3.8
GREENHOUSE GAS EMISSIONS AND CLIMATE CHANGE

This section of the Program Environmental Impact Report (PEIR) describes the greenhouse gas (GHG) emissions and climate change in the SCAG region, discusses the potential impacts of the proposed 2016 Regional Transportation Plan/Sustainable Communities Strategies ("2016 RTP/SCS," "Plan" or "Project") on GHG emissions and climate change, identifies mitigation measures for the impacts, and evaluates the residual impacts (see also **Appendix C, *Air Quality and Greenhouse Gas Emissions and Climate Change Technical Appendix***). GHG emissions and climate change were evaluated in accordance with Appendix G the 2015 State California Environmental Quality Act (CEQA) Guidelines. GHG emissions and climate change within the SCAG region were evaluated at a programmatic level of detail, in relation to the General Plans of the six counties and the 191 cities within the SCAG region; a review of related literature germane to the SCAG region, as well as a review of SCAG's 2012 RTP/SCS PEIR.[1]

Greenhouse gases (GHGs) trap heat in the atmosphere. GHGs are emitted by natural processes and human activities. The accumulation of GHGs in the atmosphere regulates the earth's temperature. The six major GHGs are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6), hydrofluorocarbons (HFCs), and perfluorocarbon (PFCs). The GHGs absorb longwave radiant energy emitted by the earth, which warms the atmosphere. The GHGs also emit longwave radiation both upward to space and back down toward the surface of the earth. The downward part of this longwave radiation emitted by the atmosphere is known as the "greenhouse effect." Emissions from human activities such as fossil fuel combustion for electricity production and vehicles have elevated the concentration of these gases in the atmosphere.[2]

Definitions

Carbon Dioxide (CO_2): 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 CO_2 that would cause the same amount of warming. CO_{2e} is based on the GWP ratios between the various GHGs relative to CO_2.

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

[1] Southern California Association of Governments. April 2012. Final Program Environmental Report: 2012-2035 Regional Transportation Plan/Sustainable Communities Strategy. Available at: http://rtpscs.scag.ca.gov/Pages/Final-2012-PEIR.aspx

[2] 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

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.

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

GHGs include CO_2, CH_4, O_3, water vapor, N_2O, HFCs, PFCs, and SF_6. Carbon dioxide is the most abundant GHG. Other GHGs are less abundant, but have higher global warming potential than CO_2. (**Table 3.8-1, *Greenhouse Gases and Their Relative Warming Potential Compared to CO_2***).

TABLE 3.8-1
GREENHOUSE GASES AND THEIR RELATIVE GLOBAL WARMING POTENTIAL COMPARED TO CO_2

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_2F_6	10,000	12,200
Perfluorobutane: C_4F_{10}	2,600	8,860
Perfluoro-2-methylpentane: C_6F_{14}	3,200	9,300
Sulfur Hexaflouride (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 CO_2, 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 (CH_4): 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 (N_2O): Emitted during agricultural and industrial activities as well as during combustion of fossil fuels and solid waste.

Sulfur Hexafluoride (SF_6): One of a class of fluorinated gases with a high greenhouse warming potential, SF_6 is a colorless gas soluble in alcohol and ether, slightly soluble in water. SF_6 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 [CF_4] and perfluoroethane [C_2F_6]) 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.

3.8.1 REGULATORY FRAMEWORK

This regulatory framework focuses on the international, federal, state, and local statutes and regulations where the primary objective is reduction of GHG emissions. However, there are other regulations that are focused on increased energy efficiency and transportation improvements, that if accomplished would be expected to contribute to per capita reductions in GHG emissions. Those regulations have been addressed respectively in **Section 3.6, *Energy***, and **Section 3.17, *Transportation, Traffic, and Safety***.

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 CO_2 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.[3]

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.[4] 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.[5]

Federal

Federal Clean Air Act, Section 111

Under Section 111 of the Federal Clean Air Act (CAA, 42 U.S. Code [USC] §7401 et seq.), the U.S. Environmental Protection Agency (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.[6]

---

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

[4] European Commission. Accessed 13 October 2015. *The 2015 international agreement.* Available at: http://ec.europa.eu/clima/policies/international/negotiations/future/index_en.htm

[5] 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

[6] Environmental Protection Agency. 3 August 2015. *Regulatory actions.* Available at: http://www2.epa.gov/cleanpowerplan/regulatory-actions#CAP

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.[7] 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 CO_2 goals reflecting the CO_2 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 CO_2 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 CO_2 emissions from the utility power sector.[8]

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.[9]

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 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.[10]

---

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

8 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

9 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

10 Environmental Protection Agency. Accessed 14 October 2015.*Greenhouse Gas Reporting Program.* Available at: http://www2.epa.gov/ghgreporting

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.[11]

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,

[11] 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

preserving forests as climate sinks, reducing energy waste, combating short-lived climate pollutants, mobilizing climate finance, and leading international negotiations on climate change.[12]

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.[13]

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

Published June 10, 2015, Executive Order (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:[14]

- 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
- 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

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

[13] 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

[14] Fed Center. 10 July 2015. *EO 13693.* Available at: https://www.fedcenter.gov/programs/eo13693/

State

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 landfills.[15] 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;

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

- 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 $MTCO_2$ 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 $MTCO_2$ per year make up 94 percent of the point source CO_2 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.[16] It calls for the 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.[17]

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

[16] 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 PEIR addresses consistency of the RTP/SCS in relation to the GHG reduction targets set forth under such executive orders.

[17] California Energy Commission. May 2011. *California's Energy Future – The View to 2050*.

- 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.

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.[18] 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.

[18] 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

Achieving such an aggressive 2050 target will require innovation and unprecedented advancements in energy demand and supply.[19] 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.

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 (Steinberg, Chapter 728, Statutes of 2008), adopted in September 30, 2008, provides an additional means for achieving AB 32 GHG emissions reduction goals. As part of the State's overall strategy to reduce GHG emissions as set forth by Executive Orders S-03-05 and B-30-15 and AB 52, SB 375 seeks to coordinate land use strategies with transportation planning. By coordinating these planning efforts, it is envisioned that vehicle congestion and travel can be reduced resulting in a corresponding reduction in passenger vehicle 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 GHG emissions consistent with AB 32's goals.
- Offering streamlined environmental review opportunities for eligible projects, should project proponents decide to pursue.
- Coordinating the Regional Housing Needs Allocation Assessment (RHNA) process with the regional transportation process while maintaining local authority over land use decisions.

An SCS is a required component of the RTP. The SCS outlines certain land use growth strategies that provide for more integrated land use and transportation planning, maximizes transportation investments, strives to reduce emissions and, if feasible, and 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.

SB 375 provides that the SCS developed as part of the RTP does not regulate the use of land or dictate local land use policies, and further expressly provides that a city's or county's land use policies and regulations, including its general plan, are not required to be consistent with the SCS. Rather, SB 375 is intended to provide a regional policy foundation that local government may build upon, if they so

[19] 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

choose. CARB set the following reduction targets for SCAG: reduce per capita 8 percent of GHG emissions 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.

