3.6 CLIMATE CHANGE, GREENHOUSE GASES, AND ENERGY

This section evaluates the potential impacts related to greenhouse gas (GHG) emissions resulting from implementation of the proposed Plan and analyzes their potential contribution to global climate change. For information on the proposed Plan's discussion of sea level rise, please see Chapter 2, "Project Description." Additionally, this section evaluates the potential impacts related to energy consumption resulting from the implementation of the proposed Plan.

Comments received in response to the Notice of Preparation expressed concerns regarding GHG emissions associated with vehicle miles traveled (VMT), Senate Bill (SB) 288 and its relationship to GHG emissions, and climate and social equity. These issues are addressed in this section.

The CEQA Guidelines note that comments received during the NOP scoping process can be helpful in "identifying the range of actions, alternatives, mitigation measures, and significant effects to be analyzed in depth in an EIR and in eliminating from detailed study issues found not to be important." (CEQA Guidelines Section 15083.) Neither the CEQA Guidelines nor Statutes require a lead agency to respond directly to comments received in response to the NOP, but they do require they be considered. Consistent with these requirements, the comments received on the NOP have been carefully reviewed and considered by MTC and ABAG in the preparation of the impact analysis in this section. Appendix B includes all NOP comments received.

3.6.1 Environmental Setting

GREENHOUSE GAS EMISSIONS AND CLIMATE CHANGE

"Climate" is defined as the average statistics of weather, which include temperature, precipitation, and seasonal patterns, such as storms and wind, in a particular region. "Global climate change" refers to the long-term and irrevocable shift in these weather-related patterns. Found in ice cores and geological records, baseline temperature and carbon dioxide (CO_2) data extend back to previous ice ages thousands of years ago. Over the last 10,000 years, the rate of temperature change has typically been incremental, with warming and cooling occurring over the course of thousands of years. However, scientists have observed an unprecedented increase in the rate of warming over the past 150 years, roughly coinciding with the global industrial revolution, which has resulted in substantial increases in GHG emissions (defined below) into the atmosphere. The anticipated impacts of climate change in California range from water shortages to inundation from sea level rise. Transportation systems contribute to climate change primarily through the emissions of certain GHGs (CO_2, methane [CH_4], and nitrous oxide [N_2O]) from nonrenewable energy (primarily gasoline and diesel fuels) used to operate passenger, commercial, and transit vehicles. Land use changes contribute to climate change through construction and operational use of electricity and natural gas and through waste production.

Climate modeling capabilities have been greatly enhanced in recent years, allowing for the future range of climate change effects to be better understood. While there are limitations to representing the anticipated changes at a regional level, the global forecasted future trends will still apply at a local level, even if specifics are unknown.

The Intergovernmental Panel on Climate Change (IPCC) has reached consensus that human-caused emissions of GHGs in excess of natural ambient concentrations are responsible for intensifying the greenhouse effect and leading to a trend of unnatural warming of the earth's climate, known as global climate change or global warming. It is "extremely likely" that more than half of the observed increases

in global average surface temperature from 1951 to 2010 were caused by the anthropogenic increase in GHG concentrations and other anthropogenic forces together (IPCC 2014:3, 5).

IPCC predicts that the global mean surface temperature increase by the end of the 21st century (2081–2100), relative to 1986–2005, could range from 0.5 to 8.7 degrees Fahrenheit. Additionally, IPCC projects that global mean sea level rise will continue during the 21st century, very likely at a faster rate than observed from 1971 to 2010. For the period 2081–2100 relative to 1986–2005, the rise will likely range from 10 to 32 inches (0.26 to 0.82 meters) (IPCC 2014:10, 13).

According to the California Energy Commission (CEC), accelerating global climate change has the potential to cause adverse impacts in the Bay Area, including but not limited to:

- *Water Supply:* Changes in local rainfall, saltwater intrusion, seawater flooding the Sacramento–San Joaquin Delta (Delta), and a reduced Sierra Nevada snowpack can all threaten the Bay Area's water supply. The potential for larger storms may also threaten current water management systems and infrastructure.

- *Infrastructure*: Increased risks of flooding because of sea level rise, coastal erosion, more frequent and extreme storms, and stronger precipitation events may lead to damage, inoperability, or impairment of critical infrastructure, such as wastewater treatment plants, sewage, power plants, and transportation. This would affect not only daily commutes and activities but also emergency response. Increased wildfires also threaten much of the inland infrastructure and can have cascading effects with rainfall on areas that were recently burned. Increased temperatures may complicate this adaptation, as they are expected to increase roadway construction costs.

- *Agriculture:* Changes in temperatures, more extreme heat days, and the earlier onset of spring may lead to suboptimal growing conditions for grapes and other agricultural products that significantly contribute to the Bay Area economy and tourism.

- *Ecosystems and Biodiversity:* Increased temperatures and wind changes are expected to increase the size and severity of wildfires, damaging habitat resilience and connectivity. With sea level rise, the Bay Area's coastal wetlands are threatened and cannot naturally move inland because of existing developments, thus destroying this important ecosystem. This threatens the region's freshwater fish species and may allow nonnative species to thrive. Increased temperatures also result in increased fire risk.

- *Energy Demand, Supply, and Transmission:* Increasing wildfires attributable to climate change threaten the transmission and distribution of electricity. Coastal flooding may affect other energy infrastructure, including oil and gas refineries or terminals. These challenges may be exacerbated by more common temperature extremes, which could lead to increased demand. This could lead to rolling blackouts or other issues with the Bay Area's aging energy infrastructure.

- *Public Health:* Many Bay Area residences and businesses were not built with air conditioning to control temperatures on extreme heat days, which may lead to illness and mortality. Higher temperatures also lead to worsened air quality and potentially the spread of diseases and pests. Increased incidence and severity of wildfires may also contribute to worsening air quality. These changes will disproportionately burden vulnerable populations.

- *Tribal and Indigenous Communities:* Tribal relationships with the environment have been limited because of historic U.S. policy. For many tribes, modern land status and geographic allotments create challenges for them to adapt to a changing climate (CEC 2018).

Greenhouse Gases

Gases that trap heat in Earth's atmosphere are called greenhouse gases (GHGs). These gases play a critical role in determining Earth's surface temperature. Part of the solar radiation that would have been reflected into space is absorbed by these gases, resulting in a warming of the atmosphere. Without natural GHGs, Earth's surface would be about 60 degrees cooler (MSU 2011). This phenomenon is known as the greenhouse effect. However, scientists have proven that emissions from human activities—such as electricity generation, vehicle use, and even farming and forestry practices—have elevated the concentration of GHGs in the atmosphere beyond naturally occurring concentrations, enhancing the greenhouse effect, and contributing to the larger process of global climate change. The six primary GHGs are:

- carbon dioxide (CO_2), emitted when solid waste, fossil fuels (oil, natural gas, and coal), and wood and wood products are burned;
- methane (CH_4), produced through the anaerobic decomposition of waste in landfills, animal digestion, decomposition of animal wastes, production and distribution of natural gas and petroleum, coal production, incomplete fossil fuel combustion, and water and wastewater treatment;
- nitrous oxide (N_2O), typically generated as a result of soil cultivation practices, particularly the use of commercial and organic fertilizers, fossil fuel combustion, nitric acid production, and biomass burning;
- hydrofluorocarbons (HFCs), primarily used as refrigerants;
- perfluorocarbons (PFCs), originally introduced as alternatives to ozone-depleting substances and typically emitted as byproducts of industrial and manufacturing processes; and
- sulfur hexafluoride (SF_6), primarily used in electrical transmission and distribution.

Although there are other contributors to global warming, these six GHGs are identified by the U.S. Environmental Protection Agency (EPA) as threatening the public health and welfare of current and future generations (EPA 2009). GHGs have varying potential to trap heat in the atmosphere, known as global warming potential (GWP), and atmospheric lifetimes. GWP reflects how long GHGs remain in the atmosphere, on average, and how intensely they absorb energy. Gases with a higher GWP absorb more energy per pound than gases with a lower GWP and thus contribute more to warming Earth. For example, one ton of CH_4 has the same contribution to the greenhouse effect as approximately 28 tons of CO_2; hence, CH_4 has a 100-year GWP of 28, while CO_2 has a GWP of one. GWP ranges from one (for CO_2) to 23,500 (for SF_6). GHG emissions are typically measured as metric tons of carbon dioxide equivalent ($MTCO_2e$) (IPCC 2014:731–737).

Greenhouse Gas Emission Sources

GHG emissions are attributable in large part to human activities. The total GHG inventory for California in 2017 was 424 million metric tons of carbon dioxide equivalent ($MMTCO_2e$) (CARB 2019). This is less than the 2020 target of 431 $MMTCO_2e$ (CARB 2019) required to meet legislative targets included in the Global Warming Solutions Act of 2006 (Assembly Bill [AB] 32). **Table 3.6-1** summarizes the Statewide GHG inventory for California by percentage.

Table 3.6-1: Statewide GHG Emissions by Economic Sector in 2017

Sector	Percent	$MMTCO_2e$
Transportation	41	174
Industrial	24	71
Electricity generation (in State)	9	29
Agriculture	8	12
Residential	7	5
Electricity generation (imports)	6	2
Commercial	5	1
Total	100	424

Note: $MMTCO_2e$ = million metric tons of carbon dioxide equivalent.
Source: CARB (2019)

As shown in Table 3.6-1, transportation, industry, and in-State electricity generation are the largest GHG emission sectors.

Local and regional agencies in the Bay Area have taken steps to measure, quantify, evaluate, and mitigate their contributions to GHG emissions and global climate change. For example, 79 cities and counties in the Bay Area have developed their own climate action plans (CAPs), and 103 have completed GHG emissions inventories (CARB 2021). Additionally, many cities, businesses, and municipal agencies are voluntary members of the Climate Action Registry, a private nonprofit organization originally formed by the State of California that serves as a voluntary GHG registry to protect and promote early actions to reduce GHG emissions by organizations.

