# 4.6 Greenhouse Gas Emissions

This section describes the existing greenhouse gas (GHG) conditions of the project site and vicinity, identifies associated regulatory requirements, evaluates potential project and cumulative impacts, and identifies mitigation measures for any significant or potentially significant impacts related to implementation of the Santa Cruz Water Rights Project (Proposed Project). The analysis is based on GHG modeling conducted for the Proposed Project as part of the preparation of this environmental impact report (EIR). The results of the GHG modeling are summarized in this section and are included in Appendix E.

A summary of the comments received during the scoping period for this EIR is provided in Table 2-1 in Chapter 2, Introduction, and a complete list of comments is provided in Appendix A. There were no comments related to GHG emissions.

## 4.6.1 Existing Conditions

### 4.6.1.1 Climate Change Overview

Climate change refers to any significant change in measures of climate—such as temperature, precipitation, or wind patterns—lasting for an extended period of time (decades or longer). The Earth's temperature depends on the balance between energy entering and leaving the planet's system. Many factors, both natural and human, can cause changes in Earth's energy balance, including variations in the sun's energy reaching Earth, changes in the reflectivity of Earth's atmosphere and surface, and changes in the greenhouse effect, which affects the amount of heat retained by Earth's atmosphere (EPA 2017).

The greenhouse effect is the trapping and buildup of heat in the atmosphere (troposphere) near the Earth's surface. The greenhouse effect traps heat in the troposphere through a three-part process as follows: (1) short-wave radiation emitted by the Sun is absorbed by the Earth, (2) the Earth emits a portion of this energy in the form of long-wave radiation, and (3) GHGs in the upper atmosphere absorb this long-wave radiation and emit it both into space and back toward the Earth. The greenhouse effect is a natural process that contributes to regulating the Earth's temperature and creates a pleasant, livable environment on the Earth. Human activities that emit additional GHGs to the atmosphere increase the amount of infrared radiation that gets absorbed before escaping into space, thus enhancing the greenhouse effect and causing the Earth's surface temperature to rise.

The scientific record of the Earth's climate shows that the climate system varies naturally over a wide range of time scales and that, in general, climate changes prior to the Industrial Revolution in the 1700s can be explained by natural causes, such as changes in solar energy, volcanic eruptions, and natural changes in GHG concentrations. However, recent climate changes, in particular the warming observed over the past century, cannot be explained by natural causes alone. Rather, it is extremely likely that human activities have been the dominant cause of warming since the mid-twentieth century, and are the most significant driver of observed climate change (IPCC 2013; EPA 2017). Human influence on the climate system is evident from the increasing GHG concentrations in the atmosphere, positive radiative forcing, observed warming, and improved understanding of the climate system (IPCC 2013). The atmospheric concentrations of GHGs have increased to levels unprecedented in the last 800,000 years, primarily from fossil fuel emissions and secondarily from emissions associated with land use changes (IPCC 2013). Continued emissions of GHGs will cause further warming and changes in all components of the climate system.

### 4.6.1.2 Greenhouse Gases

A GHG is any gas that absorbs infrared radiation in the atmosphere; in other words, GHGs trap heat in the atmosphere. As defined in California Health and Safety Code Section 38505(g), for purposes of administering many of the State's primary GHG emissions reduction programs, GHGs include carbon dioxide ($CO_2$), methane ($CH_4$), nitrous oxide ($N_2O$), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride ($SF_6$), and nitrogen trifluoride (see also see also 14 California Code of Regulations [CCR] Section 15364.5).[1] Some GHGs, such as $CO_2$, $CH_4$, and $N_2O$, occur naturally and are emitted into the atmosphere through natural processes and human activities. Of these gases, $CO_2$ and $CH_4$ are the predominant GHGs emitted from human activities. Manufactured GHGs, which have a much greater heat-absorption potential than $CO_2$, include fluorinated gases, such as HFCs, PFCs, and $SF_6$, which are associated with certain industrial products and processes. The following paragraphs provide a summary of the most common GHGs and their sources.[2]

#### Carbon Dioxide

$CO_2$ is a naturally occurring gas and a by-product of human activities; it is the principal anthropogenic GHG that affects the Earth's radiative balance. Natural sources of $CO_2$ include respiration of bacteria, plants, animals, and fungus; evaporation from oceans; volcanic out-gassing; and decomposition of dead organic matter. Human activities that generate $CO_2$ include the combustion of fuels such as coal, oil, natural gas, and wood, and changes in land use.

#### Methane

$CH_4$ is produced through both natural and human activities. $CH_4$ is a flammable gas and is the main component of natural gas. $CH_4$ is produced through anaerobic (i.e., without oxygen) decomposition of waste in landfills, flooded rice fields, animal digestion, decomposition of animal wastes, production and distribution of natural gas and petroleum, coal production, and incomplete fossil fuel combustion.

#### Nitrous Oxide

$N_2O$ is produced through natural and human activities, mainly through agricultural activities and natural biological processes, although fuel burning and other processes also create $N_2O$. Sources of $N_2O$ include soil cultivation practices (microbial processes in soil and water), especially the use of commercial and organic fertilizers, manure management, industrial processes (such as in nitric acid production, nylon production, and fossil-fuel-fired power plants), vehicle emissions, and using $N_2O$ as a propellant (such as in rockets, racecars, and aerosol sprays).

#### Fluorinated Gases

Fluorinated gases (also referred to as F-gases) are synthetic powerful GHGs emitted from many industrial processes. Fluorinated gases are commonly used as substitutes for stratospheric ozone ($O_3$)-depleting substances (e.g., chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), and halons). The most prevalent fluorinated gases include the following:

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1 Climate-forcing substances include GHGs and other substances such as black carbon and aerosols. This discussion focuses on the seven GHGs identified in California Health and Safety Code, Section 38505. Impacts associated with other climate-forcing substances are not evaluated herein.

2 The descriptions of GHGs are summarized from the Intergovernmental Panel on Climate Change's Second Assessment Report and Fourth Assessment Report (IPCC 1995, 2007), CARB's Glossary of Terms Used in GHG Inventories (CARB 2020b), and EPA's Glossary of Climate Change Terms (EPA 2016).

- **Hydrofluorocarbons:** HFCs are compounds containing only hydrogen, fluorine, and carbon atoms. HFCs are synthetic chemicals used as alternatives to $O_3$-depleting substances in serving many industrial, commercial, and personal needs. HFCs are emitted as by-products of industrial processes and are used in manufacturing.
- **Perfluorocarbons:** PFCs are a group of human-made chemicals composed of carbon and fluorine only. These chemicals were introduced, along with HFCs, as alternatives to the $O_3$-depleting substances. The two main sources of PFCs are primarily aluminum production and semiconductor manufacturing. Since PFCs have stable molecular structures and do not break down through the chemical processes in the lower atmosphere, these chemicals have long lifetimes, ranging between 10,000 and 50,000 years.
- **Sulfur Hexafluoride:** $SF_6$ is a colorless gas soluble in alcohol and ether and slightly soluble in water. $SF_6$ is used for insulation in electric power transmission and distribution equipment, semiconductor manufacturing, the magnesium industry, and as a tracer gas for leak detection.
- **Nitrogen Trifluoride:** Nitrogen trifluoride is used in the manufacture of a variety of electronics, including semiconductors and flat panel displays.

### Chlorofluorocarbons

CFCs are synthetic chemicals that have been used as cleaning solvents, refrigerants, and aerosol propellants. CFCs are chemically unreactive in the lower atmosphere (troposphere), and the production of CFCs was prohibited in 1987 due to the chemical destruction of stratospheric $O_3$.

### Hydrochlorofluorocarbons

HCFCs are a large group of compounds whose structure is very close to that of CFCs—containing fluorine, chlorine, and carbon atoms—but also including one or more hydrogen atoms. Like HFCs, HCFCs are used in refrigerants and propellants. HCFCs were also used in place of CFCs for some applications; however, their use in general is being phased out.

### Black Carbon

Black carbon is a component of fine particulate matter ($PM_{2.5}$), which has been identified as a leading environmental risk factor for premature death. It is produced from the incomplete combustion of fossil fuels and biomass burning, particularly from older diesel engines and forest fires. Black carbon warms the atmosphere by absorbing solar radiation; influences cloud formation; and darkens the surface of snow and ice, which accelerates heat absorption and melting. Black carbon is a short-lived substance that varies spatially, which makes it difficult to quantify its global warming potential (GWP). Diesel particulate matter emissions are a major source of black carbon and are toxic air contaminants that have been regulated and controlled in California for several decades to protect public health. In relation to declining diesel particulate matter as a result of the California Air Resources Board's (CARB's) regulations pertaining to diesel engines, diesel fuels, and burning activities, CARB estimates that annual black carbon emissions in California have decreased by 70% between 1990 and 2010, with 95% control expected by 2020 (CARB 2014).

### Water Vapor

The primary source of water vapor is evaporation from the ocean, with additional vapor generated by sublimation (change from solid to gas) from ice and snow, evaporation from other water bodies, and transpiration from plant leaves. Water vapor is the most important, abundant, and variable GHG in the atmosphere and maintains a climate necessary for life.

### Ozone

Tropospheric $O_3$, which is created by photochemical reactions involving gases from both natural sources and human activities, acts as a GHG. Stratospheric $O_3$, which is created by the interaction between solar ultraviolet radiation and molecular oxygen, plays a decisive role in the stratospheric radiative balance. Depletion of stratospheric $O_3$, which occurs due to chemical reactions that may be enhanced by climate change, results in an increased ground-level flux of ultraviolet-B radiation.

### Aerosols

Aerosols are suspensions of particulate matter in a gas emitted into the air through burning biomass (plant material) and fossil fuels. Aerosols can warm the atmosphere by absorbing and emitting heat and can cool the atmosphere by reflecting light.

## 4.6.1.3 Global Warming Potential

Gases in the atmosphere can contribute to climate change both directly and indirectly. Direct effects occur when the gas itself absorbs radiation. Indirect radiative forcing occurs when chemical transformations of the substance produce other GHGs, when a gas influences the atmospheric lifetimes of other gases, and/or when a gas affects atmospheric processes that alter the radiative balance of the Earth (e.g., affect cloud formation or albedo) (EPA 2017). The Intergovernmental Panel on Climate Change (IPCC) developed the GWP concept to compare the ability of each GHG to trap heat in the atmosphere relative to another gas. The GWP of a GHG is defined as the ratio of the time-integrated radiative forcing from the instantaneous release of 1 kilogram of a trace substance relative to that of 1 kilogram of a reference gas (IPCC 2014). The reference gas used is $CO_2$; therefore, GWP-weighted emissions are measured in metric tons of $CO_2$ equivalent (MT $CO_2e$).

The current version of the California Emissions Estimator Model (CalEEMod) (Version 2016.3.2) assumes that the GWP for $CH_4$ is 25 (so emissions of 1 MT of $CH_4$ are equivalent to emissions of 25 MT of $CO_2$), and the GWP for $N_2O$ is 298, based on the IPCC's Fourth Assessment Report (IPCC 2007).

## 4.6.1.4 Greenhouse Gas Inventories and Climate Change Conditions

### Greenhouse Gas Inventories

#### Global Inventory

Anthropogenic GHG emissions worldwide in 2018 (the most recent year for which data is available) totaled approximately 51,800 million metric tons (MMT) of $CO_2e$, excluding land use change and forestry (PBL 2019). Six countries—China, the United States, the Russian Federation, India, Japan, and Brazil—and the European community accounted for approximately 65% of the total global emissions, or approximately 33,700 MMT $CO_2e$ (PBL 2019). Table 4.6-1 presents the top GHG-emissions-producing countries.

## Table 4.6-1. Six Top Greenhouse-Gas-Producer Countries and the European Union

| Emitting Countries (listed in order of emissions) | Greenhouse Gas Emissions (MMT $CO_2e$) |
|---|---|
| China | 13,600 |
| United States | 6,700 |
| European Union | 4,500 |
| India | 3,700 |
| Russian Federation | 2,500 |
| Japan | 1,400 |
| Brazil | 1,300 |
| **Total** | **33,700** |

**Source:** PBL 2019.
**Note:** MMT $CO_2e$ = million metric tons of carbon dioxide equivalent.

### National Inventory

Per the Environmental Protection Agency (EPA) Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2018 (EPA 2020), total United States GHG emissions were approximately 6,676.6 MMT $CO_2e$ in 2018 (EPA 2020). The primary GHG emitted by human activities in the United States was $CO_2$, which represented approximately 81.3% of total GHG emissions (5,428.1 MMT $CO_2e$). The largest source of $CO_2$, and of overall GHG emissions, was fossil-fuel combustion, which accounted for approximately 92.8% of $CO_2$ emissions in 2018 (5,031.8 MMT $CO_2e$). Relative to 1990, gross United States GHG emissions in 2018 were 3.7% higher; however, the gross emissions were down from a high of 15.2% above 1990 levels in 2007. GHG emissions increased from 2017 to 2018 by 2.9% (188.4 MMT $CO_2e$) and overall, net emissions in 2018 were 10.2% below 2005 levels (EPA 2020).