Clean Car Standards (Assembly Bill 1493)

On September 24, 2009, the ARB adopted Assembly Bill 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.[20]

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.[21]

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, then-Governor Arnold Schwarzenegger signed EO S-14-08, which expands the state's RPS to 33 percent renewable power by 2020. In September 2009, then-Governor Schwarzenegger

[20] 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

[21] 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

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.

Greenhouse Gases: Emissions Reduction (SB 862)

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.[22] 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 [23]

Clean Energy and Pollution Reduction Act of 2015

Clean Energy and Pollution Reduction Act of 2015, Senate Bill (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.[24]

---

[22] 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

[23] California Legislative Information. Accessed 25 August 2015. *SB-862 Greenhouse Gases: Emission Reduction*. Available at: http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140SB862

[24] California Legislative Information. Accessed 14 October 2015.*SB-350 Clean Energy and Pollution Reduction Act of 2015.* Available at: https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160SB350

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.[25]

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 regulations on September 12, 2012, with the first auction for GHG allowances on November 14, 2012.[26] 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.[27] 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.

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.[28]

---

[25] 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

[26] California Air Resources Board. *Cap and Trade Program.* Accessed October 15, 2015. Available at: http://www.arb.ca.gov/cc/capandtrade/capandtrade.htm

[27] CalEPA. Accessed 9 February 2015. *Greenhouse Gas-Reduction Investments to Benefit Disadvantaged Communities.* Available at: http://www.calepa.ca.gov/EnvJustice/GHGInvest/

[28] 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

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 U.S. 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.[29]

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.

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.

[29] California Air Resources Board. 9 December 2014. *Phase 1 GHG*. Available at: http://www.arb.ca.gov/msprog/onroad/phaselghg/phaselghg.htm

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.[30]

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. [31] 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.

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)

[30] 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

[31] 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

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

Pursuant to SB 32, if approved, this bill would codify the 2030 target in the recent Executive Order B-30-15 (40% below 1990 levels by 2030). The bill would authorize the state board to adopt *an* interim greenhouse gas emissions level target to be achieved by 2030. 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.

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.[32]

California Climate Action Registry (2001)

Established in 2001, the CCAR is a private nonprofit organization originally formed by the State of California.[33] 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.

---

[32] California Legislative Information. Accessed 14 September 2015. *SB-32 California Global Warming Solutions Act of 2006: emissions limit (2015–2016).* Available at: http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160SB32

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

- 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.

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.[34]

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:[35]

- 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.

[34] 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

[35] 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

- 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 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.

Regional

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 GHG emissions from cars and light trucks through integrated transportation, land use, housing and environmental planning.[36]

South Coast Air Quality Management District (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

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

the Air Quality Management Plan. In March 1992, the SCAQMD Governing Board reaffirmed this policy and adopted amendments to the policy.[37]

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.[38]

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 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

[37] 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

[38] 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

County of Los Angeles Department of Regional Planning will implement the CCAP and work to develop climate adaptation strategies beyond 2020.[39]

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 Sustainable Communities Strategy (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.[40]

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 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.[41]

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

---

[39] Climate Resolve. 26 March 2015. *Approved: LA County's Community Climate Action Plan*. Available at: http://climateresolve.org/countyclimateactionplan/

[40] Green Riverside. Accessed August 2011. *Green Action Plan*. Available at: http://www.greenriverside.com/About-Green-Riverside-4/Green-Action-Plan-190

[41] 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

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.[42]

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.[43]

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.[44]

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.[45]

3.8.2 EXISTING CONDITIONS

GHGs are the result of both natural and human-influenced activities. Forest fires; decomposition; industrial processes; landfills; and consumption of fossil fuels for power generation, transportation, heating, and cooling are the primary sources of GHG emissions. Without human intervention, the earth maintains an approximate balance between the emission of GHGs into the atmosphere and the storage of GHGs in oceans and terrestrial ecosystems. Increased combustion of fossil fuels (e.g., gasoline, diesel, coal, etc.), have contributed to the rapid increase in atmospheric levels of GHGs over the last 150 years.

The primary effect of rising global concentrations of atmospheric GHG levels has been a rise in the average global tropospheric temperature of approximately 0.2 degree Celsius per decade, determined

---

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

[43] San Bernardino Associated Governments. Accessed 19 July 2015. *Regional greenhouse gas reduction plan.* Available at: http://www.sanbag.ca.gov/planning2/plan_greenhouse.html

[44] Ventura County. Accessed 19 July 2015. *Working & living sustainably.* Available at: http://www.ventura.org/sustain/for-community/climate-protection/

[45] 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

from meteorological measurements worldwide between 1990 and 2005. Climate change modeling using 2000 emission rates shows that further warming is likely to occur given the expected rise in global atmospheric GHG concentrations from innumerable sources of GHG emissions worldwide,[46] which would induce further changes in the global climate system during the current century. Adverse impacts from global climate change worldwide and in California may include, but may not be limited to:

- Declining sea ice and mountain snowpack levels, thereby increasing sea levels and sea surface evaporation rates with a corresponding increase in tropospheric water vapor due to the atmosphere's ability to hold more water vapor at higher temperatures.[47]
- Rising average global sea levels primarily due to thermal expansion and the melting of glaciers, ice caps, and the Greenland and Antarctic ice sheets.[48] Sea level in California has risen approximately 7 inches from 1900 to 2005, according to the National Climate Assessment.[49]
- Changing weather patterns, including changes to precipitation, ocean acidification and warming, and wind patterns.[50]
- Declining Sierra snowpack levels, which account for approximately half of the surface water storage in California, by 70 percent to as much as 90 percent over the next 100 years.[51]
- Increasing the number of days conducive to ozone formation by 25 to 85 percent (depending on the future temperature scenario) in high ozone areas located in the Southern California area and the San Joaquin Valley by the end of the 21st century.[52]
- Migrating of species to suitable habitats.
- Reducing of crop yields in the agricultural sector.
- Increasing the potential for erosion of California's coastlines and seawater intrusion into the Sacramento Delta and associated levee systems due to the rise in sea level.[53]
- Decreasing cold temperature extremes, increasing warm temperature extremes, increasing extreme high sea levels, and increasing number of heavy precipitation events in a number of regions.[54]

---

[46] See, e.g., Environmental Protection Agency, Draft Endangerment Finding, *74 Fed. Reg.* 18886, 18904 (April 24, 2009) ("cumulative emissions are responsible for the cumulative change in the stock of concentrations in the atmosphere"); see also 74 *Fed. Reg.* 66496, 66538 (same in Final Endangerment Finding).

[47] Environmental Protection Agency, Draft Endangerment Finding, 74 *Fed. Reg.* 18886, 18904 (April 24, 2009) ("cumulative emissions are responsible for the cumulative change in the stock of concentrations in the atmosphere"); see also 74 *Fed. Reg.* 66496, 66538 (same in Final Endangerment Finding).

[48] Intergovernmental Panel on Climate Change. 2007. *Climate change 2007.*

[49] 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

[50] Intergovernmental Panel on Climate Change. 2007. *Climate Change 2007.*

[51] California Environmental Protection Agency, Climate Action Team. 2006. *Climate Action Team Report to Governor Schwarzenegger and the Legislature*.

