projected air quality violation in the short-term from construction emissions. Projected long-term emissions are considered to have a less than significant cumulative impact according to the SCAG Transportation Model because the Plan is consistent with the local air quality management plans and state implementation plans. The model is inclusive of all potential air emissions in the SCAG region that could occur as a result of the Plan. Violations to the air quality standard outside of the SCAG region would not affect significance determinations within the SCAG region because the air quality thresholds are bounded within the air districts. Because the construction of development projects, occurring within the same neighborhood, may result in significant air quality emissions in excess of the thresholds, there would be a significant impact and therefore also a significant cumulative impact to the potential to violate any air quality standard or contribute substantially to an existing or projected air quality violation.

The 2016 RTP/SCS would result in a less than significant cumulative impact to increasing any criteria pollutant that is in nonattainment under applicable NAAQS or CAAQS. The region is in nonattainment for PM_{2.5}, PM₁₀, and ozone. The Plan would not contribute to a net increase in these pollutants and is within the emission budgets set by the AQMPs/SIPs in the SCAG region. As a result, the Plan has demonstrated compliance with the transportation conformity regulations set by the U.S. EPA that apply in non-attainment and maintenance areas. Increases in criteria pollutants outside the areas already analyzed in the SCAG region would have no bearing on the Plan's ability to achieve conformity. There would be a less than significant cumulative impact to a net increase of any criteria pollutant designated

as non-attainment.

The 2016 RTP/SCS includes transportation projects and strategies to improve public health, but would result in a significant cumulative impact by exposing sensitive receptors to substantial pollutant concentrations that would harm public health outcomes. While the Plan aims to limit growth within the 500-foot buffers of freeways and high volume roadways, it places a small percentage of sensitive receptors within a 500 foot buffer of major transportation projects in HQTAs beyond those provided by local jurisdictions. The Plan also sets forth strategies to increase active transportation and physical activity to improve public health. However, the HRA analysis revealed that despite a 50 to 90 percent reduction in mobile source emissions, the cancer risk threshold as measured at the receptor locations would be exceeded in all but one of sixteen segments. Because the Plan and HRA considered the potential for sensitive receptors in the SCAG region to be affected by substantial pollutant concentrations, the analysis in the Plan and HRA is representative of all the impacts to sensitive receptors in the SCAG region. Impacts to sensitive receptors outside the SCAG region would be less than those already evaluated because the distance to the receptor would be much greater. Because the Plan already results in direct and indirect significant impacts to sensitive receptors, the Plan would result in a significant cumulative impact in exposing sensitive receptors to substantial pollutant concentrations and harming public health.

The 2016 RTP/SCS would not expose a substantial number of people to objectionable odors. Odors from construction are temporary and intermittent in nature. While odors would need to be evaluated on a project by project basis, there is a potential for multiple projects to occur simultaneously within the same neighborhood and in close proximity of each other. However because all projects must comply with odor regulations as prescribed by the applicable air district, the Plan would result in a less than significant cumulative impact to exposing a substantial number of people to objectionable odors.

Cumulative Impacts under Greenhouse Gas Emissions and Climate Change

Implementation of the transportation projects included in the 2016 RTP/SCS, when taken into consideration with other development and infrastructure projects within the SCAG region and surrounding areas, would result in a 22 percent decline in GHG emissions by 2040 compared to existing conditions. Other GHG-emitting sectors beyond light and medium duty vehicles and heavy duty trucks for transportation, building energy, and water-related energy are not considered as part of the Plan. Given the state and federal leadership as shown in AB 32, EO B-30-15, EO B-16-2012, EO S-3-05, Presidential Executive Order 13154 and Revised Draft Guidance on Consideration of Greenhouse Gas Emissions and Climate Change in NEPA Reviews. As a result, the Plan would result in a less than significant cumulative impact with respect to increasing GHG emissions compared to existing conditions.

The Plan meets and exceeds SB 375 targets for reducing GHG emissions. This demonstrates that the Plan is able to do more than its share to reducing GHG emissions for light and medium duty vehicles and heavy trucks resulting in a less than significant cumulative impact with respect to the SB 375 targets.