### State Inventory

According to California's 2000–2018 GHG emissions inventory (2020 edition), California emitted 425 MMT $CO_2e$ in 2018, including emissions resulting from out-of-state electrical generation (CARB 2020a). The sources of GHG emissions in California include transportation, industry, electric power production from both in-state and out-of-state sources, residential and commercial activities, agriculture, high-GWP substances, and recycling and waste. Table 4.6-2 presents California GHG emission source categories and their relative contributions to the emissions inventory in 2018.

## Table 4.6-2. Greenhouse Gas Emissions Sources in California

| Source Category | Annual GHG Emissions (MMT $CO_2e$)[a] | Percent of Total[a] |
|---|---|---|
| Transportation | 169.5 | 40% |
| Industrial | 89.2 | 21% |
| Electric power[b] | 63.1 | 15% |
| Agriculture | 32.6 | 8% |
| Commercial and Residential | 41.4 | 10% |
| High global-warming potential substances | 20.5 | 5% |
| Recycling and waste | 9.1 | 2% |
| **Total** | **425.3** | **100%** |

**Source:** CARB 2020a.
**Notes:** GHG = greenhouse gas; GWP = global warming potential; MMT $CO_2e$ = million metric tons of carbon dioxide equivalent. Emissions reflect 2018 California GHG inventory.
[a] Totals may not sum due to rounding.
[b] Includes emissions associated with imported electricity.

Between 2000 and 2018, per-capita GHG emissions in California have dropped from a peak of 14.1 MT per person in 2001 to 10.7 MT per person in 2018, representing a 24% decrease. In addition, total GHG emissions in 2018 were approximately 1 MMT $CO_2e$ higher than 2017 emissions (CARB 2020a).

### Local Inventories

The City of Santa Cruz (City) developed a GHG inventory for multiple years as part of its *Climate Action Plan* (CAP) (City of Santa Cruz 2012). The most recent year included is 2008, with citywide GHG emissions estimated at 351,321 MT $CO_2e$. The County of Santa Cruz also developed a countywide GHG inventory, which estimated that approximately 791,278 MT $CO_2e$ were emitted during 2009 (County of Santa Cruz 2013).

## Potential Effects of Climate Change

Globally, climate change has the potential to affect numerous environmental resources through uncertain impacts related to future air temperatures and precipitation patterns. The 2014 IPCC Synthesis Report (IPCC 2014) indicated that warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia. Signs that global climate change has occurred include warming of the atmosphere and ocean, diminished amounts of snow and ice, rising sea levels, and ocean acidification (IPCC 2014).

In California, climate change impacts have the potential to affect sea-level rise, agriculture, snowpack and water supply, forestry, wildfire risk, public health, frequency of severe weather events, and electricity demand and supply. The primary effect of global climate change has been a rise in average global tropospheric temperature. Reflecting the long-term warming trend since pre-industrial times, observed global mean surface temperature for the decade 2006–2015 was 0.87°C (1.6°F) (likely between 0.75°C [1.4°F] and 0.99°C [1.8°F]) higher than the average over the 1850–1900 period (IPCC 2018). Scientific modeling predicts that continued emissions of GHGs at or above current rates would induce more extreme climate changes during the twenty-first century than were observed during the twentieth century. Human activities are estimated to have caused approximately 1.0°C (1.8°F) of global warming above pre-industrial levels, with a likely range of 0.8°C to 1.2°C (1.4°F to 2.2°F) (IPCC 2018). Global warming is likely to reach 1.5°C (2.7°F) between 2030 and 2052 if it continues to increase at the current rate (IPCC 2018).

Although climate change is driven by global atmospheric conditions, climate change impacts are felt locally. A scientific consensus confirms that climate change is already affecting California. The Office of Environmental Health Hazard Assessment identified various indicators of climate change in California, which are scientifically based measurements that track trends in various aspects of climate change. Many indicators reveal discernible evidence that climate change is occurring in California and is having significant, measurable impacts in the state. Changes in the state's climate have been observed, including an increase in annual average air temperature with record warmth from 2012 to 2016, more frequent extreme heat events, more extreme drought, a decline in winter chill, an increase in cooling degree days and a decrease in heating degree days, and an increase in variability of statewide precipitation (OEHHA 2018).

Warming temperatures and changing precipitation patterns have altered California's physical systems—the ocean, lakes, rivers, and snowpack—upon which the state depends. Winter snowpack and spring snowmelt runoff from the Sierra Nevada and southern Cascade Mountains provide approximately one-third of the state's annual water supply. Impacts of climate on physical systems have been observed such as high variability of snow-water content (i.e., amount of water stored in snowpack), decrease in snowmelt runoff, glacier change (loss in area), rise in sea levels, increase in average lake water temperature and coastal ocean temperature, and a decrease in dissolved oxygen in coastal waters (OEHHA 2018).

Impacts of climate change on biological systems, including humans, wildlife, and vegetation, have also been observed, including climate change impacts on terrestrial, marine, and freshwater ecosystems. As with global observations, species responses include those consistent with warming: elevational or latitudinal shifts in range, changes in the timing of key plant and animal life cycle events, and changes in the abundance of species and in community composition. Humans are better able to adapt to a changing climate than plants and animals in natural ecosystems. Nevertheless, climate change poses a threat to public health as warming temperatures and changes in precipitation can affect vector-borne pathogen transmission and disease patterns in California as well as the variability of heat-related deaths and illnesses. In addition, since 1950, the area burned by wildfires each year has followed an increasing trend overall.

The California Natural Resources Agency (CNRA) has released four California Climate Change Assessments (2006, 2009, 2012, and 2018), which have addressed the following: acceleration of warming across the state, more intense and frequent heat waves, greater riverine flows, accelerating sea level rise, more intense and frequent drought, more severe and frequent wildfires, more severe storms and extreme weather events, shrinking snowpack and less overall precipitation, and ocean acidification, hypoxia, and warming. To address local and regional governments' need for information to support action in their communities, the Fourth Assessment (2018) includes reports for nine regions of the state. Key projected climate changes for the Central Coast Region (which includes Santa Cruz County where the Proposed Project is located) include the following (CNRA 2018a):

- Maximum and minimum temperatures for the Central Coast will continue to increase through the next century, with greater increases in the inland region relative to the coast. Precipitation is expected to increase slightly, but precipitation variability will increase substantially.
- The future of fog is uncertain because system feedbacks and their response to climate change are not well characterized. Fog can be intercepted by coastal zone flora (which obtain up to one-third of their moisture from fog) and can also prevent low stream flows, which can keep salmonids from desiccating during dry periods.
- Periodic El Niño events dominate coastal hazards across the Central Coast while atmospheric rivers, expected to increase, are the dominant drivers of locally extreme rainfall events.
- Recently observed and projected acceleration in sea-level rise poses a significant threat to the regions' coastal communities. Future flooding is also a serious concern.
- Estuarine systems will be affected by accelerated sea-level rise, warming of water and air, ocean acidification, and changes in runoff. Some Central Coast marshes may drown or become shallow mudflats, leading to a loss of the ecosystem services that marshes provide, including carbon sequestration.
- Many beaches will narrow considerably. As many as two-thirds will be completely lost over the next century, along with the ecosystems supported by those beaches. The landward erosion of beaches will be driven by accelerating sea-level rise combined with a lack of ample sediment, effectively drowning the beaches between the rising ocean and the backing cliffs and/or urban hardscape.
- Projected future droughts are likely to be a serious challenge to the region's already stressed water supplies.
- Water supply shortages, already common during drought, will be exacerbated. Higher temperatures may result in increases in water demand for agriculture and landscaping. Reduced surface water will lead to increases in groundwater extractions that may result in increased saltwater intrusion. Lower surface flows will lead to higher pollutant concentrations and will impact aquatic species.
- Frequent and sometimes large wildfires will continue to be a major disturbance and post-fire recovery time may be lengthened.
- Central Coast native plants are a large part of the world's floristic provinces. Plant species' responses to climate change will in general depend on the climate in which a population evolved and its own unique

climate tolerances. Coastal shrubland resilience depends on climate effects to physiological responses that are modified by biotic interactions and the extent of anthropogenic land use. Grasslands closer to the coast will be less affected than interior grasslands where warming is already documented.

- Climate change outcomes for forests will depend largely on multiple abiotic drivers (increased air temperatures, altered fog patterns, changes in winter precipitation), and biotic factors (invasive species and insect and pest outbreaks).
- Terrestrial wildlife is already experiencing local extinctions. Species may have robust climate refugia in the region's mountains characterized by cooler temperatures and higher levels of precipitation.
- The aquatic life of streams and rivers is threatened by projected extreme swings from drought to floods, and exacerbated by fire and erosion that buries habitat in sediments. Climate impacts can threaten the survival of already endangered steelhead and coho salmon, and further reduce the diversity and abundance of sensitive aquatic insects.
- Impacts to the region's public health include increases in heat-related illnesses for agricultural workers, harmful particulate matter from wildfires, and an increase in ground-level $O_3$. Infectious/vector-borne diseases such as Valley Fever and Pacific Coast tick fever are expected to increase, and an increase in harmful algal blooms will have detrimental effects on animals and people exposed to toxins released from the algae.
- Residential electricity demand is likely to be affected by more frequent heat waves due to increases in cooling requirements, and warming temperatures are likely to affect electricity supply from gas-fired plants.
- Agricultural production is highly sensitive to climate change, including amounts, forms, and distribution of precipitation, changes in temperatures, and increased frequency and intensity of climate extremes.

## 4.6.2 Regulatory Framework

### 4.6.2.1 Federal

#### Energy Independence and Security Act

The Energy Independence and Security Act of 2007 (Public Law 110-140), among other key measures, would do the following, which would aid in the reduction of national GHG emissions:

- Increase the supply of alternative fuel sources by setting a mandatory Renewable Fuel Standard requiring fuel producers to use at least 36 billion gallons of biofuel in 2022.
- Set a target of 35 miles per gallon for the combined fleet of cars and light trucks by model year 2020, and directs National Highway Traffic Safety Administration (NHTSA) to establish a fuel economy program for medium- and heavy-duty trucks and create a separate fuel economy standard for work trucks.
- Prescribe or revise standards affecting regional efficiency for heating and cooling products and procedures for new or amended standards, energy conservation, energy-efficiency labeling for consumer electronic products, residential boiler efficiency, electric motor efficiency, and home appliances.

#### Federal Vehicle Standards

In *Massachusetts v. EPA* (April 2007), the U.S. Supreme Court directed the EPA administrator to determine whether GHG emissions from new motor vehicles cause or contribute to air pollution that may reasonably be anticipated to endanger public health or welfare, or whether the science is too uncertain to make a reasoned decision. In

December 2009, the administrator signed a final rule with the following two distinct findings regarding GHGs under section 202(a) of the federal Clean Air Act:

- The administrator found that elevated concentrations of GHGs—$CO_2$, $CH_4$, $N_2O$, HFCs, PFCs, and $SF_6$—in the atmosphere threaten the public health and welfare of current and future generations. This is the "endangerment finding."
- The administrator further found that the combined emissions of GHGs—$CO_2$, $CH_4$, $N_2O$, and HFCs—from new motor vehicles and new motor vehicle engines contribute to the GHG air pollution that endangers public health and welfare. This is the "cause or contribute finding."

These two findings were necessary to establish the foundation for regulation of GHGs from new motor vehicles as air pollutants under the Clean Air Act (42 United States Code Section 7401).

In 2007, in response to the *Massachusetts v. EPA* U.S. Supreme Court ruling, the Bush Administration issued Executive Order (EO) 13432 directing the EPA, the Department of Transportation, and the Department of Energy to establish regulations that reduce GHG emissions from motor vehicles, non-road vehicles, and non-road engines by 2008. In 2009, the NHTSA issued a final rule regulating fuel efficiency and GHG emissions from cars and light-duty trucks for model year 2011; and, in 2010, the EPA and NHTSA issued a final rule regulating cars and light-duty trucks for model years 2012 through 2016 (75 Federal Register [FR] 25324–25728).

In 2010, President Obama issued a memorandum directing the Department of Transportation, Department of Energy, EPA, and NHTSA to establish additional standards regarding fuel efficiency and GHG reduction, clean fuels, and advanced vehicle infrastructure. In response to this directive, the EPA and NHTSA proposed stringent, coordinated federal GHG and fuel economy standards for model years 2017 through 2025 light-duty vehicles. The proposed standards projected to achieve 163 grams per mile of $CO_2$ in model year 2025, on an average industry fleet-wide basis, which is equivalent to 54.5 miles per gallon if this level were achieved solely through fuel efficiency. The final rule was adopted in 2012 for model years 2017 through 2021 (77 FR 62624–63200). On January 12, 2017, the EPA finalized its decision to maintain the current GHG emissions standards for model years 2022–2025 cars and light trucks.