In 2017, the Bay Area Air Quality Management District (BAAQMD) updated a baseline inventory of GHG emissions in the region for the year 2015 in the *2017 Clean Air Plan: Spare the Air, Cool the Climate*. According to that inventory, 86.6 million metric tons of CO_2e ($MMTCO_2e$) were emitted in the Bay Area in 2015 (BAAQMD 2017). Table 3.6-2 and Table 3.6-3 show the emissions breakdown by pollutant and source.

Table 3.6-2: 2015 Bay Area CO_2e Emissions by Pollutant

Pollutant	Percentage	CO_2e ($MMTCO_2e$ /Year)
Carbon Dioxide	90	78
Methane	3	3
Nitrous Oxide	2	2
HFC, PFC, SF6	5	4
Regional Total	100	87

Notes: $MMTCO_2e$ = million metric tons of carbon dioxide equivalent. Totals may not sum because of independent rounding.
Source: BAAQMD 2017:Table E

Table 3.6-3: 2015 Bay Area CO_2e Emissions by Source

Source Category	Percentage	CO_2e ($MMTCO_2e$ /Year)
On and Off-Road Transportation	40	35
Stationary Sources	24	21
Electricity / Co-Generation[1]	18	16
Buildings[2]	11	10
Waste Management	3	2
High Global Warming Potential Gases	3	3
Agriculture	1	1
Regional Total	100	88

Notes: $MMTCO_2e$ = million metric tons of carbon dioxide equivalent. Totals may not sum because of independent rounding.

[1] Includes imported electricity emissions (2.7 $MMTCO_2e$).

[2] Residential and commercial fuel use, excluding electricity.

Source: BAAQMD 2017:Table Ff

The Bay Area's transportation sector alone contributes 40 percent of the CO_2e GHG emissions, followed by stationary sources (e.g., oil refineries and stationary fuel usage) (24 percent), electricity generation and cogeneration (18 percent), buildings (11 percent), waste management (three percent), high GWP gases (three percent), and agriculture (one percent). Bay Area emissions by sector are illustrated in Figure 3.6-1.

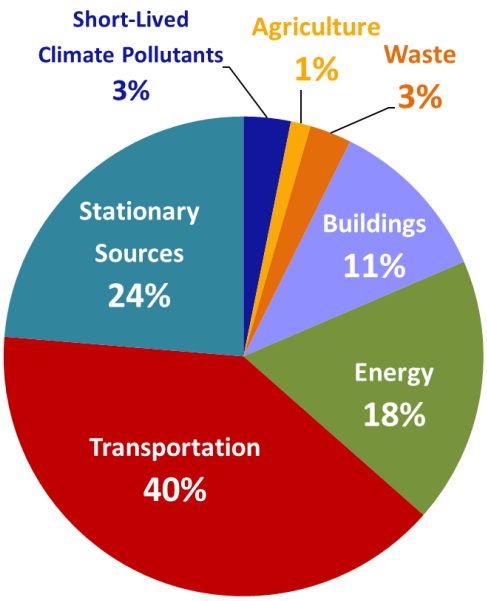

Figure 3.6-1: 2015 Bay Area Greenhouse Gas Emissions by Source, as a Percent of Total

Source: BAAQMD 2017: Figure 3-6.

Economic activity variations and the fraction of electric power generation in the region will cause year-to-year fluctuations in the emissions trends. Currently adopted policies and regulations would also affect future emission trends. Figure 3.6-2 shows the emission trends by major sources for the period of 1990–2050 alongside adopted GHG reduction targets.

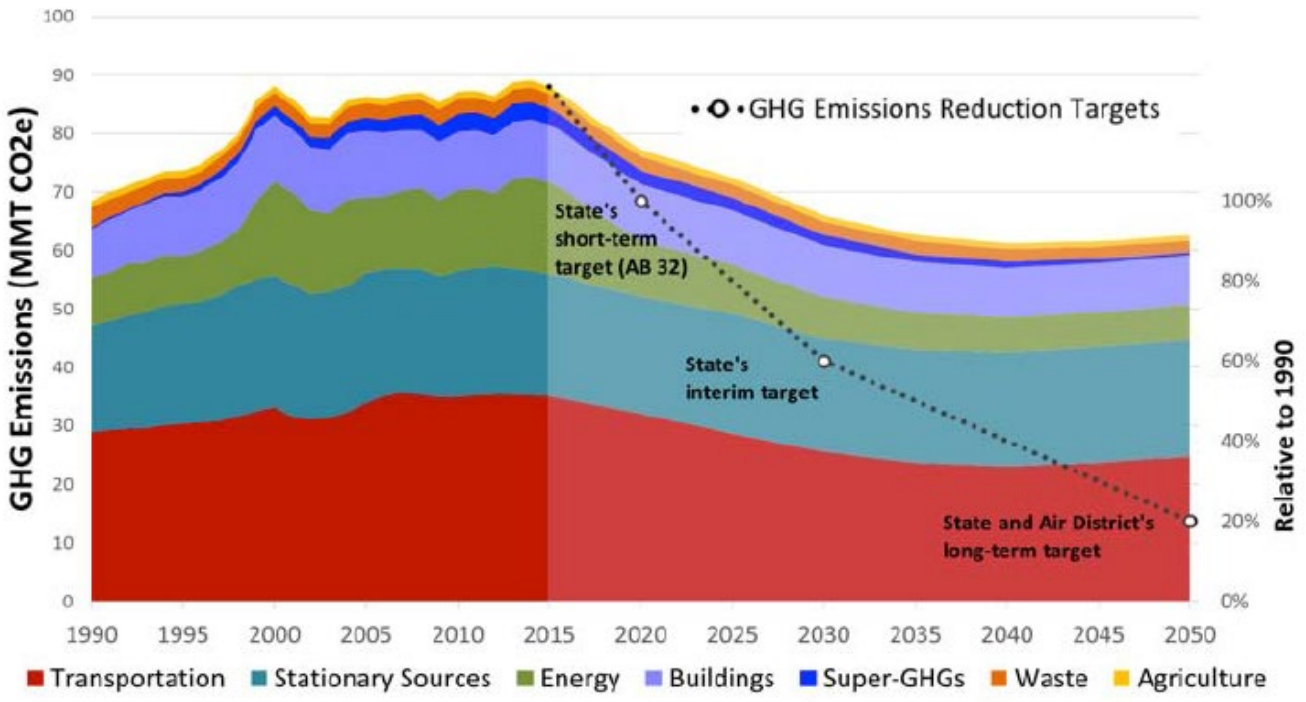

Figure 3.6-2: Bay Area Greenhouse Gas Emissions Trends by Major Source from 1990 to 2050

Source: BAAQMD 2017: Figure 3-9.

Sea Level Rise

Historical Data

Sea levels began rising globally at the end of the last ice age more than 10,000 years ago (USGS 2011). Data on ocean water levels are collected continuously from a worldwide network of more than 290 tidal gages, with hundreds more stations nationally (GLOSS 2021, NOAA 2021). New satellite-based sensors are extending these measurements. The data indicate that the global mean sea level is rising at an increasing rate, and sea level rise is already affecting much of California's coastal region, including the San Francisco Bay and its upper estuary (the Delta). Water level measurements from the San Francisco Presidio gage (CA Station ID: 9414290) indicate that mean sea level rose by an average of 0.08 ± 0.008 inch per year (reported as 2.01 ± 0.21 millimeters per year) from 1897 to 2006, equivalent to a change of about 8 inches in the last century (Heberger et al. 2009).

According to California's Ocean Protection Council Science Advisory Team, future sea level rise projections should not be based on linear extrapolation of historic sea level observations. For estimates beyond one or two decades, linear extrapolation of sea level rise based on historic observations is considered inadequate and would likely underestimate the actual sea level rise because of expected non-linear increases in global temperature and the unpredictability of complex natural systems (California Climate Action Team 2013).

Projected Climate Conditions

Global and regional climate models can be used to project the range of estimated sea level rise rates based on emission scenarios and climate simulations. Climate models continue to be developed and improved, and many models have been extended into Earth System models by including the representation of biogeochemical cycles important to climate change (IPCC 2014:743). Global climate models are based on well-established physical principles and have been demonstrated to reproduce observed features of recent climate and past climate changes. Global models provide information

about climate response to various scenarios but usually at a low resolution that does not provide the level of detail needed to make planning decisions at a local level.

On a regional scale (subcontinental and smaller), the confidence in model capability to simulate surface temperature is less than for the larger scale; however, regional-scale surface temperature simulation has continued to improve since the release of the IPCC Fourth Assessment Report. A region-based model can provide an evaluation of climate processes that are unresolved at the global model scale. Region-based climate models that provide locally relevant climate information are based on model output from global models, and the scale and resolution of the region-based climate models vary widely depending on the original application and intent of the developed model.

Global Climate Projections

To evaluate climate change effects such as sea level rise as part of the IPCC Fifth Assessment Report, IPCC developed future emission scenarios that differ based on varying combinations of economic, technological, demographic, policy, and institutional futures. Four emissions scenarios were developed and used by IPCC to represent a broad range of climate outcomes and develop sea level rise projections. The scenarios, or Representative Concentration Pathways (RCPs), document the projected future emissions, concentrations, and land-cover change projections.

The RCP 2.6 emissions scenario assumes very low GHG concentration levels, a scenario in which GHG emissions (and indirectly emissions of air pollutants) are reduced substantially over time. The RCP 4.5 emissions scenario is a stabilization scenario where the total change in energy in the atmosphere because of GHG emissions is stabilized before 2100 through implementation of a range of technologies and strategies for reducing GHG emissions. The RCP 6.0 emissions scenario is a stabilization scenario where the total change in energy in the atmosphere because of GHG emissions is stabilized after 2100 and assumes the implementation of a range of technologies and strategies for reducing GHG emissions. The RCP 8.5 emissions scenario is characterized by increasing GHG emissions over time leading to high GHG concentration levels (IAMC 2009).