While the Plan acknowledges all the responsible sectors are not in conflict with AB 32 and Executive Orders, in the event of a worst case scenario, such as other responsible agency implementation activities do not achieve their respective GHG emission reduction goals to the appropriate level, the environmental analysis results in a determination that there would be a potential for a significant cumulative impact requiring the consideration of mitigation measures.

8.0 MITIGATION MEASURES

Mitigation measures as they pertain to each CEQA question related to air quality and GHG emissions are described below. Mitigation measures are categorized into two categories: SCAG mitigation and project-level mitigation measures. SCAG mitigation measures shall be implemented by SCAG over the lifetime of the 2016 RTP/SCS. Project-level mitigation measures can and should be implemented by Lead Agencies for transportation and development projects, as applicable and feasible.

IMPACT Air-2: Potential to violate any air quality standard or contribute substantially to an existing or projected air quality violation.

SCAG Mitigation Measures

MM-Air-2(a)(1): SCAG shall determine as part of its conformity finding pursuant to the federal CAA that the Plan and updates provide for timely implementation of transportation control measures (TCMs), as required in the CAA Section 108(f)(1)(A). TCMs are identified in the Transportation Conformity Appendix to the 2016 RTP/SCS. SCAG has identified 17 measures as illustrative of TCMs based on review information contained in CAA Section 108(f)(1)(A) and information provided by utilities that serve the SCAG region:

- I. Programs for improved use of public transit;
- II. Restriction of certain roads or lanes to, or construction of such roads or lanes for use by, passenger buses or HOV;
- III. Employer-based transportation management plans, including incentives;
- IV. Trip-reduction ordinances;
- V. Traffic flow improvement programs that achieve emission reductions;
- VI. Fringe and transportation corridor parking facilities, serving multiple occupancy vehicle programs or transit service;
- VII. Programs to limit or restrict vehicle use in downtown areas or other areas of emission concentration, particularly during periods of peak use;
- VIII. Programs for the provision of all forms of high-occupancy, shared-ride services, such as the pooled use of vans;
- IX. Programs to limit portions of road surfaces or certain sections of the metropolitan area to the use of non-motorized vehicles or pedestrian use, both as to time and place;
- X. Programs for secure bicycle storage facilities and other facilities, including bicycle lanes, for the convenience and protection of bicyclists, in both public and private areas;
- XI. Programs to control extended idling of vehicles;
- XII. Programs to reduce motor vehicle emissions, consistent with Title II of the CAA, which are caused by extreme cold start conditions;
- XIII. Employer-sponsored programs to permit flexible work schedules;
- XIV. Programs and ordinances to facilitate non-automobile travel, provision and utilization of mass transit, and to generally reduce the need for single-occupant vehicle travel, as part of transportation planning and development efforts of a locality, including programs and ordinances applicable to new shopping centers, special events, and other centers of vehicle activity;
- XV. Programs for new construction and major reconstruction of paths, tracks or areas solely for the use by pedestrian or other non-motorized means of transportation, when

- economically feasible and in the public interest;
- XVI. Programs to encourage the voluntary removal from use and the marketplace of pre-1980 model year light duty vehicles and pre-1980 model light duty trucks.
 - XVII. Programs to encourage the installation of personal electric vehicle charging stations, and other alternative fuel sources.

MM-Air-2(a)(2): During the 2016 to 2040 Planning Horizon, SCAG shall pursue activities to reduce the impact associated with health risk within 500 feet of freeways and high-traffic volume roadways as follows:

- Participate in ongoing statewide deliberations on health risks near freeways and high-traffic-volume roadways. This involvement includes supporting the statewide process by providing available data and information such as the current and projected locations of sensitive receptors relative to transportation infrastructure.
- Continue to work with air agencies including ARB, SCAQMD, and all air districts in the SCAG region to support their work in monitoring the progress on reducing exposure to emissions of PM₁₀ and PM_{2.5} for sensitive receptors, including schools and residents within 500 feet of high-traffic-volume roadways.
- Work with stakeholders to identify planning and development practices that are effective in reducing health impacts to sensitive receptors.
- Share information on all of the above efforts with stakeholders, member cities, counties, and the public.