In addition to the regulations applicable to cars and light-duty trucks described above, in 2011, the EPA and NHTSA announced fuel economy and GHG standards for medium- and heavy-duty trucks for model years 2014 through 2018. The standards for $CO_2$ emissions and fuel consumption are tailored to three main vehicle categories: combination tractors, heavy-duty pickup trucks and vans, and vocational vehicles. According to the EPA, this regulatory program will reduce GHG emissions and fuel consumption for the affected vehicles by 6% to 23% over the 2010 baselines (76 FR 57106–57513).

In August 2016, the EPA and NHTSA announced the adoption of the phase two program related to the fuel economy and GHG standards for medium- and heavy-duty trucks. The phase two program will apply to vehicles with model year 2018 through 2027 for certain trailers, and model years 2021 through 2027 for semi-trucks, large pickup trucks, vans, and all sizes of buses and work trucks. The final standards are expected to lower $CO_2$ emissions by approximately 1.1 billion MT and reduce oil consumption by up to 2 billion barrels over the lifetime of the vehicles sold under the program (EPA and NHTSA 2016).

On April 2, 2018, the EPA, under administrator Scott Pruitt, reconsidered the final determination for light-duty vehicles and withdrew its previous 2017 determination, stating that the current standards may be too stringent and therefore should be revised as appropriate (EPA 2019).

In August 2018, EPA and NHTSA proposed to amend certain fuel economy and GHG standards for passenger cars and light trucks and establish new standards for model years 2021 through 2026. Compared to maintaining the post-2020 standards then in place, the 2018 proposal would increase U.S. fuel consumption by about half a million barrels per day (2% to 3% of total daily consumption, according to the Energy Information Administration) and would impact the global climate by 3/1000th of one degree Celsius by 2100 (EPA and NHTSA 2018). California and other states have stated their intent to challenge federal actions that would delay or eliminate GHG reduction measures and have committed to cooperating with other countries to implement global climate change initiatives.

On September 27, 2019, the EPA and NHTSA published the SAFE Vehicles Rule Part One: One National Program (84 FR 51310), which became effective November 26, 2019. The Part One Rule revokes California's authority to set its own GHG emissions standards and set zero-emission vehicle mandates in California. On March 31, 2020, the EPA and NHTSA issued the Part Two Rule, which went into effect 60 days after being published in the Federal Register. The Part Two Rule sets $CO_2$ emissions standards and corporate average fuel economy standards for passenger vehicles and light-duty trucks for model years 2021 through 2026. On January 20, 2021, President Joe Biden issued an EO on Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis, which includes review of Part One Rule by April 2021 and review of the Part Two Rule by July 2021 (The White House 2021).

### 4.6.2.2 State

The statewide GHG emissions regulatory framework is summarized in this subsection by category: state climate change targets, building energy, renewable energy and energy procurement, mobile sources, water, solid waste, and other state actions. The following text describes EOs, Assembly Bills (ABs), Senate Bills (SBs), and other plans and policies that would directly or indirectly reduce GHG emissions and/or address climate change issues.

#### State Climate Change Targets

The state has taken a number of actions to address climate change. These actions are summarized below, and include EOs, legislation, and CARB plans and requirements.

##### Assembly Bill 32

In furtherance of the goals established in EO S-3-05, the Legislature enacted AB 32, the California Global Warming Solutions Act of 2006 (California Health and Safety Code Sections 38500-38599 et seq.). AB 32 provided initial direction on creating a comprehensive multiyear program to limit California's GHG emissions at 1990 levels by 2020, and initiate the transformations required to achieve the state's long-range climate objectives.

##### Senate Bill 32 and Assembly Bill 197

SB 32 and AB 197 (enacted in 2016) are companion bills. SB 32 codified the 2030 emissions-reduction goal of EO B-30-15 by requiring CARB to ensure that statewide GHG emissions are reduced to 40% below 1990 levels by 2030. AB 197 established the Joint Legislative Committee on Climate Change Policies, consisting of at least three members of the Senate and three members of the Assembly, in order to provide ongoing oversight over implementation of the state's climate policies. AB 197 also added two members of the Legislature to the Board as nonvoting members; requires CARB to make available and update (at least annually via its website) emissions data for GHGs, criteria air pollutants, and toxic air contaminants from reporting facilities; and requires CARB to identify specific information for GHG emissions-reduction measures when updating the scoping plan.

### Executive Order S-3-05

EO S-3-05 (June 2005) established California's GHG emissions-reduction targets and laid out responsibilities among the state agencies for implementing the EO and for reporting on progress toward the targets. This EO established the following targets:

- By 2010, reduce GHG emissions to 2000 levels
- By 2020, reduce GHG emissions to 1990 levels
- By 2050, reduce GHG emissions to 80% below 1990 levels

EO S-3-05 also directed the California Environmental Protection Agency to report biannually on progress made toward meeting the GHG targets and the impacts to California due to global warming, including impacts to water supply, public health, agriculture, the coastline, and forestry.

### Executive Order B-30-15

EO B-30-15 (April 2015) identified an interim GHG-reduction target in support of targets previously identified under S-3-05 and AB 32. EO B-30-15 set an interim target goal of reducing GHG emissions to 40% below 1990 levels by 2030 to keep California on its trajectory toward meeting or exceeding the long-term goal of reducing GHG emissions to 80% below 1990 levels by 2050, as set forth in S-3-05. To facilitate achieving this goal, EO B-30-15 called for CARB to update the Scoping Plan to express the 2030 target in terms of MMT $CO_2e$. The EO also called for state agencies to continue to develop and implement GHG emission-reduction programs in support of the reduction targets.

### Executive Order B-55-18

EO B-55-18 (September 2018) establishes a statewide policy for the state to achieve carbon neutrality as soon as possible (no later than 2045), and achieve and maintain net negative emissions thereafter. The goal is an addition to the existing statewide targets of reducing the state's GHG emissions. CARB will work with relevant state agencies to ensure that future Scoping Plans identify and recommend measures to achieve the carbon neutrality goal.

### California Air Resources Board's Climate Change Scoping Plan

One specific requirement of AB 32 is for CARB to prepare a "scoping plan" for achieving the maximum technologically feasible and cost-effective GHG emission reductions by 2020 (California Health and Safety Code Section 38561[a]), and to update the plan at least once every 5 years. In 2008, CARB approved the first scoping plan: The *Climate Change Proposed Scoping Plan: A Framework for Change* (Scoping Plan). The Scoping Plan included a mix of recommended strategies that combined direct regulations, market-based approaches, voluntary measures, policies, and other emission-reduction programs calculated to meet the 2020 statewide GHG emission limit and initiate the transformations needed to achieve the state's long-range climate objectives.

In 2014, CARB approved the first update to the Scoping Plan. The *First Update to the Climate Change Scoping Plan: Building on the Framework* (First Update) defined the state's GHG emission reduction priorities for the next 5 years and laid the groundwork to start the transition to the post-2020 goals set forth in EOs S-3-05 and B-16-2012 (CARB 2014). The First Update concluded that California was on track to meet the 2020 target, but recommended a 2030 mid-term GHG reduction target be established to ensure a continuum of action to reduce emissions. The First Update recommended a mix of technologies in key economic sectors to reduce emissions through 2050 including energy demand reduction through efficiency and activity changes; large-scale electrification of on-road vehicles, buildings and industrial machinery; decarbonizing electricity and fuel supplies; and the rapid market penetration of efficient and clean energy technologies.

In December 2017, CARB released the *2017 Climate Change Scoping Plan Update* (Second Update) for public review and comment (CARB 2017a). The Second Update builds on the successful framework established in the initial Scoping Plan and First Update, while identifying new technologically feasible and cost-effective strategies that will serve as the framework to achieve the 2030 GHG target and define the state's climate change priorities to 2030 and beyond. The strategies' "known commitments" include implementing renewable energy and energy efficiency (including the mandates of SB 350), increased stringency of the Low Carbon Fuel Standard, measures identified in the Mobile Source and Freight Strategies, measures identified in the proposed Short-Lived Climate Pollutant Plan, and increased stringency of SB 375 targets. To fill the gap in additional reductions needed to achieve the 2030 target, the Second Update recommends continuing the Cap-and-Trade Program and a measure to reduce GHGs from refineries by 20%. The Second Update was approved by CARB's Governing Board on December 14, 2017.

The Scoping Plan recommends strategies for implementation at the statewide level to meet the goals of AB 32, SB 32, and the EOs; it also establishes an overall framework for the measures that will be adopted to reduce California's GHG emissions. A project is considered consistent with the statutes and EOs if it would meet the general policies in reducing GHG emissions in order to facilitate the achievement of the state's goals and would not impede attainment of those goals.

### California Air Resources Board's Regulations for the Mandatory Reporting of Greenhouse Gas Emissions

CARB's Regulation for the Mandatory Reporting of Greenhouse Gas Emissions (17 CCR Sections 95100–95157) incorporated by reference certain requirements that EPA promulgated in its Final Rule on Mandatory Reporting of Greenhouse Gases (40 Code of Federal Regulations Section 98). Specifically, section 95100(c) of the Mandatory Reporting Regulation incorporated those requirements that EPA promulgated in the *Federal Register* on October 30, 2009; July 12, 2010; September 22, 2010; October 28, 2010; November 30, 2010; December 17, 2010; and April 25, 2011. In general, entities subject to the Mandatory Reporting Regulation that emit over 10,000 MT $CO_2e$ per year are required to report annual GHGs through the California Electronic GHG Reporting Tool. Certain sectors, such as refineries and cement plants, are required to report regardless of emission levels. Entities that emit more than the 25,000 MT $CO_2e$ per year threshold are required to have their GHG emissions report verified by a CARB-accredited third party.

### Executive Order B-18-12

EO B-18-12 (April 2012) directed state agencies, departments, and other entities under the Governor's executive authority to take action to reduce entity-wide GHG emissions by at least 10% by 2015 and 20% by 2020, as measured against a 2010 baseline. EO B-18-12 also established goals for existing state buildings for reducing grid-based energy purchases and water use.

### Senate Bill 605 and Senate Bill 1383

SB 605 (2014) requires CARB to complete a comprehensive strategy to reduce emissions of short-lived climate pollutants (SLCPs) in the state (California Health and Safety Code Section 39730); and SB 1383 (2016) requires CARB to approve and implement that strategy by January 1, 2018 (California Public Resources Code Section 42652-43654). SB 1383 also establishes specific targets for the reduction of SLCPs (40% below 2013 levels by 2030 for $CH_4$ and HFCs, and 50% below 2013 levels by 2030 for anthropogenic black carbon), and provides direction for reductions from dairy and livestock operations and landfills. Accordingly, and as mentioned above, CARB adopted its *Short-Lived Climate Pollutant Reduction Strategy* (SLCP Reduction Strategy) in March 2017. The SLCP Reduction Strategy establishes a framework for the statewide reduction of emissions of black carbon, methane, and fluorinated gases (CARB 2017b).

## Building Energy

### California Code of Regulations, Title 24, Part 6

The California Building Standards Code were established in 1978 and serves to enhance and regulate California's building standards. While not initially promulgated to reduce GHG emissions, Part 6 of Title 24 specifically established Building Energy Efficiency Standards that are designed to ensure that new and existing buildings in California achieve energy efficiency and preserve outdoor and indoor environmental quality. These energy efficiency standards are reviewed every few years by the Building Standards Commission and the California Energy Commission (CEC), and revised if necessary (Public Resources Code Section 25402[b][(1]). The regulations receive input from members of industry, as well as the public, in order to "reduce the wasteful, uneconomic, inefficient, or unnecessary consumption of energy" (Public Resources Code Section 25402). These regulations are carefully scrutinized and analyzed for technological and economic feasibility (Public Resources Code Section 25402[d]) and cost effectiveness (Public Resources Code Section 25402[b][2–3]). As a result, these standards save energy, increase electricity supply reliability, increase indoor comfort, avoid the need to construct new power plants, and help preserve the environment. The current Title 24 standards are the 2019 Title 24 building energy efficiency standards, which became effective January 1, 2020.

### California Code of Regulations, Title 24, Part 11

In addition to the CEC's efforts, in 2008, the California Building Standards Commission adopted the nation's first green building standards. The California Green Building Standards Code (Part 11 of Title 24) is commonly referred to as California's Green Building Standards (CALGreen), and establishes minimum mandatory standards and voluntary standards pertaining to the planning and design of sustainable site development, energy efficiency (in excess of the California Energy Code requirements), water conservation, material conservation, and interior air quality. The CALGreen standards took effect in January 2011 and instituted mandatory minimum environmental performance standards for all ground-up, new construction of commercial, low-rise residential and state-owned buildings and schools and hospitals. The 2019 CALGreen standards are the current applicable standards. For nonresidential projects, some of the key mandatory CALGreen 2019 standards involve requirements related to bicycle parking, designated parking for clean air vehicles, electric vehicle (EV) charging stations, shade trees, water conserving plumbing fixtures and fittings, outdoor potable water use in landscaped areas, recycled water supply systems, construction waste management, excavated soil and land clearing debris, and commissioning (24 CCR Part 11).