Sea Level Rise Projections

IPCC projects that global mean sea level rise will likely range from 10 to 32 inches (0.26 to 0.82 meter) for the period 2081–2100 relative to 1986–2005. It is very likely that by the end of the 21st century, sea level will rise in more than 95 percent of the ocean area worldwide. About 70 percent of the coastlines worldwide are projected to experience a sea level change within ±20 percent of the global mean. Based on current understanding, only the collapse of marine-based sectors of the Antarctic ice sheet could cause global mean sea level to rise substantially above the likely range during the 21st century (IPCC 2014:13, 1140). Statewide guidance has also been issued by the California Ocean Protection Council (OPC) to help the region prepare for sea level rise. The State of California Sea-Level Rise Guidance Document: 2018 Update (OPC Guidance) offers a series of projections for the state using a set of probability distributions. The OPC Guidance used IPCC projections as a starting point, and includes the emissions scenarios; however, the absence of local projections and a lack of probabilities led to more localized projection analysis. The OPC Guidance specifies the projections of Kopp et. al 2014 as the best available for California. California projections are measured by emissions, time, and risk aversion. For 2050, the sea level rise projections are all still considered to be in a high emissions timeframe and range from 1.1 feet as the low risk averse choice, 1.9 feet as the medium-high risk averse choice, and 2.7 feet as the extreme risk averse choice. The OPC Guidance projection referenced in the proposed Plan comes from the projection that a 1-in-200 chance of exceeding 1.9 feet by the year 2050, characterizing this projection as a medium-high risk averse choice (OPC 2018). For more information on the document, see Regulatory Settings.

Sea Level Rise in San Francisco Bay

Overall sea level rise projections in the Bay Area were developed using two map sets. The San Francisco Bay Conservation and Development Commission's (BCDC's) Adapting to Rising Tides program has developed county-specific analyses of sea level rise projects for the nine Bay Area counties: Alameda, Contra Costa, Marin, Napa, San Mateo, San Francisco, Santa Clara, Solano, and Sonoma (BCDC 2021). Sea level rise projections for coastal areas outside of the bay were based on the National Oceanic and Atmospheric Administration (NOAA) Coastal Service Center's sea level rise inundation maps for the San Francisco Bay Area in 2017. Both maps depict sea level rise relative to a mean higher high-water condition in the bay. Table 3.6-4 present NOAA and BCDC sea level rise inundation information with 24 inches of sea level rise, as based on the OPC Guidance above.

Table 3.6-4: Projected Midcentury (2050) Sea Level Rise Inundation Zone by County

County	Areas Inundated by Sea Level Rise[1] (acres)	Total County Area[2] (Million acres)	Percent Inundated
Alameda	28,300	472,000	6
Contra Costa	6,700	457,100	1
Marin	14,200	321,200	4
Napa	210	30,000	1
San Francisco	15,900	286,600	6
San Mateo	9,300	815,400	1
Santa Clara	12,100	479,400	3
Solano	68,000	526,300	13
Sonoma	27,300	1,008,000	3
Regional Total	182,200	4,396,000	4

Note: Based on 24 inches of sea level rise.

[1] Includes disconnected low-lying areas.

[2] Excludes existing bodies of water within county boundaries.

Sources: Data compiled by MTC and ABAG in 2021 based on data from BCDC 2019, NOAA 2017.

Air Quality and Public Health

The negative effects of climate change on air quality in the Bay Area will affect public health, largely through increasing levels of ozone and fine particulate matter (PM). These pollutants will increase through emissions from wildfires and more frequent and longer-lasting heat waves. The health effects of exposure to both ozone and PM have historically been primarily associated with respiratory ailments, such as asthma and bronchitis. However, many epidemiological studies have also been published linking exposure to these pollutants, especially PM, with serious cardiovascular illness, including arteriosclerosis, strokes, and heart attacks, all of which can cause premature death (Raun and Ensor 2012).

Exposure to higher levels of ozone and fine PM tend to disproportionately affect the more vulnerable people in a population: children, the elderly, and the health impaired. In addition, many people affected by poor air quality are also subject to socioeconomic conditions that make them less able to prepare for and cope with these effects of climate change.

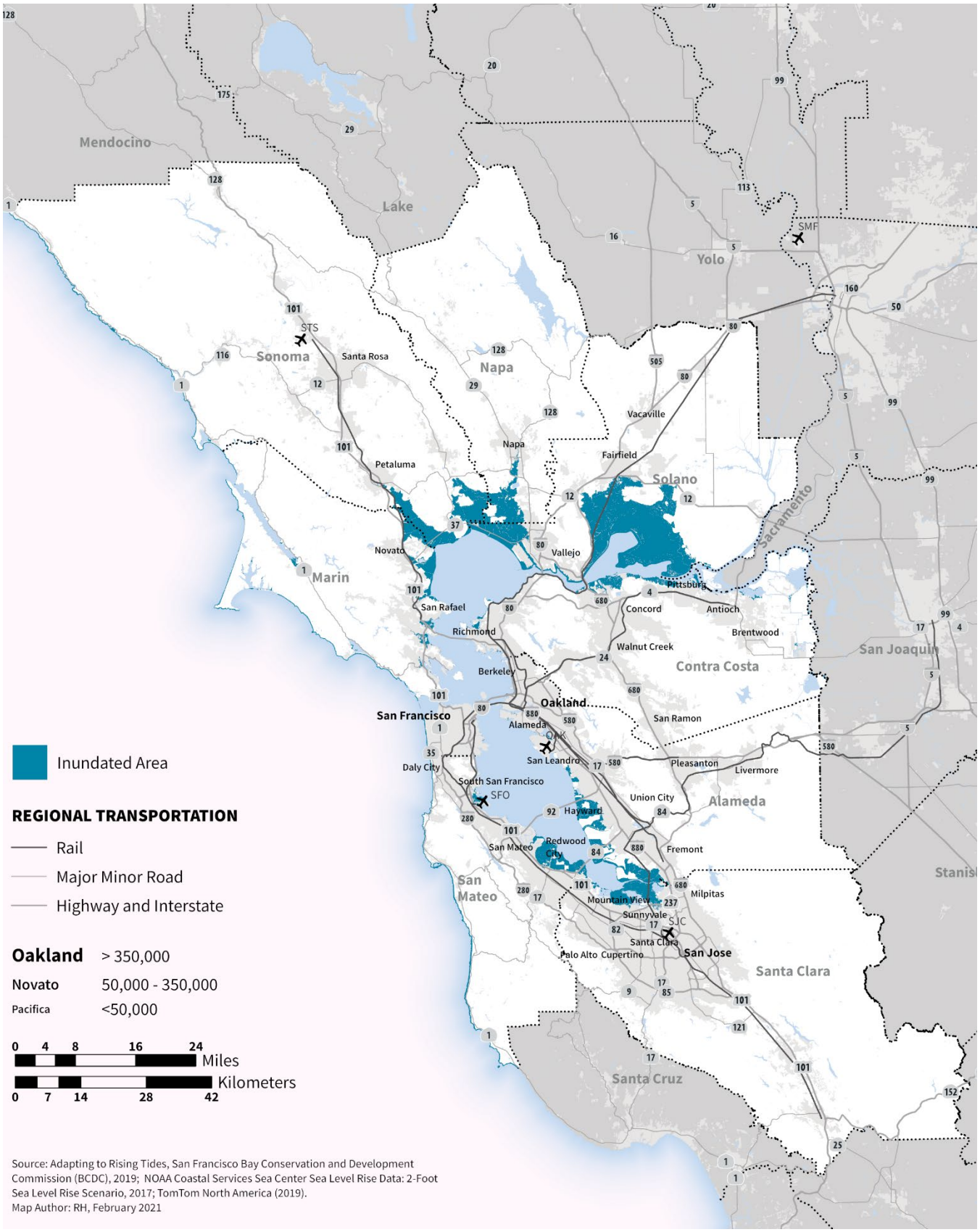

Figure 3.6-3: 24-Inch Sea Level Rise at Mean Higher High Water

Wildfires

Climate change is expected to increase the frequency and severity of wildfires in California by altering precipitation and wind patterns, changing the timing of snowmelt, and inducing longer periods of drought. In addition to the direct threat to human life and property, wildfires emit huge quantities of fine particles, such as black carbon, and can cause dramatic short-term spikes in pollution levels, greatly increasing population exposure to PM and other harmful pollutants.

According to the BAAQMD report *Understanding Particulate Matter: Protecting Public Health in the San Francisco Bay Area*, the rash of wildfires that swept across California in late June 2008 caused ambient concentrations of ozone and PM to soar to unprecedented levels (BAAQMD 2012). A study found not only that the PM concentrations from these fires reached high levels but that the PM they released was much more toxic than the PM more typically present in the California atmosphere (Wegesser et al. 2009). Smoke from wildfires can cause a variety of acute health effects, including irritation of the eyes and the respiratory tract, reduced lung function, bronchitis, exacerbation of asthma, and premature death. In addition to these health effects, wildfires also release immense quantities of CO_2 stored in trees and vegetation into the atmosphere. Therefore, to the extent that climate change increases wildfires, this will increase atmospheric concentrations of GHGs that contribute to climate change, establishing a feedback loop. See Section 3.9, "Hazards and Wildfire," for more information related to wildfire risks and the consequences of development in recognized fire hazard zones.

As stated in Section 3.9, climate change is expected to continue to produce conditions that facilitate a longer fire season, which, when coupled with human-caused changes in the seasonality of ignition sources, will produce more, longer, and bigger fires during more times of the year. As stated in Section 3.9, if greenhouse gas emissions continue to rise, the frequency of extreme wildfires burning over 25,000 acres could increase by 50 percent by 2100, and the average area burned Statewide could increase by 77 percent by the end of the century. In 2017, the Tubbs Fire caused substantial destruction in parts of Napa and Sonoma Counties. Believed to have been started by a private electrical system, the fire is the second most destructive in recent California history. In 2020, several large fires occurred in California as a result of lightning storms coupled with dry fuels. Currently the third largest fire in recent California history, the SNU Lightening Complex fires, burned 396,624 acres in Stanislaus, Santa Clara, Alameda, Contra Costa, Santa Cruz, and San Joaquin Counties in August 2020. At the same time, the LNU Lightening Complex fire burned an additional 363,200 acres in Sonoma, Lake, Napa, and Yolo Counties.