[52] California Environmental Protection Agency, Climate Action Team. 2006. *Climate Action Team Report to Governor Schwarzenegger and the Legislature*.

[53] California Environmental Protection Agency, Climate Action Team. 2006. *Climate Action Team Report to Governor Schwarzenegger and the Legislature*.

[54] Intergovernmental Panel on Climate Change. 2014. *Climate Change 2014 Synthesis Report Summary for Policymakers*. Available at: http://www.ipcc.ch/pdf/assessment-report/ar5/syr/AR5_SYR_FINAL_SPM.pdf

- Increasing frequency and severity of climate-related extremes including heat waves, droughts, floods, cyclones, and wildfires.[55]

Scientific understanding of the fundamental processes responsible for global climate change has improved over the past decade, and 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; and 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 surrounding climate change may never be completely eliminated. Because of these uncertainties, there continues to be some debate as to the extent to which increased concentrations of GHGs have caused or will cause climate change and with respect to the appropriate actions to limit and/or respond to climate change. In addition, it may not be possible to link specific development projects to future specific climate change impacts, though estimating project-specific impacts is possible.

Sources of GHG Emissions

Global

Global GHG emissions in 2012 were 43,286.2 $MTCO_2e$.[56] The top ten GHG emitters in the world contribute 72 percent of global GHG emissions, not including land use change and forestry. The top ten GHG emitters, in order from most polluting, are China, U.S., European Union, India, Russian Federation, Indonesia, Brazil, Japan, Canada, and Mexico. China contributed the most, accounting for approximately 25.4 percent (or 10,975.5 $MTCO_{2e}$) of the world's total, while the U.S. was the second largest contributor accounting for approximately 14.4 percent (6,235.1 $MTCO_{2e}$). Six of the top ten GHG emissions contributors are developing countries, which reflects a shift in the geopolitical landscape as developed countries used to dominate the top ten GHG emitters list. The energy sector accounts for more than 75 percent of total global GHG emissions, making it a primary focus in achieving reductions.[57]

National

In 2013, the United States emitted 6,673 $MTCO_2e$ (**Figure 3.8.2-1, *United States: GHG Emissions by Sector, 2013***). Total U.S. GHG emissions have increased by 5.9 percent from 1990 to 2013 at an average annual rate of 0.3 percent since 1990. From 2012 to 2013, U.S. GHG emissions increased 2 percent because of increased coal consumption and decreased natural gas consumption in electricity generation. Other factors include increase in energy use for heating during the cool winter conditions, increase in industrial production and emissions, and increase in vehicle miles traveled and fuel use in transportation. However, the national GHG emissions level in 2013 was 9 percent below 2005 levels.[58]

---

55 Intergovernmental Panel on Climate Change. 2014. *Climate Change 2014 Synthesis Report Summary for Policymakers*. Available at: http://www.ipcc.ch/pdf/assessment-report/ar5/syr/AR5_SYR_FINAL_SPM.pdf

56 Infographic: What Do Your Country's Emissions Look Like? Accessed 23 June 2015. Available at: http://www.wri.org/blog/2015/06/infographic-what-do-your-countrys-emissions-look

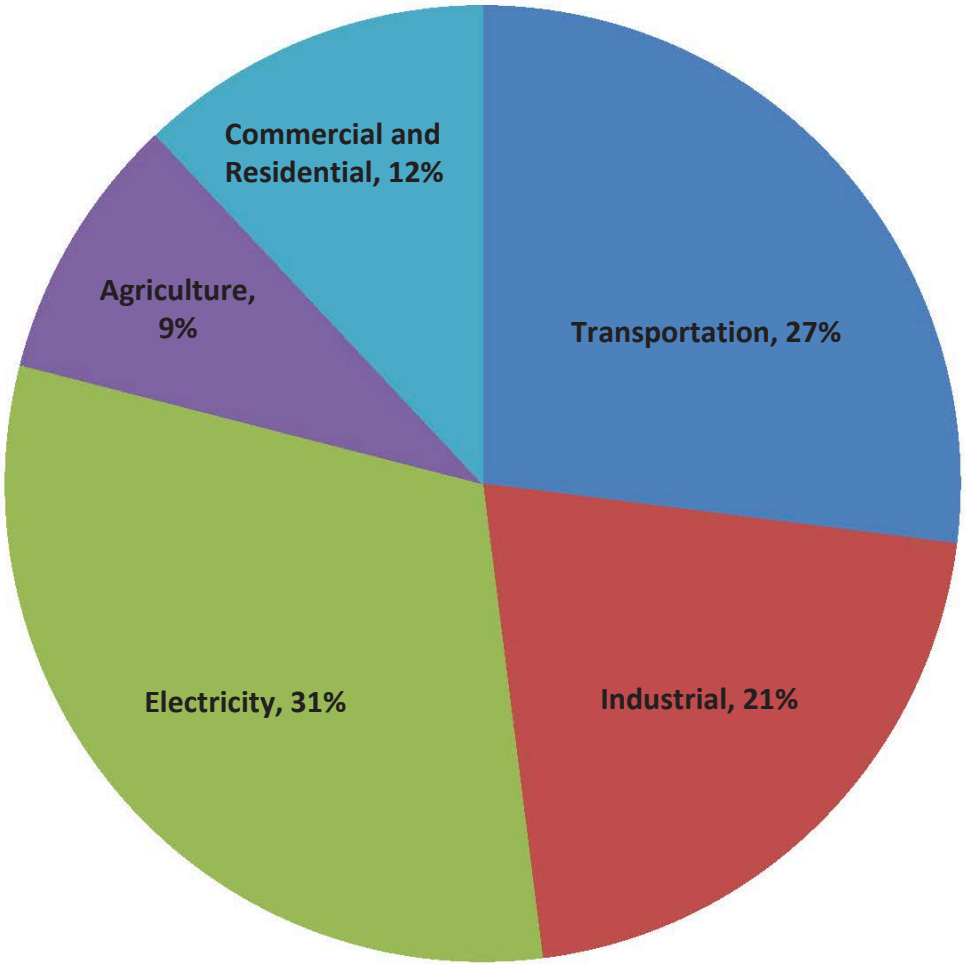
57 Infographic: What Do Your Country's Emissions Look Like? Accessed 23 June 2015. Available at: http://www.wri.org/blog/2015/06/infographic-what-do-your-countrys-emissions-look

58 U.S. Environmental Protection Agency. April 2015. *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2013*. Available at: http://www.epa.gov/climatechange/Downloads/ghgemissions/US-GHG-Inventory-2015-Chapter-Executive-Summary.pdf

Figure 3.8.2-1:

United States: GHG Emissions by Sector, 2013

Total Emissions: 6,673 MMT CO2e



Note: Land use, land-use change, and forestry is a net sink and offsets approx. 13% of GHG emissions

In June 2013, President Obama announced the U.S. Climate Action Plan, which takes a three-pronged approach by cutting carbon pollution, preparing for the impacts of climate change, and leading international efforts to address global climate change. The Plan aims to reduce carbon pollution by focusing on setting emission standards for new and existing power plants, improving energy efficiency in vehicles and buildings, reducing energy waste, and investing in renewable energy projects. The Plan also includes climate adaptation strategies to address climate vulnerabilities, such as drought and wildfires, and increases resiliency in how we build our cities.