Project-Level Mitigation Measures

MM-Air-2(b): Consistent with the provisions of Section 15091 of the State CEQA Guidelines, SCAG has identified mitigation measures that are within the jurisdiction and authority of the CARB, air quality management districts and other regulatory agencies. Where the Lead Agency has identified that a project has the potential for significant effects, the Lead Agency can and should consider the measures that have been identified by CARB and air district(s) and other agencies as set forth below, or other comparable measures, to facilitate consistency with plans for attainment of the NAAQS and CAAQS, as applicable and feasible.

CARB, South Coast AQMD, Antelope Valley AQMD, Imperial County APCD, Mojave Desert AQMD, Ventura County APCD, and Caltrans have identified project-level feasible measures to reduce construction emissions:

- Minimize land disturbance.
- Use watering trucks to minimize dust; watering should be sufficient to confine dust plumes to the project work areas.
- Suspend grading and earth moving when wind gusts exceed 25 miles per hour unless the soil is wet enough to prevent dust plumes.
- Cover trucks when hauling dirt.
- Stabilize the surface of dirt piles if not removed immediately.
- Limit vehicular paths on unpaved surfaces and stabilize any temporary roads.
- Minimize unnecessary vehicular and machinery activities.
- Sweep paved streets at least once per day where there is evidence of dirt that has been

carried on to the roadway.

- Revegetate disturbed land, including vehicular paths created during construction to avoid future off-road vehicular activities.
- On Caltrans projects, Caltrans Standard Specifications 10-Dust Control, 17-Watering, and 18-Dust Palliative shall be incorporated into project specifications.
- Require contractors to assemble a comprehensive inventory list (i.e., make, model, engine year, horsepower, emission rates) of all heavy-duty off-road (portable and mobile) equipment (50 horsepower and greater) that could be used an aggregate of 40 or more hours for the construction project. Prepare a plan for approval by the applicable air district demonstrating achievement of the applicable percent reduction for a CARB-approved fleet.
- Ensure that all construction equipment is properly tuned and maintained.
- Minimize idling time to 5 minutes—saves fuel and reduces emissions.
- Provide an operational water truck on-site at all times. Use watering trucks to minimize dust; watering should be sufficient to confine dust plumes to the project work areas. Sweep paved streets at least once per day where there is evidence of dirt that has been carried on to the roadway.
- Utilize existing power sources (e.g., power poles) or clean fuel generators rather than temporary power generators.
- Develop a traffic plan to minimize traffic flow interference from construction activities. The plan may include advance public notice of routing, use of public transportation, and satellite parking areas with a shuttle service. Schedule operations affecting traffic for off-peak hours. Minimize obstruction of through-traffic lanes. Provide a flag person to guide traffic properly and ensure safety at construction sites.
- As appropriate require that portable engines and portable engine-driven equipment units used at the project work site, with the exception of on-road and off-road motor vehicles, obtain CARB Portable Equipment Registration with the state or a local district permit. Arrange appropriate consultations with the CARB or the District to determine registration and permitting requirements prior to equipment operation at the site.

IMPACT Air-4: Expose sensitive receptors to substantial pollutant concentrations and harm public health outcomes substantially.

SCAG Mitigation Measures

See **MM-Air-2(a)(1)** and **MM-Air-2(a)(2)**.