### California Code of Regulations, Title 20

Title 20 of the California Code of Regulations requires manufacturers of appliances to meet state and federal standards for energy and water efficiency (20 CCR Sections 1401-1410 et seq.). The CEC certifies an appliance based on a manufacturer's demonstration that the appliance meets the standards. New appliances regulated under Title 20 include: refrigerators, refrigerator-freezers and freezers; room air conditioners and room air-conditioning heat pumps; central air conditioners; spot air conditioners; vented gas space heaters; gas pool heaters; plumbing fittings and plumbing fixtures; fluorescent lamp ballasts; lamps; emergency lighting; traffic signal modules; dishwaters; clothes washers and dryers; cooking products; electric motors; low voltage dry-type distribution transformers; power supplies; televisions and consumer audio and video equipment; and battery charger systems. Title 20 presents protocols for testing each type of appliance covered under the regulations and appliances must meet the standards for energy performance, energy design, water performance, and water design. Title 20 contains three types of standards for appliances: federal and state standards for federally regulated appliances, state standards for federally regulated appliances, and state standards for non-federally regulated appliances.

### Senate Bill 1

SB 1 (2006) established a $3 billion rebate program to support the goal of the state to install rooftop solar energy systems with a generation capacity of 3,000 megawatts through 2016. SB 1 added sections to the Public Resources Code, including Chapter 8.8 (California Solar Initiative), that require building projects applying for ratepayer-funded incentives for photovoltaic systems to meet minimum energy efficiency levels and performance requirements (Public Resources Code Sections 25780-25784 et seq.). Section 25780 established that it is a goal of the state to establish a self-sufficient solar industry. The goals included establishing solar energy systems as a viable mainstream option for both homes and businesses within 10 years of adoption, and placing solar energy systems on 50% of new homes within 13 years of adoption. SB 1, also termed "Go Solar California," was previously titled "Million Solar Roofs."

### Assembly Bill 1470 (Solar Water Heating)

This bill established the Solar Water Heating and Efficiency Act of 2007 (California Public Utilities Code Sections 2851-2869 et seq.). The bill makes findings and declarations of the Legislature relating to the promotion of solar water heating systems and other technologies that reduce natural gas demand.

### Assembly Bill 1109

Enacted in 2007, AB 1109 required the CEC to adopt minimum energy efficiency standards for general-purpose lighting to reduce electricity consumption by 50% for indoor residential lighting and by 25% for indoor commercial lighting (Public Resources Code Section 25402.5.4).

## Renewable Energy and Energy Procurement

### Senate Bill 1078

SB 1078 (2002) (California Public Utilities Code Section 399.11 et seq.) established the Renewables Portfolio Standard (RPS) program, which required an annual increase in renewable generation by the utilities equivalent to at least 1% of sales, with an aggregate goal of 20% by 2017. This goal was subsequently accelerated, requiring utilities to obtain 20% of their power from renewable sources by 2010 (see SB 107, EO S-14-08, and EO S-21-09).

### Senate Bill 1368

SB 1368 (2006), required the CEC to develop and adopt regulations for GHG emission performance standards for the long-term procurement of electricity by local publicly owned utilities (California Public Utilities Code Section 8340-8341 et seq.). These standards must be consistent with the standards adopted by the California Public Utilities Commission (CPUC).

### Executive Order S-14-08

EO S-14-08 (2008) focused on the contribution of renewable energy sources to meet the electrical needs of California while reducing the GHG emissions from the electrical sector. This EO required that all retail suppliers of electricity in California serve 33% of their load with renewable energy by 2020. Furthermore, the EO directed state agencies to take appropriate actions to facilitate reaching this target. The CNRA, through collaboration with CEC and the California Department of Fish and Wildlife, was directed to lead this effort.

### Executive Order S-21-09 and Senate Bill X1-2

EO S-21-09 (2009) directed CARB to adopt a regulation consistent with the goal of EO S-14-08 by July 31, 2010. CARB was further directed to work with CPUC and CEC to ensure that the regulation builds upon the RPS program and was applicable to investor-owned utilities, publicly owned utilities, direct access providers, and community choice providers. Under this order, CARB was to give the highest priority to those renewable resources that provide the greatest environmental benefits with the least environmental costs and impacts on public health, and those that can be developed the most quickly in support of reliable, efficient, cost-effective electricity system operations. On September 23, 2010, CARB initially approved regulations to implement a Renewable Electricity Standard; however, this regulation was not finalized because of subsequent legislation (SB X1-2) signed by Governor Brown in April 2011.

SB X1-2 expanded RPS by establishing a renewable energy target of 20% of the total electricity sold to retail customers in California per year by December 31, 2013, and 33% by December 31, 2020, and in subsequent years. Under the bill, a renewable electrical generation facility is one that uses biomass, solar thermal, photovoltaic, wind, geothermal, fuel cells using renewable fuels, small hydroelectric generation (30 megawatts or less), digester gas, municipal solid waste conversion, landfill gas, ocean wave, ocean thermal, or tidal current, and that meets other specified requirements with respect to its location.

SB X1-2 applies to all electricity retailers in the state, including publicly owned utilities, investor-owned utilities, electricity service providers, and community choice aggregators. All of these entities must meet the renewable energy goals listed above.

### Senate Bill 350

SB 350 (2015) further expanded the RPS program by establishing a goal of 50% of the total electricity sold to retail customers in California per year by December 31, 2030. In addition, SB 350 included the goal to double the energy efficiency savings in electricity and natural gas final end uses (such as heating, cooling, lighting, or class of energy uses on which an energy-efficiency program is focused) of retail customers through energy conservation and efficiency. The bill also requires the CPUC, in consultation with the CEC, to establish efficiency targets for electrical and gas corporations consistent with this goal.

### Senate Bill 100

SB 100 (2018) increased the standards set forth in SB 350, establishing that 44% of the total electricity sold to retail customers in California per year by December 31, 2024, 52% by December 31, 2027, and 60% by December 31, 2030, be secured from qualifying renewable energy sources. SB 100 states that it is the policy of the state that eligible renewable energy resources and zero-carbon resources supply 100% of the retail sales of electricity to California. This bill requires that the achievement of 100% zero-carbon electricity resources do not increase the carbon emissions elsewhere in the western grid and that the achievement not be achieved through resource shuffling.

## Mobile Sources

### State Vehicle Standards (Assembly Bill 1493 and Executive Order B-16-12)

AB 1493 (July 2002) was enacted in a response to the transportation sector accounting for more than half of California's $CO_2$ emissions. AB 1493 required CARB to set GHG emission standards for passenger vehicles, light-duty trucks, and other vehicles determined by the state board to be vehicles that are primarily used for noncommercial personal transportation in the state. The bill required that CARB set GHG emission standards for motor vehicles manufactured in 2009 and all subsequent model years. CARB adopted the standards in September 2004. EO B-16-12 (March 2012)

required that state entities under the governor's direction and control support and facilitate the rapid commercialization of zero-emissions vehicles. It ordered CARB, CEC, CPUC, and other relevant agencies to work with the Plug-in Electric Vehicle Collaborative and the California Fuel Cell Partnership to establish benchmarks to help achieve benchmark goals by 2015, 2020, and 2025. On a statewide basis, EO B-16-12 established a target reduction of GHG emissions from the transportation sector equaling 80% less than 1990 levels by 2050. This directive did not apply to vehicles that have special performance requirements necessary for the protection of the public safety and welfare. As explained under the "Federal Vehicle Standards" description above, EPA and NHTSA approved the SAFE Vehicles Rule Part One and Two, which revoked California's authority to set its own GHG emissions standards and set zero-emission vehicle mandates in California. As the EPA rule is the subject of pending legal challenges and no GHG adjustment factors have been issued for EMFAC by CARB, this analysis continues to utilize the best available information at this time, as set forth in EMFAC.

### Heavy-Duty Diesel

CARB adopted the final Heavy-Duty Truck and Bus Regulation on December 31, 2014 to reduce diesel particulate matter, a major source of black carbon, and oxides of nitrogen emissions from heavy-duty diesel vehicles (13 CCR Section 2025). The rule requires diesel particulate matter filters be applied to newer heavier trucks and buses by January 1, 2012, with older vehicles required to comply by January 1, 2015. The rule will require nearly all diesel trucks and buses to be compliant with the 2010 model year engine requirement by January 1, 2023. CARB also adopted an Airborne Toxic Control Measure to limit idling of diesel-fueled commercial vehicles on December 12, 2013. This rule requires diesel-fueled vehicles with gross vehicle weights greater than 10,000 pounds to idle no more than 5 minutes at any location (13 CCR Section 2485).

### Executive Order S-1-07

EO S-1-07 (January 2007, implementing regulation adopted in April 2009) sets a declining Low Carbon Fuel Standard for GHG emissions measured in $CO_2e$ grams per unit of fuel energy sold in California. The target of the Low Carbon Fuel Standard is to reduce the carbon intensity of California passenger vehicle fuels by at least 10% by 2020 (17 CCR Section 95480 et seq.). The carbon intensity measures the amount of GHG emissions in the lifecycle of a fuel—including extraction/feedstock production, processing, transportation, and final consumption—per unit of energy delivered.

### Senate Bill 375

SB 375 (California Government Code Section 65080) addresses GHG emissions associated with the transportation sector through regional transportation and sustainability plans. SB 375 requires CARB to adopt regional GHG-reduction targets for the automobile and light-truck sector for 2020 and 2035, and to update those targets every 8 years. SB 375 requires the state's 18 regional metropolitan planning organizations (MPOs) to prepare a Sustainable Communities Strategy (SCS) as part of their Regional Transportation Plan that will achieve the GHG-reduction targets set by CARB. If an MPO is unable to devise an SCS to achieve the GHG-reduction target, the MPO must prepare an Alternative Planning Strategy demonstrating how the GHG-reduction target would be achieved through alternative development patterns, infrastructure, or additional transportation measures or policies.

A SCS does not: (i) regulate the use of land; (ii) supersede the land use authority of cities and counties; or (iii) require that a city's or county's land use policies and regulations, including those in a general plan, be consistent with it (California Government Code Section 65080[b][2][K]). Nonetheless, SB 375 makes regional and local planning agencies responsible for developing those strategies as part of the federally required metropolitan transportation planning process and the state-mandated housing element process. See Section 4.6.2.3, Regional, for information about the implementation of SB 375 in the Monterey Bay Area.

### Advanced Clean Cars Program and Zero-Emissions Vehicle Program

The Advanced Clean Cars program (January 2012) is an emissions-control program for model years 2015 through 2025. The program combines the control of smog- and soot-causing pollutants and GHG emissions into a single coordinated package. The package includes elements to reduce smog-forming pollution, reduce GHG emissions, promote clean cars, and provide the fuels for clean cars (CARB 2012). To improve air quality, CARB has implemented new emission standards to reduce smog-forming emissions beginning with 2015 model year vehicles. It is estimated that in 2025, cars will emit 75% less smog-forming pollution as compared to 2014 levels. To reduce GHG emissions, CARB, in conjunction with the EPA and the NHTSA, adopted new GHG standards for model year 2017 to 2025 vehicles; the new standards are estimated to reduce GHG emissions by 34% in 2025. The zero-emission vehicle program will act as the focused technology of the Advanced Clean Cars program by requiring manufacturers to produce increasing numbers of zero-emission vehicles and plug-in hybrid EVs in the 2018 to 2025 model years. However, as detailed previously, EPA and NHTSA published the SAFE Vehicles Rule, which revokes California's authority to set its own GHG emissions standards and set zero-emission vehicle mandates in California. The effect of the SAFE Rule on the Advanced Clean Cars program is still to be determined pending the ruling of ongoing litigation.

## Water

### Senate Bill X7-7

SB X7-7, or the Water Conservation Act of 2009, required that all water suppliers increase their water use efficiency with an overall goal of reducing per capita urban water use by 20% by December 31, 2020. Each urban water supplier was required to develop water use targets to meet this goal.

### Executive Order B-29-15

In response to the ongoing drought in California, EO B-29-15 (April 2015) set a goal of achieving a statewide reduction in potable urban water usage of 25% relative to water use in 2013. The term of the EO extended through February 28, 2016, although many of the directives have become permanent water-efficiency standards and requirements. The EO includes specific directives that set strict limits on water usage in the state. In response to EO B-29-15, the California Department of Water Resources has modified and adopted a revised version of the Model Water Efficient Landscape Ordinance that, among other changes, significantly increases the requirements for landscape water use efficiency and broadens its applicability to include new development projects with smaller landscape areas.