Heat

Rising temperatures attributable to climate change are likely to have negative effects on air quality and public health in the Bay Area. Ground-level ozone—the primary component of smog—is formed through photochemical reactions among precursor pollutants. The most important of these precursor pollutants are oxides of nitrogen and volatile organic compounds (VOCs). Higher temperatures lead to greater evaporative emissions of VOCs from sources such as fuel storage tanks and motor vehicle fuel tanks, as well as greater emissions of VOCs from biogenic sources, such as trees and vegetation. Increased demand for electricity to power air conditioners can also lead to higher emissions of ozone precursors from power plants. In addition to greater emissions of ozone precursors, ozone levels are also expected to increase because ozone formation is highly temperature sensitive, increasing rapidly as temperatures rise above 90 degrees Fahrenheit. As the Bay Area experiences more extreme heat days, with higher temperatures during both the days and evenings, higher ozone levels will make it more difficult for the region to attain and maintain air quality standards.

Increasing amounts of ground-level ozone pose a threat to human health. Breathing ozone can trigger a variety of health problems, such as asthma, bronchitis, impacts on lung function, and chest pains. Recent studies have linked premature death to even short-term exposure to ozone (Bell, Dominici and Samet

2005; Levy, Chemerynski, and Sarnat 2005; Ito, De Leon, and Lippmann 2005). The *Safeguarding California Plan* highlights those who are most vulnerable to health impacts, such as young children, the elderly, or pregnant people, and acknowledges that these people also may experience systemic, preventable differences in health status, called health inequities. These communities include people with lower incomes, some communities of color, people with existing health conditions, people experiencing homelessness, outdoor workers, incarcerated people, immigrants, and tribal communities (CNRA 2018, CALOES 2020). According to a 2011 report by the Union of Concerned Scientists, increases in ozone levels induced by climate change in California could result in nearly 443,000 additional cases of serious respiratory illnesses (Union of Concerned Scientists 2011).

ENERGY

Energy Types and Sources

California relies on a regional power system composed of a diverse mix of natural gas, renewable, hydroelectric, and nuclear generation resources. One-third of energy commodities consumed in California is natural gas. In 2018, approximately 34 percent of the natural gas consumed in the State was used to generate electricity. Large hydroelectric projects generated approximately 11 percent of the electricity used by the State, and renewable energy from solar, wind, small hydroelectric, geothermal, and biomass combustion generated 31 percent (CEC 2020a). Pacific Gas and Electric Company (PG&E) is the primary electricity and natural gas service provider in the Bay Area, North Coast, and Central Valley of the State. In 2018, 39 percent of PG&E's base power plan's electricity was generated by eligible renewable energy resources, as defined by the California Energy Commission (CEC) (i.e., biomass combustion, geothermal, small-scale hydroelectric, solar, and wind); 13 percent by large-scale hydroelectric resources; and 15 percent by natural gas (CEC 2019a). PG&E also offers its customers 50- and 100-percent solar choice options, which are 69 and 100 percent renewable, respectively.

Alternative Fuels

A variety of alternative fuels are used to reduce petroleum-based fuel demand. The use of these fuels is encouraged through various Statewide regulations and plans (e.g., Low Carbon Fuel Standard [LCFS] and the 2017 California Climate Change Scoping Plan [2017 Scoping Plan]). Conventional gasoline and diesel may be replaced (depending on the capability of the vehicle) with many transportation fuels, including:

- biodiesel,
- electricity,
- ethanol (E-10 and E-85),
- hydrogen,
- natural gas (methane in the form of compressed and liquefied natural gas),
- propane,
- renewable diesel (including biomass-to-liquid),
- synthetic fuels, and
- gas-to-liquid and coal-to-liquid fuels.

California has a growing number of alternative fuel vehicles through the joint efforts of the CEC, California Air Resources Board (CARB), local air districts, federal government, transit agencies, utilities, and other public and private entities. As of October 2020, more than 33,000 alterative fueling stations have been installed in California (AFDC 2020).

Commercial and Residential Energy Use

Homes in the United States built between 2000 and 2005 used 14 percent less energy per square foot than homes built in the 1980s and 40 percent less energy per square foot than homes built before 1950. However, larger home sizes offset these efficiency improvements. Primary energy consumption in the residential sector totaled 9.1 quadrillion British thermal units (Btu) in 2015 (the latest year the U.S. Energy Information Administration's [EIA's] *Residential Energy Consumption Survey* was completed) (EIA 2018). Energy consumption increased 24 percent from 1990 to 2009. However, because of projected improvements in building and appliance efficiency, the EIA 2012 Annual Energy Outlook made lower energy assumptions for the future, forecasting a 13-percent increase from 2009 to 2035 (EIA 2020).

Commercial buildings represent just under one-fifth of U.S. energy consumption, with office space, retail space, and educational facilities representing about half of commercial sector energy consumption. In aggregate, commercial buildings consumed 47 percent of building energy consumption and approximately 18 percent of U.S. energy consumption. In comparison, the residential sector consumed approximately 22 percent of U.S. energy consumption (EIA 2020).

Commercial and residential space heating (including on-site co-generation facilities at commercial buildings) comprises a large share of energy end use in the Bay Area. Other major energy users include industrial facilities (including oil refineries that consume energy in the production of gasoline and other fuels) and electricity-generating power plants, which burn fossil fuels (generally natural gas) to convert those fuels to electricity.

Electricity and natural gas consumption for the nine Bay Area counties in 2019 is shown in Table 3.6-5.

Table 3.6-5: Electricity and Natural Gas Consumption in the San Francisco Bay Area in 2019

County	Electricity (GWh)	Natural Gas (million therms)
Alameda	10,684	384
Contra Costa	9,639	1,205
Marin	1,355	70
Napa	1,043	40
San Francisco	5,604	229
San Mateo	4,325	214
Santa Clara	16,664	460
Solano	3,227	236
Sonoma	2,880	111
Regional Total	55,421	2,949

Note: GWh = gigawatt hours.
Sources: Data compiled by MTC/ABAG based on data from CEC 2020b; 2020c

Energy Use for Transportation

On-road vehicles use about 90 percent of the petroleum consumed in California. The California Department of Transportation (Caltrans) estimates that in 2006, over 3.2 billion gallons of gasoline and diesel fuel were consumed in the nine Bay Area counties—an increase of about eight million gallons over 2000 consumption levels (Caltrans 2009).

Vehicle Miles Traveled and Gasoline Consumption

According to Caltrans, total gasoline consumption in California is expected to increase by 57 percent from 2007 to 2030, and VMT is expected to increase by 61 percent in the same period (Caltrans 2009).

As noted in Section 3.6.2, "Regulatory Setting," below, several State mandates and efforts, such as SB 375 and SB 743, seek to reduce VMT. Despite the progress in reducing per capita VMT and per capita fuel consumption, the continued projected increases in total fuel consumption and VMT can be attributed to the overall forecasted increase in population; see Section 3.15, "Transportation," for more information on VMT and other travel-related data for the Bay Area, including the effect of the project.

Total gasoline use in California varies from year to year because of a variety of factors, such as gas prices, periods of economic growth and decline, and fuel economy of vehicles. Between January 2011 and July 2020, approximately 69.2 billion gallons of gasoline were purchased in California. During this period, the volume of gasoline purchased ranged from a minimum of approximately 710 million gallons in April 2020 due to the effects of COVID-19, to a maximum of approximately 1.51 billion gallons in July 2019 (California Department of Tax and Fee Administration 2020).

Long-term energy consumption trends for transportation are generally determined by fuel efficiency trends for motor vehicles, as motor vehicles are the predominant transportation mode for passengers and commercial goods.

Energy Used by Public Transit

Public transit energy consumption includes energy consumed for the operation of public buses, electrified and diesel rail systems, and ferries.

The energy efficiency of each of these modes may vary according to operating conditions and ridership. For example, if a ferry that uses 1.256 million Btu per mile carries 400 passengers on a trip, the energy use is approximately 3,140 Btu per passenger mile, while a bus carrying 30 passengers consumes 37,310 Btu per mile, which equates to about 1,245 Btu per passenger mile.

Energy Used by Private and Commercial Vehicles

Commercial vehicles, generally composed of light, medium, and heavy trucks, are typically fueled by diesel or gasoline and are part of the general fleet mix of vehicles present within the Bay Area transportation system.

3.6.2 Regulatory Setting

FEDERAL

U.S. Supreme Court Ruling

In *Massachusetts et al. v. Environmental Protection Agency et al.,* 549 U.S. 497 (2007), the Supreme Court of the United States ruled that CO_2 is an air pollutant as defined under the federal Clean Air Act (CAA) and that the U.S. Environmental Protection Agency (EPA) has the authority to regulate GHG emissions. In 2010, EPA started to address GHG emissions from stationary sources through its New Source Review permitting program, including operating permits for "major sources" issued under Title V of the CAA.

Regulations for Greenhouse Gas Emissions from Passenger Cars and Trucks and Corporate Average Fuel Economy Standards

In October 2012, EPA and the National Highway Traffic Safety Administration, on behalf of the U.S. Department of Transportation, issued final rules to further reduce GHG emissions and improve corporate average fuel economy (CAFE) standards for light-duty vehicles for model years 2017 and beyond (77 *Federal Register* [FR] 62624). These rules would increase fuel economy to the equivalent

of 54.5 miles per gallon, limiting vehicle emissions to 163 grams of CO_2 per mile for the fleet of cars and light-duty trucks by model year 2025 (77 FR 62630).

However, on April 2, 2018, the EPA administrator announced a final determination that the current standards should be revised. On August 2, 2018, the U.S. Department of Transportation and EPA proposed the Safer Affordable Fuel-Efficient Vehicles Rule (SAFE Rule), which would amend existing CAFE standards for passenger cars and light-duty trucks by freezing the combined fuel-economy standards for vehicles for model years 2021 through 2026, which were previously set to increase in stringency throughout that period (NHTSA 2020).

The CAA grants California the ability to enact and enforce more strict fuel economy standards through the acquisition of an EPA-issued waiver. Each time California adopts a new vehicle emission standard, the State applies to EPA for a preemption waiver for those standards. However, Part One of the SAFE Rule, which became effective on November 26, 2019, revoked California's existing waiver to implement its own vehicle emission standard and established a standard to be adopted and enforced nationwide (84 FR 51310). At the time of preparation of this environmental document, the implications of the SAFE Rule on California's future emissions are uncertain. On February 8, 2021, the incoming administration issued a stay in regard to the legal challenges by California and other states to the revocation of California's waiver (JDSupra 2021a). As of April 22, 2021, there is currently a proposal to withdraw Part One of the SAFE Rule (JDSupra 2021b).