State of California

California Greenhouse Gas Inventory

The California Greenhouse Gas Inventory, maintained by the CARB, includes emissions from carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and nitrogen trifluoride (NF_3). Of the total 459 $MMTCO_{2e}$ of GHG emissions in 2013, 84 percent were from CO_2. In 2013, the transportation sector and the industrial sector were the top two GHG emissions contributors, at 37 percent and 23 percent, respectively. Starting in 2009, the GHG Mandatory Reporting Program provided the statewide emissions from electricity generation and stationary industrial sources (**Table 3.8.2-1, *California Greenhouse Gas Inventory for 2000–2013 by Economic Sector***).[59] In 2011, CARB partnered with the University of California, Berkeley, to develop new methodologies using land based data sets and remote sensing data to evaluate carbon stock changes in California. The covered lands include forests, woodlands, shrub lands, grasslands, and wetlands, but not urban or agricultural lands.[60]

[59] California Air Resources Board. 30 June 2015. *California Greenhouse Gas Emission Inventory -2015 Edition*. Available at: http://www.arb.ca.gov/cc/inventory/data/data.htm

[60] California Air Resources Board. 6 May 2015. *California Greenhouse Gas Inventory - Forests and Other Lands.* Available at: http://www.arb.ca.gov/cc/inventory/sectors/forest/forest.htm

TABLE 3.8.2-1
CALIFORNIA GREENHOUSE GAS INVENTORY FOR 2000-2013 BY ECONOMIC SECTOR

	CO_{2e} Emissions (Million Metric Tons)													
Sector	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Electricity (In state)	59	63	50	48	49	45	50	54	54	53	47	41	51	51
Electricity (Imports)	46	59	59	65	66	63	55	60	66	48	44	47	44	40
Transportation	178	179	186	186	189	192	192	192	181	175	174	171	171	173
Industrial	105	104	105	104	107	105	103	100	101	99	103	103	104	104
Commercial	15	15	17	16	17	17	18	18	19	20	22	22	22	23
Residential	32	31	31	31	32	30	31	31	31	31	32	33	31	32
Agriculture & forestry	32	33	34	35	34	35	36	36	36	35	35	36	36	36
Not specified	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total	**469**	**485**	**483**	**486**	**495**	**488**	**486**	**493**	**490**	**462**	**456**	**455**	**461**	**459**

SOURCE:
California Air Resources Board. Accessed 24 April 2015. *California Greenhouse Gas Inventory for 2000-2013 – by Sector and Activity*. Available at: http://www.arb.ca.gov/cc/inventory/data/tables/ghg_inventory_sector_sum_2000-13_20150424.pdf

In 2013, total California GHG emissions were 459 MMT of carbon dioxide equivalent ($MMTCO_{2e}$) (**Figure 3.8.2-2, *California: GHG Emissions by Sector, 2013***). Total GHG emissions decreased by 1.5 million $MMTCO_{2e}$ from 2012 to 2013. This is an overall decrease of 7 percent since peak levels in 2004. Per capita emissions in California have decreased by 14 percent from 2000 to 2013, going from 14 tonnes of CO_{2e} per person in the peak of 2001 to 12 tonnes of CO_{2e} per person in 2013.[61] The GHG inventory additionally shows as GDP rises from 2000 to 2013, emissions per unit GDP, otherwise known as carbon intensity, has been declining. Carbon intensity has declined 23 percent since its 2001 peak.[62]

For 2013, transportation makes up the largest portion at 37 percent of gross GHG emissions. Of the 173 $MMTCO_{2e}$ emitted by transportation, 90 percent are from on-road sources including passenger vehicles and trucks. While population growth has increased the number of vehicles on the road, vehicles have been getting cleaner pursuant to AB 1493. The next largest emitting sectors are industrial and electricity generation, which contribute 23 percent and 20 percent, respectively, of the total GHG emissions.

In 2012, in-state electricity generation increased because of the closure of the San Onofre Nuclear Generating Station and lower hydropower generation as a result of California's drought. The lost zero-GHG generation was replaced by power in-state from natural gas powered generation plants. Although the drought and reduced availability of hydropower continued in 2013, in-state power generation has adapted by utilizing the more efficient combined-cycle power plants and continuing recent trends of greater use of renewable power. The closing of the last of the high-carbon-intensity petroleum coke power plants also reduced the emissions associated with power generation.[63]

California ranks second in the United States in total GHG emissions behind Texas. However, from a per capita and per GDP standpoint, California has the 45th- and 46th-lowest emissions, respectively. On an international scale, California has the 20th-largest GHG emissions and the 38th-largest per capita emissions for year 2010.[64]

Cap and Trade Program

The state-wide cap and trade expenditure plan allocated $832 million dollars towards these programs that will help reduce GHG emissions, with set-asides for projects benefiting disadvantaged communities. The expenditure plan funds three main investment categories: (1) sustainable communities & clean transportation; (2) energy efficiency & clean energy; and (3) natural resources & waste diversion.[65]

---

[61] California Air Resources Board. 16 June 2015. *California Greenhouse Gas Emissions for 2000 to 2013 – Trend of Emissions and Other Indicators*. Available at: http://www.arb.ca.gov/cc/inventory/pubs/reports/ghg_inventory_trends_00-13%20_10sep2015.pdf

[62] California Air Resources Board. 16 June 2015. *California Greenhouse Gas Emissions for 2000 to 2013 – Trend of Emissions and Other Indicators*. Available at: http://www.arb.ca.gov/cc/inventory/pubs/reports/ghg_inventory_trends_00-13%20_10sep2015.pdf

[63] California Air Resources Board. 16 June 2015. *California greenhouse gas emissions for 2000 to 2013 – trends of emissions and other indicators*. Available at: http://www.arb.ca.gov/cc/inventory/pubs/reports/ghg_inventory_trends_00-13.pdf