### Executive Order B-37-16

Issued May 2016, EO B-37-16 directs the State Water Resources Control Board (SWRCB) to adjust emergency water conservation regulations through the end of January 2017 to reflect differing water supply conditions across the state. The SWRCB must also develop a proposal to achieve a mandatory reduction of potable urban water usage that builds off the mandatory 25% reduction called for in EO B-29-15. The SWRCB and Department of Water Resources will develop new, permanent water use targets that build upon the existing state law requirements that the state achieve a 20% reduction in urban water usage by 2020. EO B-37-16 also specifies that the SWRCB will permanently prohibit water-wasting practices such as hosing off sidewalks, driveways, and other hardscapes; washing automobiles with hoses not equipped with a shut-off nozzle; using non-recirculated water in a fountain or other decorative water feature; watering lawns in a manner that causes runoff, or within 48 hours after measurable precipitation; and irrigating ornamental turf on public street medians.

#### Executive Order B-40-17

EO B-40-17 (April 2017) lifted the drought emergency in all California counties except Fresno, Kings, Tulare, and Tuolumne. It also rescinds EO B-29-15, but expressly states that EO B-37-16 remains in effect and directs the SWRCB to continue development of permanent prohibitions on wasteful water use.

### Solid Waste

#### Assembly Bill 939, Assembly Bill 341, and Assembly Bill 1826

In 1989, AB 939, known as the Integrated Waste Management Act (Public Resources Code Section 40000 et seq.), was passed because of the increase in waste stream and the decrease in landfill capacity. The statute established the California Integrated Waste Management Board (replaced in 2010 by the California Department of Resources Recycling and Recovery, or CalRecycle), which oversees a disposal reporting system. AB 939 mandated a reduction of waste being disposed where jurisdictions were required to meet diversion goals of all solid waste through source reduction, recycling, and composting activities of 25% by 1995 and 50% by the year 2000.

AB 341 (2011) amended the California Integrated Waste Management Act of 1989 to include a provision declaring that it is the policy goal of the state that not less than 75% of solid waste generated be source-reduced, recycled, or composted by the year 2020, and annually thereafter. In addition, AB 341 required CalRecycle to develop strategies to achieve the state's policy goal. CalRecycle has conducted multiple workshops and published documents that identify priority strategies that it believes would assist the state in reaching the 75% goal by 2020.

AB 1826 (Chapter 727, Statutes of 2014, effective 2016) requires businesses to recycle their organic waste (i.e., food waste, green waste, landscape and pruning waste, nonhazardous wood waste, and food-soiled paper waste that is mixed in with food waste) depending on the amount of waste they generate per week. This law also requires local jurisdictions across the state to implement an organic waste recycling program to divert organic waste generated by businesses, including multi-family residential dwellings that consist of five or more units. The minimum threshold of organic waste generation by businesses decreases over time, which means an increasingly greater proportion of the commercial sector will be required to comply.

### Other State Actions

#### Senate Bill 97

SB 97 (2007) directed the Governor's Office of Planning and Research and the CNRA to develop guidelines under CEQA for the mitigation of GHG emissions. In 2008, the Governor's Office of Planning and Research issued a technical advisory as interim guidance regarding the analysis of GHG emissions in CEQA documents. The advisory indicated that the lead agency should identify and estimate a project's GHG emissions, including those associated with vehicular traffic, energy consumption, water usage, and construction activities (OPR 2008). The advisory further recommended that the lead agency determine significance of the impacts and impose all mitigation measures necessary to reduce GHG emissions to a level that is less than significant. The CNRA adopted the CEQA Guidelines amendments in December 2009, which became effective in March 2010.

Under the amended CEQA Guidelines, a lead agency has the discretion to determine whether to use a quantitative or qualitative analysis or apply performance standards to determine the significance of GHG emissions resulting from a particular project (14 CCR Section 15064.4[a]). The CEQA Guidelines require a lead agency to consider the extent to which the project complies with regulations or requirements adopted to implement a statewide, regional, or local plan

for the reduction or mitigation of GHG emissions (14 CCR Section 15064.4[b]). The CEQA Guidelines also allow a lead agency to consider feasible means of mitigating the significant effects of GHG emissions, including reductions in emissions through the implementation of project features or off-site measures (14 CCR Section 15126.4[c]). The adopted amendments do not establish a GHG emission threshold, instead allowing a lead agency to develop, adopt, and apply its own thresholds of significance or those developed by other agencies or experts. The CNRA also acknowledged that a lead agency could consider compliance with regulations or requirements implementing AB 32 in determining the significance of a project's GHG emissions (CNRA 2009b).

With respect to GHG emissions, CEQA Guidelines Section 15064.4(a), as subsequently amended in 2018, states that lead agencies "shall make a good-faith effort, based to the extent possible on scientific and factual data, to describe, calculate or estimate" GHG emissions. The CEQA Guidelines now note that an agency "shall have discretion to determine, in the context of a particular project, whether to: (1) [q]uantify greenhouse gas emissions resulting from a project; and/or (2) [r]ely on a qualitative analysis or performance based standards" (14 CCR Section 15064.4[a]). Section 15064.4(b) states that the lead agency should consider the following when assessing the significance of impacts from GHG emissions on the environment: (1) the extent a project may increase or reduce GHG emissions as compared to the existing environmental setting; (2) whether the project emissions exceed a threshold of significance that the lead agency determines applies to the project; and (3) the extent to which the project complies with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of GHG emissions (14 CCR Section 15064.4[b]).

#### Executive Order S-13-08

EO S-13-08 (November 2008) is intended to hasten California's response to the impacts of global climate change, particularly sea-level rise. Therefore, the EO directs state agencies to take specified actions to assess and plan for such impacts. The final *2009 California Climate Adaptation Strategy* report was issued in December 2009 (CNRA 2009a), and an update, *Safeguarding California: Reducing Climate Risk*, followed in July 2014 (CNRA 2014). To assess the state's vulnerability, the report summarizes key climate change impacts to the state for the following areas: Agriculture, Biodiversity and Habitat, Emergency Management, Energy, Forestry, Ocean and Coastal Ecosystems and Resources, Public Health, Transportation, and Water. Issuance of the *Safeguarding California: Implementation Action Plans* followed in March 2016 (CNRA 2016). In January 2018, the CNRA released the *Safeguarding California Plan: 2018 Update,* which communicates current and needed actions that state government should take to build climate change resiliency (CNRA 2018b).

### 4.6.2.3 Regional

#### Association of Monterey Bay Area Governments

The Association of Monterey Bay Area Governments (AMBAG) is the designated MPO for the Monterey Bay region. The AMBAG region includes Monterey, San Benito, and Santa Cruz counties. As of 2009, many of the cities and counties in the AMBAG jurisdiction had not quantified their baseline GHG inventories, due to lack of staff and funding. The AMBAG Energy Watch designed a program to assist member jurisdictions in a variety of climate action planning support services. Additionally, in 2008, AMBAG adopted the *Monterey Bay Regional Energy Plan* (Regional Energy Plan) (AMBAG 2008). The Regional Energy Plan provides a framework that local cities and counties can adopt or use as guidelines to reduce energy use.

Additionally, CARB set SB 375 GHG-reduction targets for the Monterey Bay Area at 0% increase from 2005 per capita emissions by 2020, and 5% below 2005 per capita emissions by 2035. In June 2014, AMBAG adopted the *Moving Forward 2035 Monterey Bay – Metropolitan Transportation Plan/Sustainable Communities Strategy* (2035 MTP/SCS) (AMBAG 2014). The 2035 MTP/SCS demonstrated that, if implemented, the region would achieve over

a 3%-per-capita GHG reduction in passenger vehicle emissions by 2020, and an approximately 6% reduction in 2035. These reductions meet the GHG targets for AMBAG, as discussed above.

In June 2018, AMBAG adopted an update to the 2035 MTP/SCS, *Moving Forward Monterey Bay 2040* (2040 MTP/SCS), the implementation of which was anticipated to achieve a 4%-per-capita reduction in GHG emissions from passenger vehicles by 2020, as well as a projected reduction in GHG emissions of nearly 7%-per-capita from passenger vehicles by 2035 (AMBAG 2018). The 2040 MTP/SCS outlines the region's proposed transportation network, emphasizing multimodal system enhancements, system preservation, and improved access to high quality transit, as well as land use development that complements this transportation network (AMBAG 2018).

#### Monterey Bay Air Resources District

California has 35 Air Pollution Control Districts and Air Quality Management Districts, many of which are currently addressing climate change issues by developing significance thresholds, performance standards, and mitigation measures. The Monterey Bay Air Resources District (MBARD) is the regional agency responsible for the regulation and enforcement of federal, state, and local air pollution control regulations in the North Central Coast Air Basin, where the Proposed Project is located. In February 2016, the MBARD adopted the staff-recommended significance threshold of 10,000 MT of $CO_2e$ for stationary source projects (MBARD 2016).

### 4.6.2.4 Local

#### City of Santa Cruz Climate Action Plan

In October 2012, the City adopted a CAP that outlines the actions the City will take over 10 years to reduce GHGs by 30% and to implement the policies and actions identified in the *General Plan 2030*. The CAP addresses citywide GHG reduction strategies. The CAP provides City emissions inventories, identifies an emissions reduction target for the year 2020, and includes measures to reduce energy use, reduce vehicle trips, implement water conservation programs, reduce emissions from waste collection, increase use of solar systems, and develop public partnerships to aide sustainable practices. Measures are outlined for the following sectors: municipal, residential, commercial, and community programs. None of the recommended measures are applicable to the Proposed Project. The City is currently in the process of updating the CAP.

#### City of Capitola Climate Action Plan

The Capitola City Council adopted the City's *Climate Action Plan* on October 22, 2015. The CAP fulfills several General Plan goals and brought the City into conformance with AB 32, SB 375, and EO S-3-05. The CAP includes an inventory of existing GHG emissions, a forecast of future GHG emissions, identification of GHG reduction targets, and a list of GHG reduction measures necessary to achieve identified reduction targets. The CAP includes actions and strategies to reduce GHG emissions generated by transportation and mobile sources, residential and non-residential energy consumption, water and wastewater treatment and conveyance, solid waste generation, and open space, parks, and agriculture (City of Capitola 2015). None of the recommended measures are applicable to the Proposed Project.

#### County of Santa Cruz Climate Action Strategy

The County of Santa Cruz Board of Supervisors approved the Climate Action Strategy (CAS) on February 26, 2013 (County of Santa Cruz 2013). The CAS reports the results of the GHG emissions inventory for Santa Cruz County, proposes targets for GHG reduction, outlines strategies and implementing actions to achieve the targets, and

provides a vulnerability assessment and strategies for adapting to the types of impacts that are likely to occur in Santa Cruz County. Eight "climate adaptation goals" are articulated as a guide for evaluating adaptation strategies. Specific adaptation strategies are proposed that include new actions as well as acknowledgement of existing plans and programs, which, while not explicitly about climate change, address the salient issues. There are no goals, strategies, or recommendations applicable to the Proposed Project.

## 4.6.3 Impacts and Mitigation Measures

This section contains the evaluation of potential environmental impacts associated with the Proposed Project related to GHG emissions. The section identifies the standards of significance used in evaluating the impacts, describes the methods used in conducting the analysis, and evaluates the Proposed Project's impacts and contribution to significant cumulative impacts, if any are identified.

### 4.6.3.1 Standards of Significance

The standards of significance used to evaluate the impacts of the Proposed Project related to GHG emissions are based on Appendix G of the CEQA Guidelines and the City of Santa Cruz CEQA Guidelines, as listed below. A significant impact would occur if the Proposed Project would:

A. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.
B. Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

As described previously in Section 4.6.2.3, Regional, the Proposed Project is located within the North Central Coast Air Basin under the jurisdiction of the MBARD, which, to date, has not adopted significance criteria or thresholds for land use projects. The MBARD-adopted significance threshold of 10,000 MT of $CO_2e$ for stationary source projects (MBARD 2016), does not apply to the Proposed Project, as no new stationary sources of GHG emissions are proposed. Nor has the City of Santa Cruz adopted a threshold of significance for generally applicable use. In the absence of a numeric threshold adopted by either the MBARD or the City, the City exercised its discretion to assess the significance of the Proposed Project's GHG-related impacts by considering whether GHG emissions of the Proposed Project meet the 900 MT $CO_2e$ per year screening level threshold identified by the California Air Pollution Control Officers Association (CAPCOA) (CAPCOA 2008). The 900 MT $CO_2e$ per year threshold was developed based on various land use densities and future discretionary project types to determine the size of projects that would likely have a less than cumulatively considerable contribution to climate change. The CAPCOA threshold was developed to ensure capture of 90% or more of likely future discretionary developments with the objective to set the emissions threshold low enough to capture a substantial fraction of future development while setting the emission threshold high enough to exclude small development projects that would contribute a relatively small fraction of cumulative statewide GHG emissions.