Federal Clean Air Act

The federal Clean Air Act (CAA) of 1970, amended in 1977 and 1990 (42 U.S. Code 7506[c]), was enacted for the purposes of protecting and enhancing the nation's air resources to benefit public health. In 1971, the CAA required EPA to set national ambient air quality standards that establish emission limits for certain pollutants. In 2009, EPA signed two findings related to GHGs. First, EPA found that current and projected concentrations of CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6 would threaten public health and the welfare of current and future generations. Second, EPA found that mobile vehicles contribute to GHG pollution, which threatens public health and welfare (EPA 2009).

Global Change Research Act (1990)

In 1990, Congress passed, and the president signed Public Law 101-606, the Global Change Research Act. The purpose of the legislation was "to require the establishment of a United States Global Change Research Program aimed at understanding and responding to global change, including the cumulative effects of human activities and natural processes on the environment, to promote discussions towards international protocols in global change research, and for other purposes." To that end, the Global Change Research Information Office was established in 1991 to serve as a clearinghouse of information. The act requires a report to Congress every 4 years on the environmental, economic, health, and safety consequences of climate change; however, the first *National Assessment on Climate Change* (NCA1) was not published until 2000. Subsequent assessments were released in 2009 and 2014, with NCA4 released in separate volumes in 2017 and 2018. In February 2004, operational responsibility for the Global Change Research Information Office shifted to the U.S. Climate Change Science Program.

Energy Policy Act of 1992 and 2005

The Energy Policy Act of 1992 (EPAct) was passed to reduce the country's dependence on foreign petroleum and improve air quality. The EPAct includes several parts intended to build an inventory of alternative fuel vehicles (AFVs) in large, centrally fueled fleets in metropolitan areas. The EPAct requires certain federal, state, and local governments and private fleets to purchase a percentage of light-duty AFVs capable of running on alternative fuels each year. In addition, financial incentives are also included in the EPAct. Federal tax deductions are allowed for businesses and individuals to cover the

incremental cost of AFVs. States are also required by the EPAct to consider a variety of incentive programs to help promote AFVs. The Energy Policy Act of 2005 provides renewed and expanded tax credits for electricity generated by qualified energy sources, such as landfill gas; provides bond financing, tax incentives, grants, and loan guarantees for clean renewable energy and rural community electrification; and establishes a federal purchase requirement for renewable energy.

Energy Independence and Security Act of 2007

The Energy Independence and Security Act of 2007 is designed to improve vehicle fuel economy and help reduce U.S. dependence on oil. It represents a major step forward in expanding the production of renewable fuels, reducing dependence on oil, and confronting global climate change. It also increases the supply of alternative fuel sources by setting a mandatory Renewable Fuel Standard that requires fuel producers to use at least 36 billion gallons of biofuel by 2022, which represents a nearly fivefold increase over 2007 levels. It also reduces U.S. demand for oil by setting a national fuel economy standard of 35 miles per gallon by 2020—an increase in fuel economy standards of 40 percent.

STATE REGULATIONS

Assembly Bill 1493 (Chapter 200, Statutes of 2002)

Assembly Bill (AB) 1493 (Pavley) amended Health and Safety Code Sections 42823 and 43018.5 requiring the California Air Resources Board (CARB) to develop and adopt regulations that achieve maximum feasible and cost-effective reduction of GHG emissions from passenger vehicles, light-duty trucks, and other vehicles used for noncommercial personal transportation in California. The regulations prescribed by AB 1493 took effect on January 1, 2006 and apply only to 2009 and later model year motor vehicles.

In September 2004, pursuant to AB 1493, CARB approved regulations to reduce GHG emissions from new motor vehicles. Under the new regulations, one manufacturer fleet average emission standard is established for passenger cars and the lightest trucks, and a separate manufacturer fleet average emission standard is established for heavier trucks. The regulations took effect on January 1, 2006, and set near-term emission standards, phased in from 2009 through 2012, and midterm emission standards, to be phased in from 2013 through 2016 (referred to as the Pavley Phase I rules). For model years 2017–2025, CARB has adopted the National Fuel Efficiency Policy standards as previously described. CARB established the Advanced Clean Cars program in 2012 to work with manufacturers to develop vehicle technologies, such as zero-emission vehicles (ZEVs), that would meet both the adopted GHG and criteria air pollutant standards (CARB 2021a).

Executive Order S-3-05 (Gov. Schwarzenegger, June 2005)

Executive Order (EO) S-3-05 was signed on June 1, 2005. The EO recognizes California's vulnerability to climate change, noting that increasing temperatures could potentially reduce snowpack in the Sierra Nevada, which is a primary source of the State's water supply. Additionally, according to this EO, climate change could influence human health, coastal habitats, microclimates, and agricultural yield. The EO set the GHG reduction targets for California: by 2010, reduce GHG emissions to 2000 levels; by 2020, reduce GHG emissions to 1990 levels; and by 2050, reduce GHG emissions to 80 percent below 1990 levels.

The EO directs the secretary of the California Environmental Protection Agency to coordinate oversight of efforts made to achieve these targets with other State agencies and, like all EOs, it has no binding legal effect on regional agencies, such as MTC and ABAG, which are outside of the California Executive Branch. MTC and ABAG may voluntarily consider the emissions reduction targets and other provisions of the EO, but MTC and ABAG play no formal role in the EO's implementation.

Cleveland National Forest Foundation v. San Diego Association of Governments (November 24, 2014) (Cal.App.4th) further examined the EO and concluded it should be viewed as having the equivalent force of a legislative mandate for specific emissions reductions. The California Supreme Court reversed the judgement in 2017 The Supreme Court found San Diego Association of Governments did not abuse its discretion by declining to explicitly engage in a consistency analysis with the EO's 2050 goals but future analyses must be guided by available scientific and factual data (2017) (3 Cal. 5th 497).

California Global Warming Solutions Act of 2006 (AB 32 and SB 32)

AB 32, the California Global Warming Solutions Act (Health and Safety Code Section 38500 et seq.), was signed in September 2006. The act requires the reduction of Statewide GHG emissions to 1990 levels by the year 2020. This change, which is estimated to be a 25- to 35-percent reduction from current emission levels, will be accomplished through an enforceable Statewide cap on GHG emissions that will be phased in starting in 2012. The act also directs CARB to develop and implement regulations to reduce Statewide GHG emissions from stationary sources and address GHG emissions from vehicles. CARB has stated that the regulatory requirements for stationary sources will be first applied to electricity power generation and utilities, petrochemical refining, cement manufacturing, and industrial/commercial combustion. The second group of target industries will include oil and gas production/distribution, transportation, landfills, and other GHG-intensive industrial processes.

On December 11, 2008, CARB adopted its *Climate Change Scoping Plan* (Scoping Plan), which functions as a roadmap of CARB's plans to achieve the GHG reductions in California required by AB 32 through subsequently enacted regulations. The Scoping Plan contains the main strategies California will implement to reduce CO_2e emissions by 174 MMT, or approximately 30 percent, from the State's projected 2020 emissions level of 596 $MMTCO_2e$ under a "business-as-usual" scenario. The Scoping Plan also breaks down the amount of GHG emissions reductions CARB recommends for each emissions sector of the State's GHG inventory. The Scoping Plan's recommended measures were developed to reduce GHG emissions from key sources and activities while improving public health, promoting a cleaner environment, preserving natural resources, and ensuring that the impacts of the reductions are equitable and do not disproportionately affect low-income and minority communities. These measures also put the State on a path to meet the long-term goal of reducing California's GHG emissions to 80 percent below 1990 levels by 2050.

In May 2014, CARB released and has since adopted the First Update to the Climate Change Scoping Plan to identify the next steps in reaching AB 32 goals and evaluate the progress that has been made between 2000 and 2012 (CARB 2014a:4, 5). According to the update, California is on track to meet the near-term 2020 GHG limit and is well positioned to maintain and continue reductions beyond 2020 (CARB 2014a:ES-2). The update also reports the trends in GHG emissions from various emission sectors.

On September 8, 2016, Governor Brown approved Senate Bill (SB) 32 (Pavley, Chapter 249, Statutes of 2016), which added a 2030 target to the Global Warming Solutions Act of 2006. SB 32 requires that Statewide GHG emissions be reduced to 40 percent below 1990 levels by 2030. This bill was tied to passage of a companion bill, AB 197, described below.

On November 30, 2017, CARB released its 2017 Climate Change Scoping Plan (2017 Scoping Plan), which lays out the framework for achieving the 2030 reductions as established in EO B-30-15, SB 32, and AB 197. The 2017 Scoping Plan identifies the GHG reductions needed by emissions sector to achieve a Statewide emissions level that is 40 percent below 1990 levels before 2030. Many of the programs require Statewide action, promulgated through regulation, and are outside the ability of substate jurisdictions to implement on their own accord. This is important to recognize in terms of GHG emissions efficiency and attaining GHG targets. The ability to attain targets will rely not only on transportation strategies (e.g., the SCS) but also on land use strategies implemented by local cities and

counties (e.g., qualified GHG reduction plans) and controls and actions tied to economy-wide changes promulgated by the State.

Examples listed in the 2017 Scoping Plan include:

- relying on SB 350 targets of providing 50 percent of the State's electricity via renewable resources by 2030 (largely accomplished by actions of utilities),
- attaining an 18-percent reduction in carbon intensity of fuels (Low Carbon Fuel Standard [LCFS]),
- attaining a vehicle fleet mix that includes 4.2 million ZEVs by 2030 and making similar changes in urban buses and light- and heavy-duty trucks,
- implementing regulations that reduce the emission of short-lived GHGs,
- deploying 100,000 ZEV freight vehicles by 2030,
- reducing refinery GHG emissions by 20 percent,
- continuing (past 2020) the Cap-and-Trade Program, and
- reducing vehicle miles traveled (VMT) by implementation of SB 375 and other strategies intended to reduce VMT (CARB 2017:ES4, ES5).