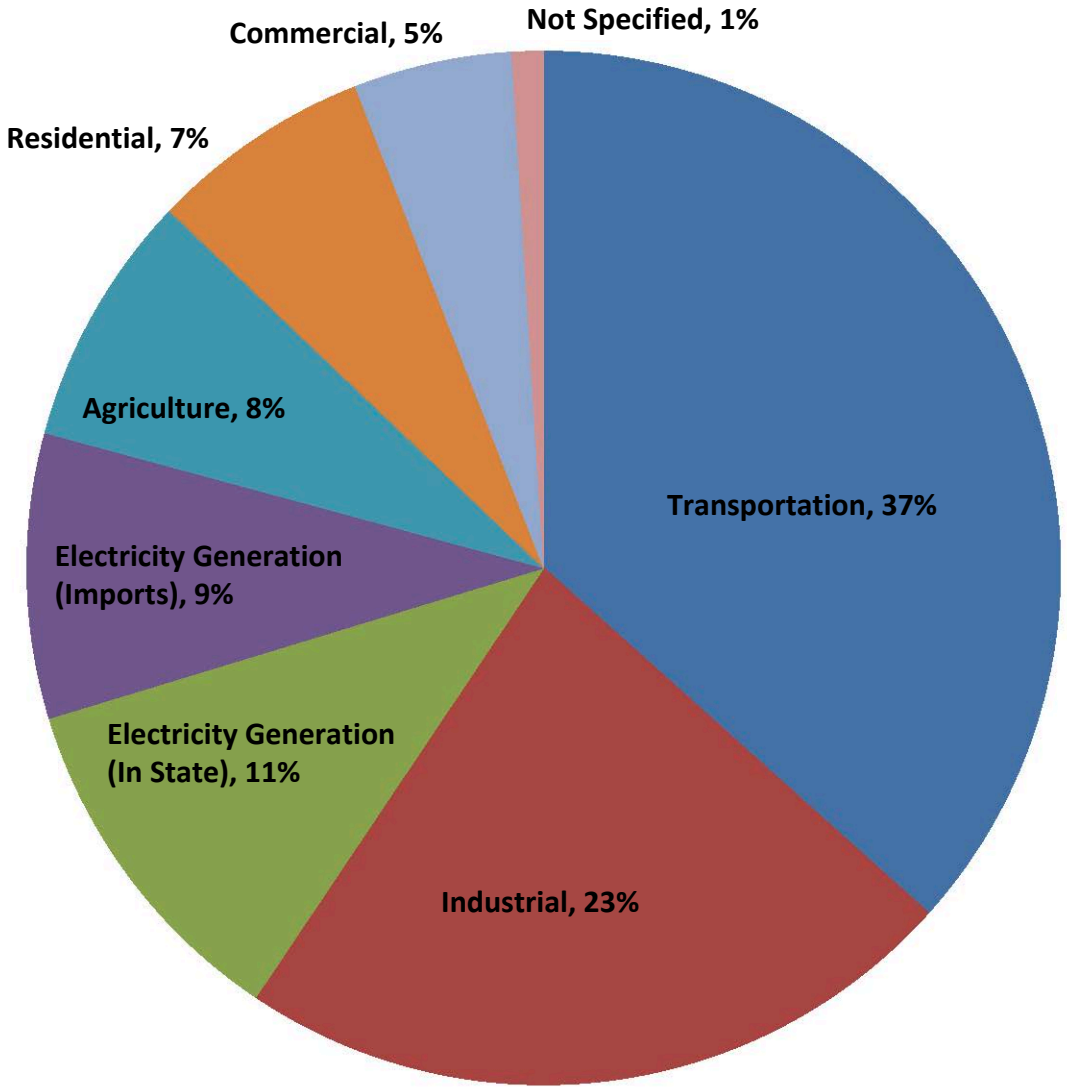
[64] California Air Resources Board. May 2014. *California Greenhouse Gas Emission Inventory: 2000 – 2012, 2014 edition*. Available at: http://www.arb.ca.gov/cc/inventory/pubs/reports/ghg_inventory_00-12_report.pdf

[65] Southern California Association of Governments. Accessed 25 August 2015. *The Greenhouse Gas Reduction Fund.* Available at: http://www.scag.ca.gov/programs/Pages/GGRFExpenditurePlan.aspx?opentab=2

Figure 3.8.2-2:

California: GHG Emissions by Sector, 2013

Total Emissions: 459 MMT CO2e



SCAG, as part of its 2013 and 2014 legislative priorities adopted by Regional Council, has partnered with transportation, local government, business and environmental stakeholders from around the state to work closely with the legislature to ensure that equitable allocations of cap-and-trade revenues flow to transportation programs and policies reducing GHG emissions. These critical funding programs are expected to help local jurisdictions and SCAG's partners implement the 2012-2035 RTP/SCS (2012 RTP/SCS), adopted by SCAG Regional Council in April 2012.[66]

The Affordable Housing & Sustainable Communities (AHSC) Program is a statewide competitive program that provides grants and loans for affordable housing, infill development, transit oriented development and related infrastructure. The Strategic Growth Council (SGC) and Department of Housing and Community Development (HCD) administer the program, including project evaluation and the approval of funding awards. Nine projects in the SCAG region were awarded funding for Round One of the AHSC Program. The nine projects totaled approximately $27.5 million, representing approximately 22.5 percent of total funding statewide. These nine projects are: (1) 127th Street Apartments (City of Los Angeles); (2) Anchor Place (City of Long Beach); (3) Crenshaw Villas (City of Los Angeles); (4) Depot at Santiago (City of Santa Ana); (5) El Segundo Family Apartments (City of Los Angeles); (6) Macarthur Park Apartments Phase B (City of Los Angeles); (7) March Veterans Village (Riverside County); (8) Mosaic Gardens at Westlake (City of Los Angeles); and (9) Sylmar Court Apartments (City of Los Angeles).[67,68] The Fiscal Year (FY) 2015–2016 Cap and Trade Expenditure Plan has an increase of approximately 270 million for the AHSC program, totaling $400 million. The Greenhouse Gas Reduction Fund (GGRF) is expected to be $2.2 billion in FY 2015–2016.[69]

SCAG Region

The most recent GHG emissions data by sector for the SCAG region is from 2008 (**Figure 3.8.2-3, *SCAG: GHG Emissions by Sector, 2008***). Similar to the 2013 U.S. and California GHG emission profiles, transportation, industrial, and electricity are the three largest contributors to GHG emissions (**Figure 3.8.2-1** and **Figure 3.8.2-2**). Total SCAG emissions in 2008 were 230 $MMTCO_{2e}$. Transportation emissions are most prevalent relative to all other sectors in California and specifically in the SCAG region. Transportation emissions accounted for 40 percent of total emissions in the SCAG region, compared to 27 percent of total emissions in the United States.

In light of climate change, the SCAG region could face devastating environmental impacts if GHG emissions continue at a business as usual rate. Southern California will likely warm by 4 degrees Fahrenheit by 2100 with emission controls, or as much as 10 degrees Fahrenheit with no climate action. The region will experience longer, hotter, and more frequent heat waves as well as drought conditions

---

66 Southern California Association of Governments. Accessed 25 August 2015. *The Greenhouse Gas Reduction Fund.* Available at: http://www.scag.ca.gov/programs/Pages/GGRFExpenditurePlan.aspx?opentab=2

67 The SCAG region includes nearly 50 percent of the State's population and approximately 67 percent of the State's disadvantaged communities. In light of the approximately 23 percent of total statewide funding from the AHSC Program, SCAG plans to seek a fair share of funding in future rounds of cap and trade funding through implementation of the AHSC Program Action Plan, adopted by SCAG Regional Council in July 2015. Available at: http://scag.granicus.com/MetaViewer.php?view_id=9&clip_id=856&meta_id=15443