CAPCOA's 900 MT $CO_2e$ per year threshold was developed to meet the target identified by AB 32 of reducing emissions to 1990 levels by year 2020. Subsequent to CAPCOA identifying the 900 MT $CO_2e$ per year threshold, SB 32 was passed and set a revised statewide reduction target to reduce emissions to 40% below 1990 levels by year 2030. Though the CAPCOA threshold does not consider the reduction targets set by SB 32, the CAPCOA threshold was developed with an aggressive project-level GHG emission capture rate of 90%. Due to the aggressive GHG emission capture rate, the CAPCOA threshold has been determined to be a viable threshold to reduce project GHG emissions and meet SB 32 targets beyond 2020. Furthermore, more stringent state legislative requirements such

as Building Energy Efficiency Standards and transportation-related efficiency measures will act to reduce future project GHG emissions and help in meeting State emissions reduction targets. Projects that generate emissions beyond the 900 MT $CO_2e$ per year screening level threshold are required to implement feasible on-site mitigation measures to reduce their impacts on climate change. Projects that meet or fall below CAPCOA's screening level threshold of 900 MT $CO_2e$ per year of GHG emissions require no further analysis and are not required to implement mitigation measures to reduce GHG emissions. As such, the CAPCOA threshold of 900 MT $CO_2e$ per year is used as a quantitative threshold for the analysis of impacts related to GHG emissions generated by the Proposed Project.

### 4.6.3.2 Analytical Methods

This section evaluates the potential greenhouse gas emissions impacts associated with construction and operation of the Proposed Project. The analysis of potential impacts addresses the various project and programmatic components listed in Table 4.6-3, which are described in detail in Chapter 3, Project Description.

**Table 4.6-3. Project and Programmatic Components**

| Proposed Project Components | Project Components | Programmatic Components |
|---|---|---|
| **WATER RIGHTS MODIFICATIONS** | | |
| Place of Use | ✓ | |
| Points of Diversion | ✓ | |
| Underground Storage and Purpose of Use | ✓ | |
| Method of Diversion | ✓ | |
| Extension of Time | ✓ | |
| Bypass Requirement (Agreed Flows) | ✓ | |
| **INFRASTRUCTURE COMPONENTS** | | |
| ***Water Supply Augmentation*** | | |
| Aquifer Storage and Recovery (ASR) | | ✓ |
| New ASR Facilities at Unidentified Locations | | ✓ |
| Beltz ASR Facilities at Existing Beltz Well Facilities | ✓ | |
| Water Transfers and Exchanges and Intertie Improvements | | ✓ |
| ***Surface Water Diversion Improvements*** | | |
| Felton Diversion Fish Passage Improvements | | ✓ |
| Tait Diversion and Coast Pump Station Improvements | | ✓ |

#### Construction

Emissions from the construction phase of the Proposed Project were estimated using California Emissions Estimator Model (CalEEMod) Version 2016.3.2. Construction of the Proposed Project would result in GHG emissions primarily associated with use of off-road construction equipment, on-road hauling and vendor (material delivery) trucks, and worker vehicles. The analysis of GHG emissions used the same methodology and modeling inputs assumptions as the analysis of air quality impacts in Section 4.2, Air Quality, of this EIR. All details for construction criteria air pollutants discussed in Section 4.2.3.2, Analytical Methods, are also applicable for the estimation of construction-related GHG emissions. See Section 4.2.3.2 for a discussion of construction emissions calculation methodology and modeling inputs assumptions used in the GHG emissions analysis.

### Operation

Once Proposed Project construction is complete, operations would entail a minimal increase in on-road vehicle trips associated with routine inspection and maintenance of the new facilities by City staff. It is anticipated that up to three new staff would be needed: one for the Agreed Flows implementation and two for the new ASR facility maintenance. An additional daily vehicle trip was included for Beltz ASR facility maintenance. As a conservative estimate, these new daily vehicle trips were assumed to occur seven days a week, 365 days per year. On-road vehicle emissions were estimated using CalEEMod.

The Proposed Project would also result in increased GHG emissions associated with electricity demand for water system operation under project conditions. As provided by the City, the Proposed Project is anticipated to require an additional 1,326,350 kilowatt-hours (kWh) per year as compared to the City's 10-year average electricity demand (2009 to 2018). This net increase in electricity and indirect GHG emission factors from electricity generation were incorporated into a spreadsheet model to estimate GHG emissions.

### Application of Relevant Standard Practices

The Proposed Project does not include any standard operational or construction practices that are relevant to GHG emissions.

## 4.6.3.3 Project Impact Analysis

This section provides a detailed evaluation of GHG impacts associated with the Proposed Project.

| | |
|---|---|
| **Impact GHG-1:** | **Greenhouse Gas Emissions (Significance Standard A).** Construction and operation of the Proposed Project would not generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment. ***(Less than Significant)*** |

### Construction Emissions

#### Water Rights Modifications

Water rights modifications would not directly result in construction GHG emissions. As such, this project component would result in no direct impacts.

The following analysis evaluates the potential indirect impacts related to construction GHG emissions as a result of the proposed water rights modifications, that once approved could result in the implementation of the project and programmatic infrastructure components of the Proposed Project.

#### Infrastructure Components

Aquifer Storage and Recovery Facilities

**New ASR Facilities.** GHG emissions associated with the new ASR facilities were estimated for each year of construction and are depicted in Table 4.6-4. As shown in Table 4.6-4, the total estimated GHG emissions that would be generated during construction of new ASR facilities are approximately 1,378 MT $CO_2e$.

### Table 4.6-4. Estimated Annual Construction Greenhouse Gas Emissions – New Aquifer Storage and Recovery Facilities

| Project | $CO_2$ | $CH_4$ | $N_2O$ | $CO_2e$ |
|---|---|---|---|---|
| | *Metric Tons per Year* | | | |
| *2024* | | | | |
| New ASR Monitoring Wells[1] | 401.96 | 0.09 | 0.00 | 404.29 |
| New ASR Supply Wells[1] | 275.83 | 0.06 | 0.00 | 277.36 |
| *2024 Total* | *677.79* | *0.15* | *0* | *681.65* |
| *2025* | | | | |
| New ASR Facilities[1] | 694.07 | 0.10 | 0.00 | 696.51 |
| *2025 Total* | *694.07* | *0.10* | *0.00* | *696.51* |
| *Total* | | | | |
| **Total for New ASR Facility Construction** | **1,371.86** | **0.25** | **0** | **1,378.16** |

**Notes:** ASR = aquifer storage and recovery; $CH_4$ = methane; $CO_2$ = carbon dioxide; $CO_2e$ = carbon dioxide equivalent; $N_2O$ = nitrous oxide. See Appendix E for details.

1 The CalEEMod modeling included in Appendix E accounted for one representative monitoring well, one supply well, and one treatment facility. However, since up to four new ASR facilities are anticipated, the emissions outputs for the new ASR facilities were multiplied by four for inclusion in this table, which conservatively assumes that four new ASR facilities would be constructed concurrently.

**Beltz ASR Facilities.** GHG emissions associated with Beltz ASR facilities were estimated for each year of construction and are depicted in Table 4.6-5. As shown in Table 4.6-5, the total estimated GHG emissions that would be generated during construction of the Beltz ASR facilities are approximately 160 MT $CO_2e$.

### Table 4.6-5. Estimated Annual Construction Greenhouse Gas Emissions – Beltz Aquifer Storage and Recovery Facilities

| Project | $CO_2$ | $CH_4$ | $N_2O$ | $CO_2e$ |
|---|---|---|---|---|
| | *Metric Tons per Year* | | | |
| *2021* | | | | |
| Beltz 9 ASR Monitoring Well | 22.32 | 0.01 | 0.00 | 22.45 |
| *2021 Total* | *22.32* | *0.01* | *0.00* | *22.45* |
| *2022* | | | | |
| Beltz 8 ASR Facility Upgrades | 56.18 | 0.01 | 0.00 | 56.44 |
| Beltz 12 ASR Facility Upgrades | 32.86 | 0.01 | 0.00 | 33.02 |
| *2022 Total* | *89.04* | *0.02* | *0* | *89.46* |
| *2023* | | | | |
| Beltz 8 ASR Facility Upgrades | 3.81 | 0.00 | 0.00 | 3.84 |
| Beltz 9 ASR Facility Upgrades | 22.32 | 0.01 | 0.00 | 22.45 |
| Beltz 10 ASR Facility Upgrades | 22.11 | 0.00 | 0.00 | 22.22 |
| *2023 Total* | *48.24* | *0.01* | *0* | *48.51* |
| *Total* | | | | |
| **Total for Beltz ASR Facility Construction** | **159.6** | **0.04** | **0** | **160.42** |

**Notes:** ASR = aquifer storage and recovery; $CH_4$ = methane; $CO_2$ = carbon dioxide; $CO_2e$ = carbon dioxide equivalent; $N_2O$ = nitrous oxide. See Appendix E for details.

Water Transfers and Exchanges and Intertie Improvements

GHG emissions associated with the intertie improvements were estimated for each year of construction and are depicted in Table 4.6-6.

## Table 4.6-6. Estimated Annual Construction Greenhouse Gas Emissions – Intertie Improvements

| Project | $CO_2$ | $CH_4$ | $N_2O$ | $CO_2e$ |
|---|---|---|---|---|
| | *Metric Tons per Year* | | | |
| *2022* | | | | |
| City/SqCWD/CWD[1] Intertie – Pipeline | 273.69 | 0.07 | 0.00 | 275.56 |
| City/SqCWD/CWD[1] Intertie – New Pump Stations | 67.71 | 0.01 | 0.00 | 67.93 |
| City/SqCWD/CWD[1] Intertie – Pump Station Upgrade | 23.57 | 0.00 | 0.00 | 23.66 |
| *2022 Total* | *364.97* | *0.08* | *0* | *367.15* |
| *2027* | | | | |
| City/SVWD Intertie - Pipeline | 132.00 | 0.04 | 0.00 | 132.90 |
| City/SVWD Intertie - New Pump Station | 33.66 | 0.00 | 0.00 | 33.76 |
| *2027 Total* | *165.66* | *0.04* | *0* | *166.66* |
| *Total* | | | | |
| **Total for Intertie Improvement Construction** | **530.63** | **0.12** | **0** | **533.81** |

**Notes:** $CH_4$ = methane; $CO_2$ = carbon dioxide; $CO_2e$ = carbon dioxide equivalent; CWD = Central Water District; $N_2O$ = nitrous oxide; SqCWD = Soquel Creek Water District; SVWD = Scotts Valley Water District.
See Appendix E for details.

1 The CalEEMod modeling included in Appendix E for the City/SqCWD/CWD intertie connections and new pump stations accounted for one representative intertie connection and one new pump station. However, since two intertie connections and two new pump stations are anticipated for the City/SqCWD/CWD intertie, the emissions outputs for these components were multiplied by two for inclusion in this table, which conservatively assumes concurrent construction.

As shown in Table 4.6-6, total estimated GHG emissions generated during construction of the intertie improvements are approximately 534 MT $CO_2e$.

Felton Diversion Improvements

GHG emissions associated with the Felton Diversion improvements were estimated and are depicted in Table 4.6-7.

## Table 4.6-7. Estimated Annual Construction Greenhouse Gas Emissions – Felton Diversion Improvements

| Project | $CO_2$ | $CH_4$ | $N_2O$ | $CO_2e$ |
|---|---|---|---|---|
| | *Metric Tons per Year* | | | |
| *2027* | | | | |
| Felton Diversion Improvements | 21.55 | 0.00 | 0.00 | 21.64 |
| *Total* | | | | |
| **Total for Felton Diversion Improvement Construction** | **21.55** | **0.00** | **0.00** | **21.64** |

**Notes:** $CH_4$ = methane; $CO_2$ = carbon dioxide; $CO_2e$ = carbon dioxide equivalent; $N_2O$ = nitrous oxide.
See Appendix E for details.

As shown in Table 4.6-7, total estimated GHG emissions generated during construction of the Felton Diversion improvements are approximately 22 MT $CO_2e$.

Tait Diversion and Coast Pump Station Improvements

GHG emissions associated with the Tait Diversion and Coast Pump Station improvements were estimated and are depicted in Table 4.6-8.

**Table 4.6-8. Estimated Annual Construction Greenhouse Gas Emissions – Tait Diversion and Coast Pump Station Improvements**

| Project | $CO_2$ | $CH_4$ | $N_2O$ | $CO_2e$ |
|---|---|---|---|---|
| | *Metric Tons per Year* | | | |
| *2028* | | | | |
| Coast Pump Station Improvements | 24.92 | 0.00 | 0.00 | 25.01 |
| Tait Diversion Improvements | 233.46 | 0.02 | 0.00 | 234.05 |
| *2028 Total* | *258.38* | *0.02* | *0* | *259.06* |
| *Total* | | | | |
| **Total for Tait Diversion and Coast Pump Station Improvement Construction** | **258.38** | **0.02** | **0** | **259.06** |

**Notes:** $CH_4$ = methane; $CO_2$ = carbon dioxide; $CO_2e$ = carbon dioxide equivalent; $N_2O$ = nitrous oxide.
See Appendix E for details.