In addition, and as mentioned above, the 2017 Scoping Plan states that local governments (e.g., cities and counties) play an important role in achieving the State's long-term GHG goals because they have broad influence, and sometimes exclusive authority, over activities that enable or thwart uptake of policies that contribute to significant direct and indirect GHG emissions. These actions include community-scale planning and permitting processes, discretionary actions, local codes and ordinances, outreach and education efforts, and municipal operations. CARB states that to achieve the 2030 target, local governments are essential partners and that their action is required to complement and support State-level actions. CARB also acknowledges that without land use decisions from local governments that allow more efficient use and management of land use, longer-term targets cannot be met. CARB recommends that local jurisdictions develop sufficiently detailed and adequately supported GHG reduction plans (including CAPs) that look holistically at GHG emissions and local strategies to support Statewide limits.

Senate Bill 375 (Chapter 728, Statutes of 2008)

SB 375, adopted September 30, 2008, helps meet the statewide goals of reducing emissions from cars and light-duty trucks. SB 375 requires regional planning agencies to include an SCS in their RTP that demonstrates how the region could achieve the GHG emissions reductions set by CARB through integrated land use and transportation planning. Local governments retain control of land use planning authority; however, SB 375 amended CEQA (PRC Section 21000 et seq.) to ease environmental review of specific types of developments that are anticipated to reduce emissions if consistent with the SCS.

The SCS must identify a transportation network that, when integrated with the forecasted development pattern for the Plan area, will reduce GHG emissions from automobiles and light trucks in accordance with reduction targets set by CARB. In 2018, CARB revised established per-capita GHG emission reduction targets for MPOs across the state. The Bay Area's revised targets were set as 10 percent per capita by 2020 and 19 percent per capita by 2035 (CARB 2018), as shown in **Table 3.6-6**.

SB 375 and CARB's emissions reduction targets are the primary mechanism to achieve GHG reduction goals for cars and light trucks under AB 32 targets, which were extended by SB 32 (see discussion above). However, CARB acknowledges that MPO's collective achievement of their revised per-capita GHG emissions reduction targets would not be enough to achieve the reduction need identified in the 2017 Climate Change Scoping Plan. CARB expects the GHG emission reduction gap (estimated at 7 percent) would be accounted for through "new State-initiated VMT Reduction strategies." For further discussion, please see Criterion GHG-3 (CARB 2018).

Table 3.6-6: SB 375 Regional Plan Climate Targets

MPO	Targets	
	2020	2035
MTC/ABAG	-10%	-19%
SACOG	-7%	-19%
SANDAG	-15%	-19%
SCAG	-8%	-19%
Fresno COG	-6%	-13%
Kern COG	-9%	-15%
Kings CAG	-5%	-13%
Madera CTC	-10%	-16%
Merced CAG	-10%	-14%
San Joaquin COG	-12%	-16%
Stanislaus COG	-12%	-16%
Tulare CAG	-13%	-16%
AMBAG	-3%	-6%
Butte CAG	-6%	-7%
San Luis Obispo COG	-3%	-11%
Santa Barbara CAG	-13%	-17%
Shasta RTA	-4%	-4%
Tahoe MPO	-8%	-5%

Note: Targets are expressed as a percent change in per capita passenger vehicle greenhouse gas emissions relative to 2005.
Source: Data compiled by MTC/ABAG bases on data from CARB 2021e

Assembly Bill 197

Governor Brown signed AB 197 (Garcia, Chapter 250, Statutes of 2016) on September 8, 2016. AB 197 creates a legislative committee to oversee CARB and requires CARB to take specific actions when adopting plans and regulations pursuant to SB 32 (described above) related to disadvantaged communities, identification of specific information regarding reduction measures, and information regarding existing GHGs at the local level.

Senate Bill 1368 (Chapter 598, Statutes of 2006)

SB 1368, signed in September 2006, required the California Public Utilities Commission (CPUC) to establish a GHG emissions performance standard for "baseload" generation from investor-owned utilities by February 1, 2007. CEC was required to establish a similar standard for local publicly owned utilities by June 30, 2007. The legislation further required that all electricity provided to California, including imported electricity, be generated from plants that meet or exceed the standards set by CPUC and CEC. In January 2007, CPUC adopted an interim performance standard for new long-term

commitments (1,100 pounds of CO_2 per megawatt-hour), and in May 2007, CEC approved regulations that match the CPUC standard.

Executive Order S-01-07 (Gov. Schwarzenegger, January 2007)

In January 2007, EO S-01-07 established an LCFS. The EO calls for a Statewide goal to be established to reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020 and requires that an LCFS for transportation fuels be established for California. Further, it directs CARB to determine if an LCFS can be adopted as a discrete early action measure pursuant to AB 32, and, if so, to consider the adoption of an LCFS on the list of early action measures required to be identified by June 30, 2007, pursuant to Health and Safety Code Section 38560.5. The LCFS applies to all refiners, blenders, producers, and importers ("Providers") of transportation fuels in California; will be measured on a full fuels cycle basis; and may be met through market-based methods by which Providers exceeding the performance required by an LCFS shall receive credits that may be applied to future obligations or traded to Providers not meeting the LCFS.

In June 2007, CARB approved the LCFS as a Discrete Early Action item under AB 32, and in April 2009, CARB approved the new rules and carbon intensity reference values with the new regulatory requirements taking effect in January 2011. The standards require Providers to report on the mix of fuels that they provide and demonstrate that it meets the LCFS intensity standards annually. This is accomplished by ensuring that the number of "credits" earned by providing fuels with a carbon intensity lower than the established baseline (or obtained from another party) is equal to or greater than the "deficits" earned from selling higher-intensity fuels.

In December 2011, the U.S. District Court for the Eastern District of California issued three rulings against the LCFS, including a requirement for CARB to abstain from enforcing the LCFS. In April 2012, the Ninth Circuit granted CARB's motion for a stay of the injunction while it continued to consider CARB's appeal of the lower court's decision. Consequently, CARB readopted the LCFS regulation in September 2015, and the changes went into effect on January 1, 2016. The program establishes a strong framework to promote the low-carbon fuel adoption necessary to achieve the governor's 2030 and 2050 GHG goals.

Senate Bill 97

SB 97, signed in August 2007, acknowledges that climate change is an environmental issue that requires analysis in CEQA documents. Pursuant to SB 97, in March 2010, the California Resources Agency adopted amendments to the CEQA Guidelines for the feasible mitigation of the GHG emissions or the effects of GHG emissions. The adopted guidelines give lead agencies the discretion to set quantitative or qualitative thresholds for the assessment and mitigation of GHG and climate change impacts.

Executive Order B-16-2012

EO B-16-2012 directs State entities to support and facilitate the rapid commercialization of ZEVs. It outlines benchmarks for 2015, 2020, and 2025 related to establishing infrastructure to support and accommodate ZEVs, helping get ZEVs to market and on the road, and increasing their use for public transportation and public use, among others. It also establishes a goal of an 80-percent reduction of GHG emissions from the transportation sector in California as compared to 1990 levels by 2050. This EO also explicitly states that it "is not intended to, and does not create any rights or benefits, substantive or procedural, enforceable at law or in equity, against the State of California, its agencies, departments, entities, officers, employees, or any other person."

Senate Bill 743

SB 743 of 2013 required that the Governor's Office of Planning and Research (OPR) propose changes to the CEQA Guidelines to address transportation impacts in transit priority areas and other areas of the State. In response, Section 15064.3 was added to the CEQA Guidelines in December 2018, requiring that transportation impact analyses no longer consider congestion as an environmental impact but instead focus on the impacts of VMT. More detail about SB 743 is provided in the Section 3.15, "Transportation."

2016 Mobile Source Strategy

CARB released an updated Mobile Source Strategy on May 16, 2016 to demonstrate how the state could simultaneously meet air quality standards, meet greenhouse gas emission reduction targets, decrease health risk from emissions, and reduce petroleum consumption over the next fifteen years. The estimated benefits of the strategy include an 80 percent reduction in smog-forming emissions, and a 45 percent reduction in greenhouse gas emissions statewide. The Strategy informs goals for a series of related planning efforts, including the implementation of SB 375. At the time of preparing this environmental document, development of the 2020 Mobile Source Strategy was still underway (CARB 2021b)

Senate Bill 1383

SB 1383 of 2016 required that CARB approve and implement a Short-lived Climate Pollutant Strategy (SLCP) to reduce emissions of short-lived climate pollutants. The SLCP specifies a 40 percent reduction in methane and hydrofluorocarbons, and a 50 percent reduction in anthropogenic black carbon below 2013 levels by 2030. The bill also establishes targets for reducing organic waste in landfills and provides direction for managing methane emissions from dairy and livestock operations (CARB 2021c).

2018 Progress Report – California's Sustainable Communities and Climate Protection Act

On November 30, 2018, CARB released the *2018 Progress Report on California's Sustainable Communities and Climate Protection Act* (2018 Progress Report), which evaluates the performance of the SCSs prepared pursuant to the first set of reduction targets established by SB 375. The 2018 Progress Report found that MPOs are not on track to meet the GHG reductions expected under SB 375 for 2020 because of an overall increase in Statewide VMT per capita. While the State will meet its overall 2020 target because of reductions achieved in the energy sector, additional VMT reductions will be needed to meet longer-term State GHG reductions targets for 2030 and 2050.

Executive Order N-19-19

Governor Gavin Newsom issued N-19-19 on September 23, 2020, which outlines goals to combat climate change. The EO sets a series of emission goals, including for all new passenger cars and trucks, drayage trucks, and off-road vehicles and equipment to be zero-emission by 2035, and all medium- and heavy-duty vehicles to be zero emission by 2045 where feasible, giving CARB the authority to issue regulations for implementation. It also requires state agencies to accelerate the deployment of affordable fueling and charging options for ZEVs, and to develop a Zero-Emissions Vehicle Market Deployment Strategy by January 31, 2021. The EO also calls for the end of new hydraulic fracking permits by 2024, with state agencies expected to propose regulations to protect communities and workers by December 31, 2020.