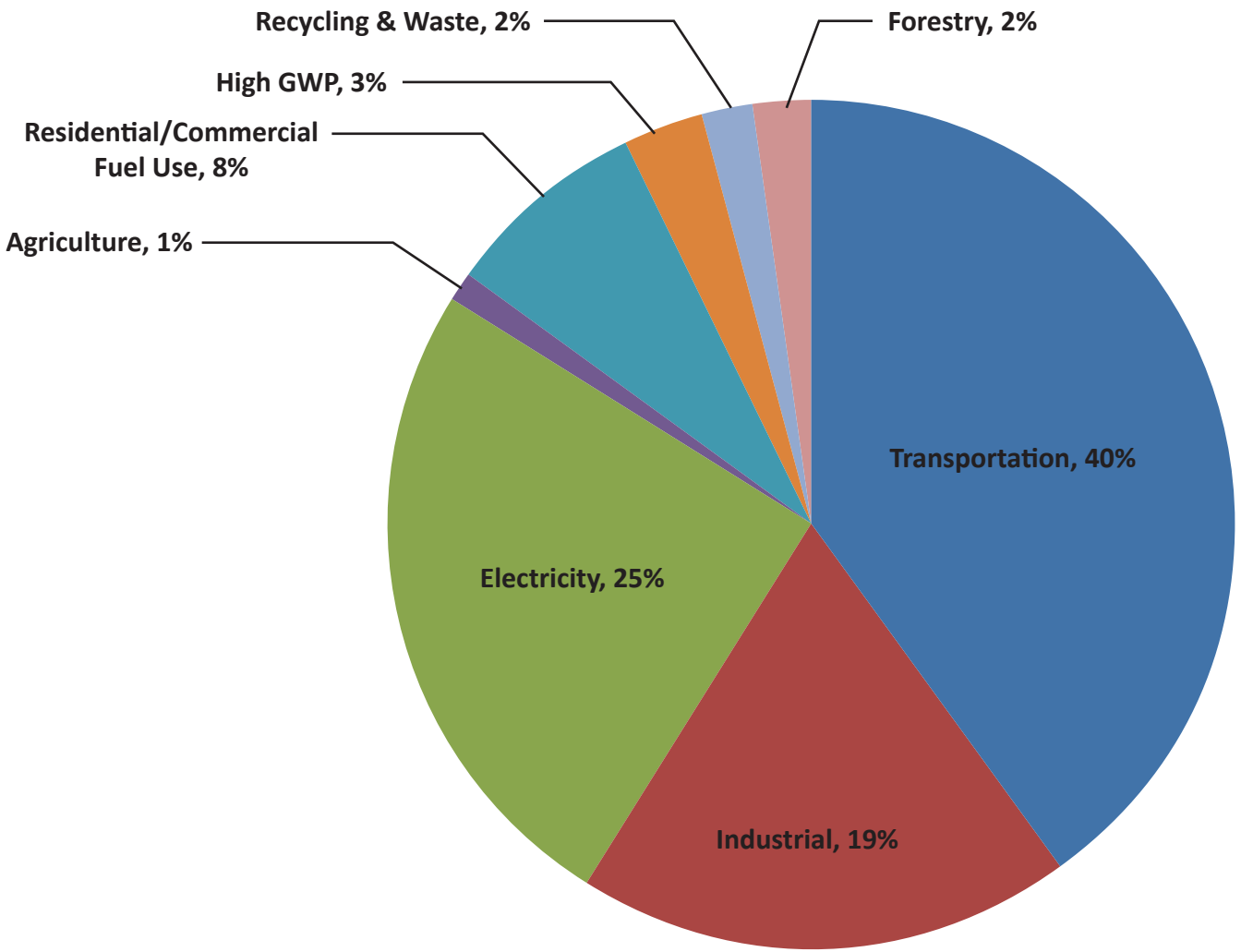
68 Southern California Association of Governments. 3 September 2015. *Regional Council staff Report: Cap and Trade Greenhouse Gas Reduction Fund: Affordable Housing & Sustainable Communities (AHSC) Program Update.*

69 Southern California Association of Governments. 2 July 2015. *Regional Council Staff Report: Cap and Trade Greenhouse Gas Reduction Fund: Affordable Housing & Sustainable Communities (AHSC) Program and State Expenditure Plan Update.*

Figure 3.8.2-3:

SCAG: GHG Emissions by Sector, 2008

Total Emissions= 230 MMT CO2e



that limit the region's water supply as the snowpack in the Sierra Nevada and Colorado River Watershed is reduced. Along the coasts, the sea level could rise up to 1 foot above the 2000 level by 2050, and 1.5 feet to 4 feet above 2000 level by 2100.[70]

Ongoing GHG Emission Reduction and Adaptation Strategies in the SCAG Region

Climate change affects natural and human systems globally. Climate mitigation strategies include reducing or sequestering GHG emissions, while climate adaptation is preparing for the unavoidable impacts from climate change. Climate mitigation strategies include, but are not limited to: [71]

- Promoting energy efficiency in buildings
- Using low carbon electricity
- Transitioning to high efficiency heating and cooling systems
- Using low carbon and alternative fuels
- Incorporating zero emission or hybrid vehicles
- Incorporating healthy community planning (active transportation)
- Increasing urban density
- Reducing automobile dependence
- Increasing transit options
- Integrating renewable energy
- Improving waste management

Climate adaptation solutions would be long term and require a shift in thinking on how communities are designed. Adaptation strategies include, but are not limited to:[72]

- Using scarce water more efficiently
- Adapting building codes to future climate conditions and extreme weather events
- Building flood defenses and raising the levels of levees
- Developing drought tolerant crops
- Implementing urban tree planting and reforestation
- Setting aside land corridors for species migration
- Increasing collaboration on climate preparedness strategies among public agencies

The CARB Climate Action Plan Update, Appendix D1, the California Air Pollution Control Officers Association (CAPCOA) and Other Local and Regional Efforts to Implement Climate Protection Strategies, details the various approaches that local jurisdictions in California have taken to achieve GHG reduction targets. Regulations, plans, permitting, GHG inventories, emission banking and trading, grants,

---

[70] Southern California Association of Governments. July 2009. *Climate Change and the Future of Southern California*. Available at: http://sustain.scag.ca.gov/Sustainability%20Portal%20Document%20Library/ClimateChange_Full_lores.pdf

[71] Energy + Environmental Economics. 6 April 2015. *Summary of the California State Agencies' PATHWAYS Project: Long-Term Greenhouse Gas Reduction Scenarios.* Available at: https://ethree.com/documents/E3_Project_Overview_20150406.pdf

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

incentives, and education have contributed to changing how people use energy and started a system where emissions are tracked and monitored.[73]

Multiple jurisdictions in the SCAG region have taken action to address climate change. After assessing the climate vulnerabilities distinct to their community, these jurisdictions formulate a plan to move forward to minimize the impacts of these vulnerabilities. These actions take the form of climate action plans, general plan policies, GHG reduction plans, sustainability plans, and ordinances.[74] As shown above, the Regulatory Framework section covers these actions in greater detail as applicable to the counties and cities within the SCAG region.