Project-Level Mitigation Measures

MM-Air-4(b): Consistent with the provisions of Section 15091 of the State CEQA Guidelines, SCAG has identified mitigation measures that are within the jurisdiction and authority of the air quality management district(s) where proposed 2016 RTP/SCS projects or development projects resulting from the land use patterns in the 2016 RTP/SCS would be located. Where the Lead Agency has identified that a project has the potential for significant effects, the Lead Agency can and should consider the measures that have been identified by CARB and air district(s), or other comparable measures, to reduce cancer risk pursuant to the Air Toxics “Hot Spots” Act of 1987 (AB2588), as applicable and feasible. Such

measures include those adopted by CARB designed to reduce substantial pollutant concentrations, specifically diesel, from mobile sources and equipment. CARB's strategy includes the following elements:

- Set technology forcing new engine standards.
- Reduce emissions from the in-use fleet.
- Require clean fuels, and reduce petroleum dependency.
- Work with US EPA to reduce emissions from federal and state sources.
- Pursue long-term advanced technology measures.
- Proposed new transportation-related SIP measures include:

On-Road Sources

- Improvements and Enhancements to California's Smog Check Program
- Expanded Passenger Vehicle Retirement
- Modifications to Reformulated Gasoline Program
- Cleaner In-Use Heavy-Duty Trucks
- Ship Auxiliary Engine Cold Ironing and Other Clean Technology
- Cleaner Ship Main Engines and Fuel
- Port Truck Modernization
- Accelerated Introduction of Cleaner Line-Haul Locomotives
- Clean Up Existing Commercial Harbor Craft
- Limited idling of diesel-powered trucks
- Consolidated truck trips and improve traffic flow
- Late model engines, Low emission diesel products, engine retrofit technology
- Alternative fuels for on-road vehicles

Off-Road Sources

- Cleaner Construction and Other Equipment
- Cleaner In-Use Off-Road Equipment
- Agricultural Equipment Fleet Modernization
- New Emission Standards for Recreational Boats
- Off-Road Recreational Vehicle Expanded Emission Standards

CUMULATIVE IMPACTS UNDER GREENHOUSE GAS EMISSIONS AND CLIMATE CHANGE:

Mitigation measures described below are in response to the significant and unavoidable cumulative impact found with respect to the greenhouse gas emissions and climate change.

SCAG Mitigation Measures

MM-GHG-3(a)(1): SCAG shall update any future RTP/SCS to incorporate policies and measures that lead to reduced GHG emissions in accordance with AB 32.

MM-GHG-3(a)(2): SCAG shall coordinate with CARB and air districts in efforts to implement the AB 32 Scoping Plan.

MM-GHG-3(a)(3): SCAG shall continue coordination with other metropolitan planning organizations (MPOs) regarding statewide strategies to reduce GHG emissions and facilitate the implementation of SB 375.

MM-GHG-3(a)(4): SCAG shall work with utilities, sub-regions, and other stakeholders to promote accelerated penetration of zero- (and/or near zero-) emission vehicles in the region, including developing a strategy for the deployment of public charging infrastructure.

MM-GHG-3(a)(5): SCAG shall in its capacity as a Clean Cities Coalition establish coordinated, creative public outreach activities, including publicizing the importance of reducing GHG emissions and steps community members may take to reduce their individual impacts.

MM-GHG-3(a)(6): SCAG shall work with local community groups and business associations to organize and publicize walking tours and bicycle events, and to encourage pedestrian and bicycle modes of transportation such as the “Go Human” Campaign.

MM-GHG-3(a)(7): SCAG shall support and/or sponsor workshops on water conservation activities, such as selecting and planting drought tolerant, native plants in landscaping, and installing advanced irrigation systems.

MM-GHG-3(a)(8): SCAG shall in coordination with local jurisdictions (as practicable) support and/or sponsor a periodic Climate Protection Summits or Fairs, to educate the public on current climate science, projected local impacts, and local efforts and opportunities to reduce GHG emissions, including exhibits of the latest technology and products for conservation and efficiency.

MM-GHG-3(a)(9): Schools Programs: SCAG shall develop and implement a program in coordination with school districts to present information to students about climate change and ways to reduce GHG emissions, and will support school-based programs for GHG reduction, such as school-based trip reduction and the importance of recycling.

MM-GHG-3(a)(10): As outlined in the AHSC Action Plan approved by the Regional Council at the July 2, 2015, meeting, SCAG shall work with the Strategic Growth Council and seek legislative revisions to AHSC programs to revise the AHSC competitive grant program for future rounds.