As shown in Table 4.6-8, the total estimated GHG emissions that would be generated during construction of the Tait Diversion and Coast Pump Station improvements are approximately 259 MT $CO_2e$.

**Construction Summary**

Table 4.6-9 summarizes the estimated GHG emissions that would be generated during construction of all project and programmatic infrastructure components of the Proposed Project in each year, as discussed above.

## Operational Emissions

For long-term operations, it was conservatively estimated that an increase of up to eight daily one-way trips would be generated in support of the project and programmatic components, primarily associated with routine inspection and maintenance activities by City staff. Indirect GHG emissions associated with electricity generation to supply the anticipated increase in demand was also estimated for the Proposed Project. Operational emissions associated with these on-road vehicles and electricity generation were estimated and are depicted in Table 4.6-10.

## Table 4.6-9. Estimated Annual Construction Greenhouse Gas Emissions – Proposed Project Total

| Project | $CO_2$ | $CH_4$ | $N_2O$ | $CO_2e$ |
|---|---|---|---|---|
| | *Metric Tons per Year* | | | |
| *2021* | | | | |
| Beltz 9 ASR Monitoring Well | 22.32 | 0.01 | 0.00 | 22.45 |
| ***2021 Total*** | ***22.32*** | ***0.01*** | ***0.00*** | ***22.45*** |
| *2022* | | | | |
| Beltz 8 ASR Facility Upgrades | 56.18 | 0.01 | 0.00 | 56.44 |
| Beltz 12 ASR Facility Upgrades | 32.86 | 0.01 | 0.00 | 33.02 |
| City/SqCWD/CWD[1] Intertie - Pipeline | 273.69 | 0.07 | 0.00 | 275.56 |
| City/SqCWD/CWD[1] Intertie - New Pump Stations | 67.71 | 0.01 | 0.00 | 67.93 |
| City/SqCWD/CWD[1] Intertie - Pump Station Upgrade | 23.57 | 0.00 | 0.00 | 23.66 |
| ***2022 Total*** | ***454.01*** | ***0.1*** | ***0*** | ***456.61*** |
| *2023* | | | | |
| Beltz 8 ASR Facility Upgrades | 3.81 | 0.00 | 0.00 | 3.84 |
| Beltz 9 ASR Facility Upgrades | 22.32 | 0.01 | 0.00 | 22.45 |
| Beltz 10 ASR Facility Upgrades | 22.11 | 0.00 | 0.00 | 22.22 |
| ***2023 Total*** | ***48.24*** | ***0.01*** | ***0*** | ***48.51*** |
| *2024* | | | | |
| New ASR Monitoring Wells[2] | 401.96 | 0.09 | 0.00 | 404.29 |
| New ASR Supply Wells[2] | 275.83 | 0.06 | 0.00 | 277.36 |
| ***2024 Total*** | ***677.79*** | ***0.15*** | ***0*** | ***681.65*** |
| *2025* | | | | |
| New ASR Treatment Facilities[2] | 694.07 | 0.10 | 0.00 | 696.51 |
| ***2025 Total*** | ***694.07*** | ***0.10*** | ***0.00*** | ***696.51*** |
| *2027* | | | | |
| City/SVWD Intertie - Pipeline | 132.00 | 0.04 | 0.00 | 132.90 |
| City/SVWD Intertie - New Pump Station | 33.66 | 0.00 | 0.00 | 33.76 |
| Felton Diversion Improvements | 21.55 | 0.00 | 0.00 | 21.64 |
| ***2027 Total*** | ***187.21*** | ***0.04*** | ***0*** | ***188.3*** |
| *2028* | | | | |
| Coast Pump Station Improvements | 24.92 | 0.00 | 0.00 | 25.01 |
| Tait Diversion Improvements | 233.46 | 0.02 | 0.00 | 234.05 |
| ***2028 Total*** | ***258.38*** | ***0.02*** | ***0*** | ***259.06*** |
| *Total* | | | | |
| **Total for All Years of Construction** | **2,342.02** | **0.43** | **0.00** | **2,353.09** |
| | | | **Amortized Over 30 Years** | **78.44** |

**Notes:** ASR = aquifer storage and recovery; $CH_4$ = methane; $CO_2$ = carbon dioxide; $CO_2e$ = carbon dioxide equivalent; CWD = Central Water District; $N_2O$ = nitrous oxide; SqCWD = Soquel Creek Water District; SVWD = Scotts Valley Water District.
See Appendix E for details.

1 The CalEEMod modeling included in Appendix E for the City/SqCWD/CWD intertie connections and new pump stations accounted for one representative intertie connection and one new pump station. However, since two intertie connections and two new pump stations are anticipated for the City/SqCWD/CWD intertie, the emissions outputs for these components were multiplied by two for inclusion in this table, which conservatively assumes concurrent construction.

2 The CalEEMod modeling included in Appendix E accounted for one representative monitoring well, one supply well, and one treatment facility. However, since up to four new ASR facilities are anticipated, the emissions outputs for the new ASR facilities were multiplied by four for inclusion in this table, which conservatively assumes that four new ASR facilities would be constructed concurrently.

## Table 4.6-10. Estimated Annual Operational Greenhouse Gas Emissions with Amortized Construction Greenhouse Gas Emissions

| Emission Source | $CO_2$ | $CH_4$ | $N_2O$ | $CO_2e$ |
|---|---|---|---|---|
| | *Metric Tons per Year* | | | |
| Electricity Generation | 126.34 | 0.44 | 1.11 | 127.88 |
| Mobile | 13.34 | <0.01 | 0.00 | 13.35 |
| ***Combined Total*** | 139.68 | 0.44 | 1.11 | 141.23 |
| *Amortized Construction GHGs* | | | | *78.44* |
| **Total Operational + Amortized Construction GHGs** | | | | **219.67** |
| ***GHG Emissions Threshold*** | | | | ***900*** |
| **Threshold Exceeded?** | | | | **No** |

**Notes**: $CH_4$ = methane; $CO_2$ = carbon dioxide; $CO_2e$ = carbon dioxide equivalent; GHG = greenhouse gas; $N_2O$ = nitrous oxide. See Appendix B for details. Of note, only the emissions associated with the incremental increase in operations (i.e., net increase in electricity and new employees) were included in the table in order to represent the overall net increase in GHG emissions.

As shown in Table 4.6-10, the Proposed Project would result in an increase of approximately 141 MT $CO_2e$ per year as a result of Proposed Project operations. This comparatively small number reflects the fact that, compared with most projects requiring EIRs under CEQA, the Proposed Project would generate relatively little vehicular traffic and would consume relatively limited amounts of electricity. After summing the Proposed Project's amortized temporary construction emissions, total GHGs generated by the Proposed Project would be approximately 220 MT $CO_2e$ per year. As such, increased annual operational GHG emissions with amortized construction emissions would not exceed the applied threshold of 900 MT $CO_2e$ per year. Therefore, the Proposed Project's GHG emissions would be less than significant.

### Mitigation Measures

As described above, the Proposed Project would not result in significant impacts related to GHG emissions, and therefore, no mitigation measures are required.

**Impact GHG-2: Conflict with an Applicable Greenhouse Gas Reduction Plan (Significance Standard B).** Construction and operation of the Proposed Project would not conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases. ***(Less than Significant)***

While there are no mandatory GHG plans, policies, or regulations or finalized agency guidelines that would apply to implementation of the Proposed Project, an analysis of the potential for the Proposed Project to conflict with relevant plans that include GHG reduction strategies is provided below.[3]

### Climate Action Plans

The overall goals and GHG reduction strategies of the City of Santa Cruz Climate Action Plan, City of Capitola Climate Action Plan, and County of Santa Cruz Climate Action Strategy are described in Section 4.6.2.4. The Proposed Project would not conflict with any of these City or County plans.

[3] As described previously in Section 4.6.2.4, Local, no recommended measures in the City of Santa Cruz CAP, City of Capitola CAP, or County of Santa Cruz CAS are applicable to the Proposed Project.

### AMBAG's Metropolitan Transportation Plan/Sustainable Communities Strategy

AMBAG's 2040 MTP/SCS is a regional growth-management strategy that targets per-capita GHG reduction from passenger vehicles and light-duty trucks within the Monterey Bay Area. The 2040 MTP/SCS incorporates local land use projections and circulation networks in city and county general plans. Typically, a project would be consistent with the MTP/SCS if the project does not exceed the underlying growth parameters within the MTP/SCS. As discussed in Chapter 5, Growth Inducement, the Proposed Project would generate negligible new employment. Therefore, the Proposed Project would not result in significant population growth that would exceed AMBAG growth projections for the County. Furthermore, as described in Table 4.6-11, the Proposed Project would not conflict with the major goals of the 2040 MTP/SCS.

**Table 4.6-11. Review of the Association of Monterey Bay Area Governments' 2040 Metropolitan Transportation Plan/Sustainable Communities Strategy Goals and Proposed Project**

| MTP/SCS Goal | Project Consistency |
|---|---|
| Provide convenient, accessible, and reliable travel options while maximizing productivity for all people and goods in the region. | **No conflict.** The Proposed Project would not inhibit AMBAG from strengthening the regional transportation network for goods movement. |
| Raise the region's standard of living by enhancing the performance of the transportation system. | **No conflict.** The Proposed Project would not inhibit AMBAG from preserving and expanding the existing regional transit system. |
| Promote environmental sustainability and protect the natural environment. | **No conflict.** The Proposed Project would not inhibit AMBAG from promoting sustainability within the Monterey Bay Area region. |
| Protect the health of our residents; foster efficient development patterns that optimize travel, housing, and employment choices and encourage active transportation. | **No conflict.** The Proposed Project would not inhibit AMBAG from preserving and expanding the existing regional transit system. |
| Provide an equitable level of transportation services to all segments of the population. | **No conflict.** The Proposed Project would not inhibit AMBAG from strengthening the regional transportation network for all segments of the population. |
| Preserve and ensure a sustainable and safe regional transportation system. | **No conflict.** The Proposed Project would not inhibit AMBAG from providing a sustainable and safe transportation system. |

**Source:** AMBAG 2018.
**Notes:** AMBAG = Association of Monterey Bay Area Governments; MTP/SCS = Metropolitan Transportation Plan/Sustainable Communities Strategy.

### California Air Resources Board's Scoping Plan

The Scoping Plan, approved by CARB on December 12, 2008 and updated in 2014 and 2017, provides a framework for actions to reduce California's GHG emissions and requires CARB and other state agencies to adopt regulations and other initiatives to reduce GHGs. As such, the Scoping Plan is not directly applicable to specific projects. Relatedly, in the Final Statement of Reasons for the Amendments to the State CEQA Guidelines, the CNRA observed that "[t]he [Scoping Plan] may not be appropriate for use in determining the significance of individual projects because it is conceptual at this stage and relies on the future development of regulations to implement the strategies identified in the Scoping Plan" (CNRA 2009b). Under the Scoping Plan, however, there are several state regulatory measures aimed at the identification and reduction of GHG emissions. CARB and other state agencies have adopted many of the measures identified in the Scoping Plan. Most of these measures focus on area source emissions (e.g., energy usage, high-GWP GHGs in consumer products) and changes to the vehicle fleet (i.e., hybrid, electric, and more fuel-efficient vehicles) and associated fuels (e.g., Low Carbon Fuel Standard), among others. The

Proposed Project would comply with all regulations adopted in furtherance of the Scoping Plan to the extent applicable and required by law.

Regarding consistency with SB 32 (goal of reducing GHG emissions to 40% below 1990 levels by 2030) and EO S-3-05 (goal of reducing GHG emissions to 80% below 1990 levels by 2050), there are no established protocols or thresholds of significance for those future-year analyses. However, CARB has expressed optimism with regard to both the 2030 and 2050 goals. It states in the *First Update to the Climate Change Scoping Plan* that California is "well positioned to maintain and continue reductions beyond 2020 as required by AB 32" (CARB 2014). With regard to the 2050 target for reducing GHG emissions to 80% below 1990 levels, the *First Update to the Climate Change Scoping Plan* states the following (CARB 2014):

> This level of reduction is achievable in California. In fact, if California realizes the expected benefits of existing policy goals (such as 12,000 megawatts of renewable distributed generation by 2020, net zero energy homes after 2020, existing building retrofits under Assembly Bill 758, and others) it could reduce emissions by 2030 to levels squarely in line with those needed in the developed world and to stay on track to reduce emissions to 80 [percent] below 1990 levels by 2050. Additional measures, including locally driven measures and those necessary to meet federal air quality standards in 2032, could lead to even greater emission reductions.