SCAG presents annual Sustainability Awards to recognize exemplary planning projects that support the core principles of mobility, livability, prosperity, and sustainability. On May 7, 2015, SCAG presented Sustainability Awards to the following cities/counties and their associated sustainability projects:[75]

- City of Anaheim—Anaheim Regional Transportation Intermodal Center (ARTIC)
- Los Angeles Department of Transportation—Broadway Dress Rehearsal Existing Conditions Report
- City of Glendale—Greener Glendale Plan for Community Activities
- City of Coachella—City of Coachella General Plan Update
- City of Rialto Public Works Department—Rails to Trails/ Along the Pacific Electric Railway
- Orange County Transit Association—Measure M2 Environmental Cleanup Program
- Los Angeles County—Los Angeles County General Plan Update

Past Sustainability Award winners include:

2014:

- Los Angeles County Metropolitan Transportation Authority (Metro)— First/Last Mile Strategic Plan & Planning Guidelines
- City of Santa Monica - Bike Santa Monica/Santa Monica Bike Action Plan
- City of San Gabriel City of San Gabriel - Greening the Code
- City of Santa Ana - Triada at the Station District
- Los Angeles Department of Transportation - LADOT People St
- City of Yucaipa - Historic Uptown Revitalization Program
- City of Oxnard-Groundwater Recovery, Enhancement and Treatment (GREAT) Program
- City of Lynwood - City-wide Residential Design Guidelines
- Imperial County Transportation Commission - El Centro and Brawley Transit Transfer Stations

---

[73] California Air Resources Board. February 10, 2014. *Climate Action Plan Update, Appendix D1, CAPCOA and Other Local and Regional Efforts to Implement Climate Protection Strategies.* Available at: http://www.arb.ca.gov/cc/scopingplan/2013_update/appendix_d.pdf

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

[75] Southern California Association of Governments. Accessed 1 September 2015. *SCAG Sustainability Awards*. Available at: http://sustain.scag.ca.gov/Pages/Awards.aspx

- San Bernardino Associated Governments & County of San Bernardino - Countywide Vision

2013:

- Los Angeles County Metropolitan Transportation Authority (METRO) - Countrywide Sustainability Planning Policy
- City of Los Angeles - Cornfields Arroyo Specific Plan
- Coachella Valley Association of Governments – Coachella Valley Parkway 1e11
- County of Los Angeles - One Valley One Vision, Santa Clarita (OVOV)
- Western Riverside Council of Governments (WRCOG) - Highway 395 Corridor Study for Southwest Riverside County
- City of Fontana - Senior Apartments
- South Bay Bicycle Coalition/LA County Bicycle Coalition - South Bay Bicycle Master Plan
- City of Long Beach - The Collage Apartments
- Riverside Transit Agency (RTA)- Travel Training Program

2012:

- City of Glendale – Safe & Healthy Streets
- Western Riverside Council of Governments - Home Energy Renovation Opportunity (HERO) Program
- Orange County Transportation Authority - 4th Supervisorial District Bikeways Collaborative
- City of La Mirada - Imperial Highway Specific Plan
- City of Irvine - Irvine Business Complex Residential/Mixed Use Vision Plan
- City of La Quinta - Wolff Waters Place Affordable Housing Complex
- City of Long Beach - 4th & Linden Adaptive Reuse Project
- City of Artesia - Artesia Boulevard Corridor Specific Plan
- City of Los Angeles - Bonnie Brae Village Senior Community
- City of Chino - Re-Envisioning Chino: Implementing the 2025 General Plan

SCAG 2012 RTP/SCS

For the SCAG region, in 2011, CARB set the GHG emission reduction targets at 8 percent per capita by 2020 and 13 percent per capita by 2035. In April 2012, SCAG Regional Council approved the 2012 RTP/SCS. The 2012 RTP/SCS stated it would meet or exceed the region's GHG targets set by CARB by achieving a 9 percent per capita reduction by 2020 and a 16 percent per capita reduction by 2035 compared to the 2005 level on a per capita basis.[76] These targets remain the same for the 2016 RTP/SCS.

[76] Southern California Association of Governments. Adopted April 2012. *2012-2035 Regional Transportation Plan/Sustainable Communities Strategy: Executive Summary*. Available at: http://rtpscs.scag.ca.gov/Documents/2012/final/2012fRTP_ExecSummary.pdf

3.8.3 THRESHOLDS OF SIGNIFICANCE

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.

CEQA Guidelines Section 15064.4(a) confirms that lead agencies retain the discretion to determine the significance of GHG emissions. The Guidelines advise lead agencies to consider the following factors in determining the significance of GHG emissions: whether the project increases or reduces GHG emissions compared to the existing environmental setting, whether project emissions exceed a threshold of significance identified by the lead agency as appropriate to the project, and the extent to which the project compiles with regulations or requirements of certain adopted GHG reduction plans. (CEQA Guidelines Section 15064.4(b)). However, fundamentally, the courts recognize that lead agencies are allowed to decide what threshold of significance they will apply to a project. (See *Citizens for Responsible Equitable Development v. City of Chula Vista* (2011) 197 Cal.App. 4th 327, upholding an AB 32–based approach to setting significance thresholds.)

This PEIR uses three thresholds of significance: increase in GHG emissions compared to existing conditions; conflict with SB 375 GHG emission reduction targets; or conflict with AB 32 or other applicable plan, policy or regulation adopted for the purposed of reducing emissions of GHGs. SCAG selected the SB 375–based threshold, because complying with SB 375 is the statutory requirement for the SCS. Evaluation to AB 32 and other applicable plan, policy, or regulation is consistent with CEQA Guidelines suggestions.

SCAG chose not to use the Executive Order emissions reduction goals as a specific threshold of significance because goals of the Executive Order are currently not considered an adopted GHG reduction target within the meaning of CEQA Guidelines Section 15064.4(b)(2), nor are the Executive Orders, regulations or requirements adopted to implement a statewide plan for reduction or mitigation of GHG under Section 15064.4(b)(3),.[77] The 2016 Plan will be evaluated in terms of meeting AB 32 GHG emission reduction goals, SB 375 emission targets, and to determine if the trajectory of the SB 375 GHG emission reductions for the 2016 RTP/SCS would be consistent with the trajectory of the State's long-term (2050) GHG emission reduction goals as set forth in the Executive Order S-3-05, Executive Order B-16-2012 and Executive B-30-15 as well as the accelerated GHG emission reduction timeline of Executive Order B-30-15.

Methodology

The GHG emissions were analyzed based off the Scenario Planning Model (SPM) and transportation modeling conducted by SCAG in 2015 (see also **Appendix C**). The SPM includes model run data for

[77]Note that the California Supreme Court is currently reviewing the role of Executive Order S-3-05 in the context of CEQA thresholds for GHG emissions in *Cleveland Nat'l Forest Foundation v. San Diego Assn. of Gov'ts* (2014) 231 Cal. App. 4th 1056. Nevertheless, given the State's policy to reduce GHG emissions in long term, the PEIR compares the regional GHG emissions resulting from the plan with the long terms goals set forth in Executive Order S-3-05, Executive Order B-16-2012, and Executive B-30-15.

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. Estimates of energy and water use are based on (1) current demand factors and (2) emission rates associated with current power generation operations and water supply.

Analysis of the potential GHG impacts of the 2016 Plan was conducted based on detailed modeling of on-road and gross estimates of stationary sources. As water and energy prices rise and as GHG regulations become stricter, it is anticipated that future energy demand will decrease as people respond to increased prices reducing the amount of energy they use. 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 knowledge of future regulations, technologies or market drivers, only modest reductions in demand are assumed. While the analysis takes into account regulations, programs, and policies currently in place, there is substantial uncertainty in projecting emissions for future horizon years. The analysis used reasonable assumptions regarding future conditions, but is limited as the Renewable Portfolio Standard does not set targets beyond 2020 and the ARB Advanced Clean Cars Program does not address passenger vehicles beyond the 2025 model year (see **Appendix C** for additional information regarding assumptions and methods used in the characterization of baseline conditions and analysis of greenhouse gas emissions).