MM-GHG-3(a)(11): SCAG shall encourage local jurisdictions to support the following transportation-related strategies to reduce emissions:

- Support the planning and development of HQTAs, jobs and housing balance, transit oriented development, and infill development through transportation investments and other funding decisions.
- Offer incentives such as free or low-cost monthly transit passes to employees or free ride areas to residents and customers
- Coordinate the funding of low carbon transportation with smart growth development.
- Promote parking management measures that encourage walking and transit use in smart growth areas.

- Develop comprehensive parking policies that encourages the use of alternative transportation. Incorporate bicycle lanes, routes and facilities into street systems, new subdivisions, and large developments, and create transit, bicycle, and pedestrian connections.
- Require amenities for non-motorized transportation, such as secure and convenient bicycle parking.

MM-GHG-3(a)(12): As part of SCAG’s Sustainability Program, SCAG shall assist local jurisdictions in developing Climate Actions Plans (CAPS, also known as Plans for the Reduction of Greenhouse Gas Emissions), as appropriate and feasible.

Project-Level Mitigation Measures

MM-GHG-3(b): Consistent with the provisions of Section 15091 of the State CEQA Guidelines, SCAG has identified mitigation measures capable of avoiding or reducing the potential to conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emission of greenhouse gases that are within the jurisdiction and authority of California Air Resources Board, local air districts, and/or Lead Agencies. Where the Lead Agency has identified that a project has the potential for significant effects, the Lead Agency can and should consider mitigation measures to mitigate the significant effects of greenhouse gas impacts to ensure compliance with all applicable laws, regulations, governing CAPs, general plans, adopted policies and plans of local agencies, and standards set forth by responsible public agencies for the purpose of reducing emissions of greenhouse gases, as applicable and feasible. Consistent with Section 15126.4(c) of the State CEQA Guidelines, compliance can be achieved through adopting GHG mitigation measures that have been used for projects in the SCAG region as set forth below, or through comparable measures identified by Lead Agency:

- Measures in an adopted plan or mitigation program for the reduction of emissions that are required as part of the Lead Agency’s decision.
- Reduction in emissions resulting from a project through implementation of project features, project design, or other measures, such as those described in Appendix F of the State CEQA Guidelines.
- Off-site measures to mitigate a project’s emissions.
- Measures that consider incorporation of Best Available Control Technology (BACT) during design, construction and operation of projects to minimize GHG emissions, including but not limited to:
 - Use energy and fuel efficient vehicles and equipment;
 - Deployment of zero- and/or near zero emission technologies;
 - Use lighting systems that are energy efficient, such as LED technology;
 - Use the minimum feasible amount of GHG-emitting construction materials that is feasible;
 - Use cement blended with the maximum feasible amount of flash or other materials that reduce GHG emissions from cement production;
 - Incorporate design measures to reduce GHG emissions from solid waste management through encouraging solid waste recycling and reuse;
 - Incorporate design measures to reduce energy consumption and increase use of renewable energy;
 - Incorporate design measures to reduce water consumption;

- Use lighter-colored pavement where feasible;
- Recycle construction debris to maximum extent feasible;
- Plant shade trees in or near construction projects where feasible; and
- Solicit bids that include concepts listed above.
- Measures that encourage transit use, carpooling, bike-share and car-share programs, active transportation, and parking strategies, including, but not limited to, transit-active transportation coordinated strategies, increased bicycle carrying capacity on transit and rail vehicles;
- Incorporating bicycle and pedestrian facilities into project designs, maintaining these facilities, and providing amenities incentivizing their use; providing adequate bicycle parking and planning for and building local bicycle projects that connect with the regional network;
- Improving transit access to rail and bus routes by incentives for construction of transit facilities within developments, and/or providing dedicated shuttle service to transit stations; and
- Adopting employer trip reduction measures to reduce employee trips such as vanpool and carpool programs, providing end-of-trip facilities, and telecommuting programs.
- Designate a percentage of parking spaces for ride-sharing vehicles or high-occupancy vehicles, and provide adequate passenger loading and unloading for those vehicles;
- Land use siting and design measures that reduce GHG emissions, including:
 - Developing on infill and brownfields sites;
 - Building high density and mixed use developments near transit;
 - Retaining on-site mature trees and vegetation, and planting new canopy trees;
 - Measures that increase vehicle efficiency, encourage use of zero and low emissions vehicles, or reduce the carbon content of fuels, including constructing or encouraging construction of electric vehicle charging stations or neighborhood electric vehicle networks, or charging for electric bicycles; and
 - Measures to reduce GHG emissions from solid waste management through encouraging solid waste recycling and reuse.