Executive Order N-79-20

In September 2020, Governor Gavin Newsom signed Executive Order N-79-20, which sets a statewide goal that 100 percent of all new passenger car and truck sales in the state will be zero-emissions by 2035. It also establishes a goal that 100 percent of statewide new sales of medium- and heavy-duty vehicles will be zero emissions by 2045, where feasible, and that all new drayage trucks sold in California will be zero emissions by 2035. Additionally, the Executive Order targets 100 percent of new

off-road vehicle sales in the state to be zero emission by 2035. CARB is responsible for implementing the new vehicle sales regulation.

Senate Bill 288

SB 288 of 2020 amended PRC Section 21080.20 to provide additional statutory exemptions under CEQA. These exemptions include pedestrian and bicycle facilities projects; projects to improve customer information and wayfinding for transit riders, bicyclists, and/or pedestrians; transit prioritization projects; projects to designate peak hours or full-time bus-only lanes on highways; projects to institute or increase new bus rapid transit; transit agency projects to construct or maintain infrastructure to charge or refuel zero-emissions transit buses; maintenance, repair, relocation, replacement, or removal of any utility infrastructure associated with exempt projects; and city or county projects to reduce minimum parking requirements. At the time of writing this draft EIR, SB 288 sunsets in January 2030.

Caltrans Strategic Plan 2015-2020

The Strategic Management Plan of 2015-2020 named a strategic objective to reduce the environmental impacts from Caltrans transportation projects with an emphasis on supporting statewide emissions reduction goals. The targets included a 15 percent reduction from 2010 levels of greenhouse gases, and an 85 percent reduction from 2000 levels in diesel particulate matter emissions statewide by 2020. It also held a reduction target of 2010 levels for internal operational greenhouse gases of 15 percent by 2015 and 20 percent by 2020, as per EO B-18-12. The 2020-2024 Strategic Plan, adopted in December 2020, also names a goal to reduce greenhouse gas emissions, and lists a series of supporting strategies, including the development of a Caltrans Climate Action Plan, accelerating sustainable freight sector transformation, and establishing a VMT monitoring and reduction program.

Legislation Associated with Electricity Generation

The State has passed multiple pieces of legislation requiring the increasing use of renewable energy to produce electricity for consumers. California's Renewable Portfolio Standard Program was established in 2002 (SB 1078) with the initial requirement for utilities to generate 20 percent of their electricity from renewables by 2017, 33 percent by 2020 (SB X1-2 of 2011), 52 percent by 2027 (SB 100 of 2018), 60 percent by 2030 (also SB 100 of 2018), and 100 percent by 2045 (also SB 100 of 2018).

California's Energy Efficiency Standards for Residential and Nonresidential Buildings

The energy consumption of new residential and nonresidential buildings in California is regulated by CCR Title 24, Part 6, Building Energy Efficiency Standards (California Energy Code). Known by the shorthand name of "Title 24," this policy was established in 1978 in response to a legislative mandate to reduce California's energy consumption. CEC updates the California Energy Code every 3 years with more stringent design requirements for reduced energy consumption, which results in the generation of fewer GHG emissions. The current California Energy Code will require builders to use more energy-efficient building technologies for compliance with increased restrictions on allowable energy use. CEC estimates that the combination of required energy-efficiency features and mandatory solar panels in the 2019 California Energy Code will result in new residential buildings that use 53 percent less energy than those designed to meet the 2016 California Energy Code. CEC also estimates that the 2019 California Energy Code will result in new commercial buildings that use 30 percent less energy than those designed to meet the 2016 standards, primarily through the transition to high-efficacy lighting (CEC 2018).

California Green Building Standards Code (2016), California Code of Regulations Title 24, Part 11

California's green building code, referred to as "CALGreen," was developed to provide a consistent approach to green building within the State. Taking effect in January 2016, the most recent version of the code lays out the minimum requirements for newly constructed residential and nonresidential buildings to reduce GHG emissions through improved efficiency and process improvements. It also includes voluntary tiers to further encourage building practices that improve public health, safety, and general welfare by promoting the use of building concepts that minimize buildings' impact on the environment and promote a more sustainable design. Local jurisdictions are required to adopt the CALGreen provisions. CALGreen is complementary with the California Energy Code, Title 24, Part 6, which continues to regulate energy efficiency in buildings.

Senate Bill 1 (Chapter 132, Statutes of 2006)

The "Million Solar Roofs" legislation sets a goal of installing 3,000 megawatts of new solar capacity by 2017 to move the State toward a cleaner energy future and help lower the cost of solar systems for consumers. The Million Solar Roofs program is a ratepayer-financed incentive program aimed at transforming the market for rooftop solar systems by driving the cost down over time. It provides up to $3.3 billion in financial incentives that decline over time.

Executive Order S-13-08

Governor Schwarzenegger signed EO S-13-08 on November 14, 2008, to address the potential impacts of global climate change, including sea level rise. The EO emphasizes the need for timely planning to mitigate and adapt to the potential effects of sea level rise on the State's resources. As a result, any State agency planning construction projects in areas vulnerable to future sea level rise must evaluate and reduce the potential risks and increase resiliency, to the extent feasible. Planning must consider a range of sea level rise scenarios for 2050 and 2100.

Cap-and-Trade Program

In 2011, CARB adopted the cap-and-trade regulation and created the Cap-and-Trade Program. The program covers GHG emissions sources that emit more than 25,000 metric tons of CO_2e per year, such as refineries, power plants, industrial facilities, and transportation fuels. The Cap-and-Trade Program includes an enforceable Statewide emissions cap that declines approximately 3 percent annually. CARB distributes allowances, which are tradable permits, equal to the emissions allowed under the cap. Sources that reduce emissions more than their limits can auction carbon allowances to other covered entities through the cap-and-trade market. Sources subject to the cap are required to surrender allowances and offsets equal to their emissions at the end of each compliance period. The Cap-and-Trade Program took effect in early 2012 with the enforceable compliance obligation beginning January 1, 2013. The program was initially slated to sunset in 2020, but the passage of SB 398 in 2017 extended the program through 2030.

Executive Order B-30-15

On April 20, 2015, Governor Brown signed EO B-30-15, which established a California GHG reduction target of 40 percent below 1990 levels by 2030. The governor's EO aligns California's GHG reduction targets with those of leading international governments, such as the 28-nation European Union, which adopted the same target in October 2014. California's new emission reduction target of 40 percent below 1990 levels by 2030 will make it possible to reach the goal of reducing emissions 80 percent under 1990 levels by 2050. This is in line with the scientifically established levels needed in the United States to limit global warming below 2 degrees Celsius—the warming threshold at which there will likely be major climate disruptions such as super droughts and rising sea levels according to scientific consensus. SB 32, discussed previously, legislatively implements the targets in this EO.

Executive Order B-55-18

On September 10, 2018, Governor Jerry Brown signed EO B-55-18 to achieve carbon neutrality by 2045 and maintain net negative GHG emissions thereafter. It builds off of existing Statewide targets for reducing GHG emissions, including EO B-30-15, SB 32, and EO S-3-05, mentioned previously.

Executive Order B-48-18

EO B-48-18, signed into law in January 2018, requires all State entities to work with the private sector to have at least 5 million ZEVs on the road by 2030, as well as 200 hydrogen fueling stations and 250,000 electric vehicle–charging stations installed by 2025. It specifies that 10,000 of these charging stations must be direct-current fast chargers.

Senate Bill 100

On September 10, 2018, Governor Brown signed SB 100, a state policy that requires that eligible renewable energy and zero-carbon resources supply an increasing percent of all retail sales of electricity by 2045. The standards are set for 33 percent by 2020 (SB X1-2 of 2011), 52 percent by 2027 (California Renewables Portfolio Standard Program [SB 100 of 2018]), 60 percent by 2030 (also SB 100 of 2018), and 100 percent by 2045 (also SB 100 of 2018).

Warren-Alquist Act

The 1974 Warren-Alquist Act established the California Energy Resources Conservation and Development Commission, now known as the California Energy Commission, or CEC. The creation of the act occurred as a response to the State legislature's review of studies projecting an increase in Statewide energy demand, which would potentially encourage the development of power plants in environmentally sensitive areas. The act introduced State policy for siting power plants to reduce potential environmental impacts, and additionally sought to reduce demand for these facilities by directing CEC to develop Statewide energy conservation measures to reduce the wasteful, inefficient, and unnecessary uses of energy. Conservation measures recommended establishing design standards for energy conservation in buildings that ultimately resulted in the creation of the California Energy Code, which has been updated regularly and remains in effect today. The act additionally directed CEC to cooperate with OPR, CNRA, and other interested parties in ensuring that a discussion of wasteful, inefficient, and unnecessary consumption of energy is included in all environmental impact reports required on local projects.

State of California Energy Plan

CEC is responsible for preparing the State Energy Plan, which identifies emerging trends related to energy supply, demand, and conservation; public health and safety; and the maintenance of a healthy economy. The State Energy Plan was updated in 2008, which called for the State to assist in the transformation of the transportation system to improve air quality, reduce congestion, and increase the efficient use of fuel supplies with the least environmental and energy costs. To further this policy, the plan identified several strategies, including assisting public agencies and fleet operators in implementing incentive programs for zero-emission vehicles and addressing their infrastructure needs, as well as encouraging urban design that reduces VMT and accommodates pedestrian and bicycle access (CEC 2008).

The 2008 update has been supplemented by the *2019 California Energy Efficiency Action Plan*, which includes three goals to drive energy efficiency: doubling energy efficiency savings by 2030, removing and reducing barriers to energy efficiency in low-income and disadvantaged communities, and reducing GHG emissions from the buildings sector (CEC 2019b).

Assembly Bill 2076: Reducing Dependence on Petroleum

Pursuant to AB 2076 (Chapter 936, Statutes of 2000), CEC and CARB prepared and adopted in 2003 a joint agency report, *Reducing California's Petroleum Dependence*. Included in this report are recommendations to increase the use of alternative fuels to 20 percent of on-road transportation fuel use by 2020 and 30 percent by 2030, significantly increase the efficiency of motor vehicles, and reduce per-capita VMT (CARB and CEC 2003). Further, in response to the CEC's 2003 and 2005 *Integrated Energy Policy Reports*, the governor directed CEC to take the lead in developing a long-term plan to increase alternative fuel use.