3.8.4 IMPACT ANALYSIS

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 3.8.4-1 *Greenhouse Gas Emissions from Transportation by County***). **Table 3.8.4-1** includes CO_2 instead of CO_{2e} because CO_2 is the primary GHG emitted by human activities. Thereby analyzing CO_2 emissions is representative of the GHG emissions.[78]

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

TABLE 3.8.4-1
GREENHOUSE GAS EMISSIONS FROM TRANSPORTATION BY COUNTY*

	CO_2 Emissions (tons/day)				
County	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 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 would contribute to the reduction in GHG emissions.

GHG emissions result from direct and indirect sources. Direct emissions in the transportation sector 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 3.8.4-1**). For the purpose of analyzing the 2016 RTP/SCS, the transportation emissions include on-road mobile sources: light and medium duty vehicles, and heavy duty trucks.

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 3.8.4-1**).

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 3.8.4-2, *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, water-related energy consumption, and construction. Though GHG emissions from construction are generally associated with construction equipment, current and projected data with respect to construction emissions is not available. However, as noted in the 2012 RTP/SCS PEIR, construction related emissions account for less than 0.3 percent of total of the three sectors shown in **Table 3.8.4-2**. 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 3.8.4-2
GREENHOUSE GAS EMISSIONS SUMMARY FOR THE SCAG REGION

	CO2e Emissions (MMT CO2e per year)			
Area	**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 CO_2 emissions requires modeling vehicle miles traveled (VMT) by passenger vehicles and light trucks that emit CO_2 (see **Table 3.3.4-4, *Daily VMT by County***, in **Section 3.3, *Air Quality***) 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 CO_2 per person per day (**Table 3.8.4-3, *SB 375 Analysis***).

TABLE 3.8.4-3
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 3.8.4-3**, per capita CO_2 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 CO_2 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 CO_2 emissions from cars and light duty trucks (only). This represents an approximately 18 percent decrease in per capita CO_2 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 aggressive GHG emission reductions are projected for 2040 (**Table 3.8.4-3**). The Plan would result in an estimated 22 percent decrease in per capita GHG emissions by 2040 (**Figure 3.8.4-1, *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

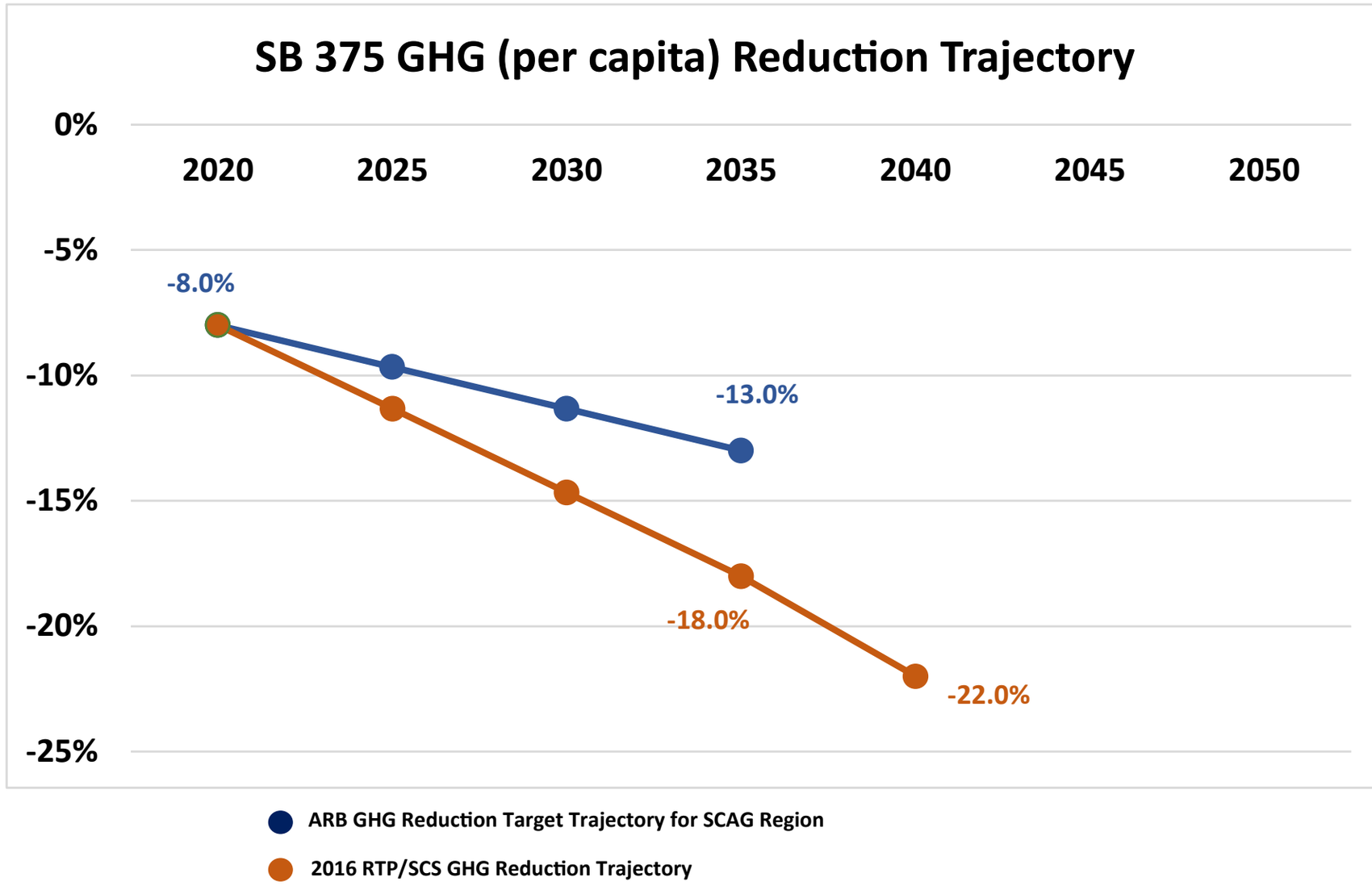


FIGURE 3.8.4-1:

SB 375 GHG (per capita) Reduction Trajectory

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 targets. 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 3.8.4-1**, 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." [79] 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 Update. From 2016 to 2040, the Plan includes increased investment in transit and rail services, active transportation, and other VMT reduction strategies.

[79] 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

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 3.8.4-1**). 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 3.8.4-1**, 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.

3.8.5 CUMULATIVE IMPACTS

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

Less than Significant Cumulative Impact

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.

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

Less than Significant Cumulative Impact

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.

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.

Significant Cumulative Impact

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.

3.8.6 MITIGATION MEASURES

Mitigation measures described below are in response to the significant cumulative impact. 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.

Cumulative Impacts

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

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 to conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emission of greenhouse gases**,** 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 greenhouse gas 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.

MM-EN-2(b).

3.8.7 LEVEL OF SIGNIFICANCE AFTER MITIGATION

Cumulative Impacts

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

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 the cumulative impacts related to 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.