See **MM-EN-2(b)**.

9.0 LEVEL OF SIGNIFICANCE AFTER MITIGATION

IMPACT Air-2: Potential to violate any air quality standard or contribute substantially to an existing or projected air quality violation.

Given SCAG's limited authority over the local jurisdictions and unforeseeable circumstances at the project level, whereas implementation of **MM-Air-2(a)(1)**, **MM-Air-2(a)(2)**, and **MM-Air-2(b)** would reduce the impact of short-term emissions, direct, indirect, and cumulative impacts would remain significant and unavoidable.

IMPACT Air-4: Expose sensitive receptors to substantial pollutant concentrations and harm public health outcomes substantially.

Implementation of **MM-Air-2(a)(1)**, **MM-Air-2(a)(2)**, and **MM-Air-4(b)** would reduce the impacts to sensitive receptors and public health, but direct, indirect, and cumulative impacts would remain significant and unavoidable.

CUMULATIVE IMPACTS UNDER GREENHOUSE GAS EMISSIONS AND CLIMATE CHANGE:

While implementation of Mitigation Measures **MM-GHG-3(a)(1) through MM-GHG-3(a)(12)**, **MM-GHG-3(b)** and **MM-EN-2(b)** would reduce GHG emissions, the effectiveness of the mitigation measures identified above cannot be reasonably quantified at this time. Although the mitigation measures would encourage reduction in GHG emissions, they would not guarantee GHG emission reductions. Under SCAG's limited authority, these measures are not directly enforceable and the cumulative impacts would remain significant and unavoidable.

10.0 CONCLUSION AND RECOMMENDATIONS

In conclusion, the 2016 RTP/SCS will have a net positive effect on the air quality of the SCAG region. Despite increasing population and economic growth, the 2016 RTP successfully curbs emissions below the 2040 baseline to help achieve air quality goals such as AB 32 and SB 375. GHG emissions will actually decrease from the 2012 existing conditions in the transportation, building energy, and water-energy sectors.

Air quality and GHG impacts are regional and even global in nature. The 2016 RTP/SCS contains projects ranging from large residential developments to large commercial developments. These related projects, as a result of local input, have been included in SCAG's transportation model. Forecasted regional growth, land use change, and transportation network improvements with the Plan would generate emissions of for all six criteria air pollutants during both construction and operations of development projects and the transportation network. The 2016 RTP/SCS is consistent with air-related plans in the region and will not have an overall significant contribution to any pollutant in the long term, but it would have a significant impact on short-term emissions.

The Plan meets and exceeds SB 375 targets for reducing GHG emissions and contributes to reductions in statewide emissions required under AB 32. The SB 375 GHG emission reduction targets contribute to achieving GHG emissions reduction goals set forth in AB 32. By meeting and exceeding SB 375, the 2016 RTP/SCS has shown that they are on pace with accelerating the GHG emission reductions in the later years beyond 2020. These reductions are gained through better fuel efficiencies, and lower carbon intensities in vehicles. Additionally, the GHG reduction trajectory of the 2016 RTP/SCS beyond 2030 is consistent, if not more aggressive, with the accelerated pace established in the Executive Orders including the recent Executive Order B-30-15. Hence, the Plan is not in conflict with AB 32 and Executive Orders. It should be noted that the goals set forth by AB 32 and the Executive Orders are intended to be achieved by all the responsible sectors. In the event that cumulative impacts of GHG emissions cannot be fully addressed to the appropriate level by projects or responsible sectors, cumulative impact under greenhouse gas emissions and climate change would be significant and unavoidable.

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