In other words, CARB believes that California is on a trajectory to meet the 2030 and 2050 GHG reduction targets set forth in AB 32, SB 32, and EO S-3-05. This is confirmed in the 2017 Scoping Plan, which states, "This Plan draws from the experiences in developing and implementing previous plans to present a path to reaching California's 2030 GHG reduction target. The Plan is a package of economically viable and technologically feasible actions to not just keep California on track to achieve its 2030 target, but stay on track for a low- to zero-carbon economy by involving every part of the state" (CARB 2017a). The 2017 Scoping Plan also states that although "the Scoping Plan charts the path to achieving the 2030 GHG emissions reduction target, we also need momentum to propel us to the 2050 statewide GHG target (80 [percent] below 1990 levels). In developing this Scoping Plan, we considered what policies are needed to meet our mid-term and long-term goals" (CARB 2017a).

With regard to EO B-55-18 (statewide goal of carbon neutrality by no later than 2045), which is a more aggressive statewide goal than EO S-3-05, the EO notes that CARB will work with relevant state agencies to ensure that future Scoping Plans identify and recommend measures to achieve the carbon neutrality goal. With respect to future GHG targets under SB 32 and EO B-55-18, CARB has made clear its legal interpretation that it has the requisite authority to adopt whatever regulations are necessary, beyond the AB 32 horizon year of 2020, to meet the long-term statewide goals; this legal interpretation by an expert agency provides evidence that future regulations will be adopted to continue the state on its trajectory toward meeting these future GHG targets.

As described in Impact GHG-1, amortized construction and operational GHG emissions from the Proposed Project would not exceed the applied threshold of 900 MT $CO_2e$ per year, which was established based on the goal of AB 32 to reduce statewide emissions to 1990 levels by 2020. Though the CAPCOA threshold does not consider the reduction targets set by SB 32 for 2030, the CAPCOA threshold was developed with an aggressive project-level GHG emission capture rate of 90% and therefore is a viable threshold to reduce project GHG emissions and meet SB 32 targets beyond 2020. As such, the Proposed Project would also be considered consistent with implementation of any of the above-described GHG-reduction goals for 2030 and beyond.

Based on the above considerations, the Proposed Project would not conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs. This impact would be less than significant.

**Mitigation Measures**

As described above, the Proposed Project would not result in significant impacts related to conflicts with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases, and therefore, no mitigation measures are required.

### 4.6.3.4 Cumulative Impacts Analysis

This section provides an evaluation of cumulative GHG impacts associated with the Proposed Project and past, present, and reasonably foreseeable future projects, as identified in Table 4.0-2 in Section 4.0, Introduction to Analyses, and as relevant to this topic. The geographic area for the analysis of cumulative impacts resulting from GHG emissions is the Earth as GHG emissions are a global concern.

**Impact GHG-3: Cumulative Greenhouse Gas Impacts (Significance Standards A and B).** Construction and operation of the Proposed Project, in combination with past, present, and reasonably foreseeable future development, would result in a significant cumulative impact related to greenhouse gas emissions, but the Proposed Project's contribution to this impact would not be cumulatively considerable. ***(Less than Significant)***

Cumulative development throughout the North Central Coast Air Basin region and beyond would generate GHG emissions that could have a significant cumulative impact on the environment. Accordingly, the analysis above considers the potential for the Proposed Project to contribute to a cumulative impact related to global climate change. As shown in Table 4.6-10, the Proposed Project's GHG emissions would not exceed the applied threshold of 900 MT $CO_2e$ per year. In addition, as described in Impact GHG-2 above, the Proposed Project would not conflict with an applicable plan, policy, or regulation adopted to reduce GHG emissions. As such, the Proposed Project's contribution to significant cumulative GHG impacts would not be cumulatively considerable and therefore would be less than significant.

## 4.6.4 References

AMBAG (Association of Monterey Bay Area Governments). 2008. *Monterey Bay Regional Energy Plan.* Accessed February 2020 at https://ambag.org/programs/EnergyWatch/documents/RegionalEnergyPlan%202008.pdf.

AMBAG. 2014. *Moving Forward 2035 Monterey Bay – Metropolitan Transportation Plan/ Sustainable Communities Strategy*. Adopted June 2014. Accessed February 2019 at https://ambag.org/programs/met_transp_plann/documents/Final_2035_MTP_SCS/MovingForwardMontereyBayFinal.pdf.

AMBAG. 2018. *Monterey Bay 2040 Moving Forward – 2040 Metropolitan Transportation Plan/ Sustainable Communities Strategy*. Adopted June 2018. Accessed February 2019 at https://ambag.org/programs/met_transp_plann/documents/Final_2040_MTP_SCS/AMBAG_MTP-SCS_Final_EntireDocument.pdf.

CAPCOA (California Air Pollution Control Officers Association). 2008. *CEQA & Climate Change: Evaluating and Addressing Greenhouse Gas Emissions from Projects Subject to the California Environmental Quality Act*. January 2008.

CARB (California Air Resources Board). 2008. *Climate Change Proposed Scoping Plan: A Framework for Change*. October 2008. Accessed June 2020 at http://www.arb.ca.gov/cc/scopingplan/document/psp.pdf.

CARB. 2012. "California Air Resources Board Approves Advanced Clean Car Rules." January 27, 2012. Accessed June 2020 at https://ww2.arb.ca.gov/news/california-air-resources-board-approves-advanced-clean-car-rules.

CARB. 2014. *First Update to the Climate Change Scoping Plan: Building on the Framework.* May 2014. Accessed June 2020 at http://www.arb.ca.gov/cc/scopingplan/2013_update/first_update_climate_change_scoping_plan.pdf.

CARB. 2017a. *The 2017 Climate Change Scoping Plan Update: The Proposed Strategy for Achieving California's 2030 Greenhouse Gas Target*. January 20, 2017. Accessed June 2020 at https://www.arb.ca.gov/cc/scopingplan/2030sp_pp_final.pdf.

CARB. 2017b. *Short-Lived Climate Pollutant Reduction Strategy*. March 2017. Accessed June 2020 at https://www.arb.ca.gov/cc/shortlived/meetings/03142017/final_slcp_report.pdf.

CARB. 2020a. Current California GHG Emission Inventory Data: 2000-2018 GHG Inventory (2020 Edition). Accessed October 2020 at https://ww2.arb.ca.gov/ghg-inventory-data?utm_medium=email&utm_source=govdelivery.

CARB. 2020b. "Glossary of Terms Used in Greenhouse Gas Inventories." Accessed June 2020 at http://www.arb.ca.gov/cc/inventory/faq/ghg_inventory_glossary.htm.

City of Capitola. 2015. *Climate Action Plan.* Accessed December 2020 at http://www.cityofcapitola.org/sites/default/files/fileattachments/community_development/page/3953/capitola_climate_action_plan.pdf.

City of Santa Cruz. 2012. *Climate Action Plan*. Accessed June 2020 at http://www.cityofsantacruz.com/home/showdocument?id=27824.

CNRA (California Natural Resources Agency). 2009a. 2009 California Climate Adaptation Strategy: A Report to the Governor of the State of California in Response to Executive Order S-13-2008. Accessed June 2020 at http://resources.ca.gov/docs/climate/Statewide_Adaptation_Strategy.pdf.

CNRA. 2009b. *Final Statement of Reasons for Regulatory Action: Amendments to the State CEQA Guidelines Addressing Analysis and Mitigation of Greenhouse Gas Emissions Pursuant to SB 97*. December 2009. Accessed June 2020 at https://resources.ca.gov/CNRALegacyFiles/ceqa/docs/Final_Statement_of_Reasons.pdf.

CNRA. 2014. *Safeguarding California: Reducing Climate Risk: An Update to the 2009 California Climate Adaptation Strategy*. July 2014. Accessed June 2020 at http://resources.ca.gov/docs/climate/Final_Safeguarding_CA_Plan_July_31_2014.pdf.

CNRA. 2016. *Safeguarding California: Implementation Action Plans*. March 2016. Accessed June 2020 at http://resources.ca.gov/docs/climate/safeguarding/Safeguarding%20California-Implementation%20Action%20Plans.pdf.

CNRA. 2018a. *California's Fourth Climate Change Assessment: Central Coast Region Report.* September 28, 2018. Accessed June 2020 at https://www.energy.ca.gov/sites/default/files/2019-11/Reg_Report-SUM-CCCA4-2018-006_CentralCoast_ADA.pdf.

CNRA. 2018b. *Safeguarding California Plan: 2018 Update: California's Climate Adaptation Strategy.* January 2018. Accessed June 2020 at http://resources.ca.gov/docs/climate/safeguarding/update2018/safeguarding-california-plan-2018-update.pdf.

County of Santa Cruz. 2013. *Climate Action Strategy*. Adopted February 26, 2013. Accessed June 2020 at https://www.sccoplanning.com/Portals/2/County/Planning/policy/Climate%20Action%20Strategy/Climate%20Action%20Strategy.pdf?ver=-dse4v30qSAQ_YA7SW_Zfw%3d%3d.

EPA (U.S. Environmental Protection Agency). 2016. "Glossary of Climate Change Terms." September 29, 2016. Accessed November 2020 at https://19january2017snapshot.epa.gov/climatechange/glossary-climate-change-terms_.html.

EPA. 2017. "Climate Change." Last updated January 19, 2017. Accessed May 2019 at https://19january2017snapshot.epa.gov/climatechange_.html.

EPA. 2019. "Mid-Term Evaluation of Light-Duty Vehicle Greenhouse Gas Emissions Standards for Model Years 2022-2025". Last updated March 2019. Accessed November 19, 2020 at https://www.epa.gov/regulations-emissions-vehicles-and-engines/midterm-evaluation-light-duty-vehicle-greenhouse-gas.

EPA. 2020. *Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990–2018*. EPA 430-R-20-002. April 2020. Accessed November 2020 at https://www.epa.gov/sites/production/files/2020-04/documents/us-ghg-inventory-2020-main-text.pdf.

EPA and NHTSA (U.S. Environmental Protection Agency and Department of Transportation's National Highway Traffic Safety Administration). 2016. *EPA and NHTSA Adopt Standards to Reduce Greenhouse Gas Emissions and Improve Fuel Efficiency of Medium- and Heavy-Duty Vehicles for Model Year 2018 and Beyond*. August 2016. Accessed June 2020 at https://nepis.epa.gov/Exe/ZyPDF.cgi/P100P7NL.PDF?Dockey=P100P7NL.PDF.

EPA and NHTSA. 2018. *The Safer Affordable Fuel-Efficient 'SAFE' Vehicles Rule for Model Years 2021-2026 Passenger Vehicles and Light Trucks*. Proposed Rule August 2018. Accessed June 2020 at https://www.govinfo.gov/content/pkg/FR-2018-08-24/pdf/2018-16820.pdf.

IPCC (Intergovernmental Panel on Climate Change). 1995. *Climate Change 1995: A Report of the Intergovernmental Panel on Climate Change*. IPCC Second Assessment.

IPCC. 2007. *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.). Cambridge University Press, Cambridge, United Kingdom, and New York, NY, 996 pp. Accessed June 2020 at http://archive.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4_wg1_full_report.pdf.

IPCC. 2013. *Climate Change 2013: The Physical Science Basis*. *Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.* Stocker, T.F., D. Qin, G.K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex, and P.M. Midgley (eds.). Cambridge University Press, Cambridge, United Kingdom, and New York, NY. Accessed June 2020 at http://www.ipcc.ch/report/ar5/wg1.

IPCC. 2014. *Climate Change 2014 Synthesis Report: A Report of the Intergovernmental Panel on Climate Change.* Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Accessed June 2020 at http://www.ipcc.ch/report/ar5/syr/.

IPCC. 2018. "Summary for Policymakers." In *Global Warming of 1.5 °C. An IPCC Special Report on the impacts of global warming of 1.5 °C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty*. Accessed June 2020 at https://www.ipcc.ch/site/assets/uploads/sites/2/2019/05/SR15_SPM_version_report_LR.pdf.

MBARD (Monterey Bay Air Resources District). 2016. *Guidelines for Implementing the California Environmental Quality Act*. Adopted April 1996. Revised February 2016.

OEHHA (Office of Environmental Health Hazard Assessment). 2018. Indicators of Climate Change in California. May 9, 2018. Accessed May 19, 2021 at https://oehha.ca.gov/media/downloads/climate-change/report/2018caindicatorsreportmay2018.pdf.

OPR (California Governor's Office of Planning and Research). 2008. "Technical Advisory—CEQA and Climate Change: Addressing Climate Change through California Environmental Quality Act (CEQA) Review." June 19, 2008. Accessed June 2020 at http://opr.ca.gov/docs/june08-ceqa.pdf.

OPR. 2018. *Discussion Draft: CEQA and Climate Change Advisory*. December 2018.

PBL (PBL Netherlands Environmental Assessment Agency). 2019. *Trends in Global CO2 and Total Greenhouse Gas Emissions. Summary of the 2019 Report*. Accessed June 2020 at https://www.pbl.nl/en/publications/trends-in-global-co2-and-totaal-greenhouse-gas-emissions-summary-of-the-2019-report.

The White House. 2021. Executive Order on Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis. January 20. Accessed February 11, 2021 at https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/20/executive-order-protecting-public-health-and-environment-and-restoring-science-to-tackle-climate-crisis/.