A performance-based goal of AB 2076 was to reduce petroleum demand to 15 percent below 2003 demand.

Integrated Energy Policy Report

SB 1389 (Chapter 568, Statutes of 2002) required CEC to "conduct assessments and forecasts of all aspects of energy industry supply, production, transportation, delivery and distribution, demand, and prices. The Energy Commission shall use these assessments and forecasts to develop energy policies that conserve resources, protect the environment, ensure energy reliability, enhance the State's economy, and protect public health and safety" (PRC Section 25301[a]). This work culminated in the Integrated Energy Policy Report (IEPR).

CEC adopts an IEPR every 2 years and an update every other year. The 2020 IEPR is the most recent IEPR, which was adopted on April 14, 2021. The 2020 IEPR provides a summary of priority energy issues currently facing the State, outlining strategies and recommendations to further the State's goal of ensuring reliable, affordable, and environmentally responsible energy sources. Energy topics covered in the report include statewide transportation trends, including impacts from COVID-19; progress toward vehicle electrification, the role of microgrids contributing to a clean and reliable energy system; and an update on the state's energy demand outlook to reflect the global pandemic. The 2020 IEPR recommends that the public and private entities, as feasible, consider instituting telecommuting options to reduce VMT; engage and understand the local mobility and clean transportation needs of low-income and disadvantaged communities; develop policies to support the expansion of microgrids in underserved communities; and develop new fee structures that will address the impact of departing load charges on new microgrids (CEC 2021).

Senate Bill 350: Clean Energy and Pollution Reduction Act of 2015

The Clean Energy and Pollution Reduction Act of 2015 (SB 350) requires the amount of electricity generated and sold to retail customers per year from eligible renewable energy resources to be increased to 50 percent by December 31, 2030. This act also requires doubling of the energy efficiency savings in electricity and natural gas for retail customers, through energy efficiency and conservation by December 31, 2030.

Assembly Bill 1007: State Alternative Fuels Plan

AB 1007 (Chapter 371, Statutes of 2005) required CEC to prepare a state plan to increase the use of alternative fuels in California. CEC prepared the State Alternative Fuels Plan (SAF Plan) in partnership with CARB and in consultation with other State, federal, and local agencies. The SAF Plan presents strategies and actions California must take to increase the use of alternative nonpetroleum fuels in a manner that minimizes costs to California and maximizes the economic benefits of in-State production. The SAF Plan assessed various alternative fuels and developed fuel portfolios to meet California's goals to reduce petroleum consumption, increase alternative fuels use, reduce GHG emissions, and increase in-State production of biofuels without causing a significant degradation of public health and environmental quality.

Bioenergy Action Plan, Executive Order #S-06-06

Executive Order S-06-06, April 25, 2006, establishes targets for the use and production of biofuels and biopower and directs State agencies to work together to advance biomass programs in California while providing environmental protection and mitigation. The executive order establishes the following target to increase the production and use of bioenergy, including ethanol and biodiesel fuels made from renewable resources: produce a minimum of 20 percent of its biofuels within California by 2010, 40 percent by 2020, and 75 percent by 2050. Executive Order S-06-06 also calls for the State to meet a target for use of biomass electricity. The 2011 Bioenergy Action Plan identifies those barriers and recommends actions to address them so that the State can meet its clean energy, waste reduction, and climate protection goals. The 2012 Bioenergy Action Plan updates the 2011 Plan and provides a more detailed action plan to achieve the following goals (CEC 2012):

- increase environmentally and economically sustainable energy production from organic waste;
- encourage development of diverse bioenergy technologies that increase local electricity generation, combined heat and power facilities, renewable natural gas, and renewable liquid fuels for transportation and fuel cell applications;
- create jobs and stimulate economic development, especially in rural regions of the State; and
- reduce fire danger, improve air and water quality, and reduce waste.

As of 2018, 2.35 percent of the total electricity system power in California was derived from biomass (CEC 2020a).

State of California Sea-Level Rise Guidance Document

EO S-13-08 directs the California Natural Resources Agency, in coordination with other State agencies and the National Academy of Sciences, to assess sea level rise for the Pacific Coast and create official sea level rise estimates for State agencies in California, Oregon, and Washington. The assessment and official estimates are provided within the State of California Sea-Level Rise Guidance document (OPC 2018). The State of California Sea-Level Rise Guidance: 2018 Update is also referred to above in Environmental Settings.

The State of California Sea-Level Rise Guidance 2018 update contains eight recommendations for incorporating sea level rise into planning:

- prioritize social equity, environmental justice, and the needs of vulnerable communities;
- prioritize protection of coastal habitats and public access;
- consider the unique characteristics, constraints, and values of existing water-dependent infrastructure, ports, and public trust uses;
- consider episodic increases in sea level rise caused by storms and other extreme events;
- coordinate and collaborate with local, State, and federal agencies when selecting sea level rise projections, and where feasible, use consistent sea level rise projections across multiagency planning and regulatory decisions;
- consider local conditions to inform decision making;
- include adaptive capacity in design and planning; and

- assessment of risk and adaptation planning should be conducted at the community and regional levels.

The guidance document is expected to be updated regularly, to keep pace with scientific advances associated with sea level rise.

California Climate Adaptation Strategy

In response to EO S-13-08, the California Natural Resources Agency released the California Climate Adaptation Strategy (CAS) in 2009. The strategy proposes a comprehensive set of recommendations designed to inform and guide State agencies in their decision-making processes as they begin to develop policies to protect the State, its residents, and its resources from a range of climate change impacts. The CAS presents recommendations for seven sectors, including Ocean and Coastal Resources and Transportation and Energy Infrastructure.

Within the Transportation and Energy Infrastructure sector, the CAS specifically directs the California Department of Transportation (Caltrans) to incorporate climate change vulnerability assessment planning tools, policies, and strategies into existing transportation and investment decisions. The strategy also instructs Caltrans to develop guidelines to establish buffer areas and setbacks to avoid risks to structures within projected "high" future sea level rise or flooding inundation zones.

Caltrans Guidance on Incorporating Sea Level Rise

Pursuant to EO S-13-08 and the California Sea-Level Rise Interim Guidance document, in May 2011 Caltrans released guidance on incorporating sea level rise into planning and decision making with respect to transportation projects. Caltrans's guidance recommends first determining if sea level should be incorporated into project planning, based on the project location and level of risk. A screening process with 10 criteria guides the assessment of whether to incorporate sea level rise: design life, redundancy/alternative route(s), anticipated travel delays, evacuations/emergencies, traveler safety, expenditure of public funds, scope of project, effect on non-State highways, and environmental constraints. If the screening determines that sea level rise should be incorporated into project planning, the next step is to estimate the degree of potential impact and assess alternatives for preventing, mitigating, and/or absorbing the impact. Caltrans uses the Statewide sea level rise estimates presented in the California Sea Level Rise Interim Guidance document for different years (2030–2100) to determine target sea level rise values, and it directs projects with a life that extends to 2030 or earlier not to assume impacts from sea level rise. Having identified target sea level rise values for a project, Caltrans then lays out steps for implementation, including conducting more technical studies of inundation and subsidence and determining any adverse effects on facility functions and operations (e.g., from erosion, exposure to salt water), necessary adaptation measures, and the costs of mitigation. Caltrans plans to release an updated guidance document late in 2021 (Caltrans 2020).

California Department of Public Health Guidance on Integrating Public Health into Climate Action Planning

In February of 2012, the California Department of Public Health released a guidance document, *Climate Action for Health: Integrating Public Health into Climate Action Planning*. This document introduces key health connections to climate change mitigation strategies, and suggestions for where these fit into a local CAP or general plan. The guidance document also provides several examples of strategies taken from actual CAPs that integrate public health objectives, with policy efforts to improve community health and reduce GHG emissions. The information provided is advisory and educational, and participation is voluntary. The document includes specific policy recommendations for transportation and land use planning, including incorporation of green space and tree canopy to mitigate urban heat islands, and healthy siting of housing, schools, and health care facilities to avoid major air quality impacts.

California Coastal Act

The California Coastal Act of 1976 directs CCC to protect and enhance the State's coastal resources.

CCC has planning, regulatory, and permitting authority over all development within the coastal zone, whose landward boundary varies with location. For the Bay Area, the Coastal Act covers the area along the Pacific Ocean, but the area along the margins of San Francisco Bay is covered by the Bay Conservation and Development Commission, under different legislation. This is addressed later in this section. The act governs coastal hazards for new development, mandating that it minimize risks to life and property in areas of high flood. New development must be located such that it will not be subject to erosion or stability hazard over the course of its design life, and construction of protective devices (e.g., seawalls, revetment) that substantially alter natural landforms along bluffs and cliffs are not permitted (Section 30253).

CCC's mandate extends to climate change, including sea level rise; however, the agency is currently assessing how best to address sea level rise and other challenges resulting from climate change. CCC partners with local governments to form Local Coastal Programs (LCPs), transferring the power to regulate development within the coastal zone to cities and counties. Within the Bay Area, San Mateo, San Francisco, Marin, and Sonoma Counties and the Cities of Daly City, Pacifica, and Half Moon Bay all have certified LCPs. Any changes in CCC's policies and/or regulations with respect to sea level rise may ultimately require revisions to LCPs.

REGIONAL AND LOCAL REGULATIONS

City and County General Plans

Many of the counties and cities in the Bay Area have general plan elements and policies that specifically address energy use and conservation. Those energy conservation measures contain goals, objectives, and policies aimed at reducing energy consumption. These include policies on energy retrofits to existing residential and commercial land uses, zoning and building ordinances for energy efficiency of new construction, and ways to reduce VMT through land use and transportation priorities.

Local Climate Action Plans

Consistent with CARB recommendations, several Bay Area jurisdictions have completed community emissions inventories (103), and 79 jurisdictions have finalized and adopted community CAPs, as shown in **Table 3.6-7**. There are also jurisdictions that have drafted or are in the process of drafting CAPS that are not included in **Table 3.6-7**.

Table 3.6-7: Bay Area Cities with Completed GHG Emissions Inventories or Climate Action Plans

Jurisdiction	Completed Community Emissions Inventory	Finalized and Adopted Community Climate Action Plan
Alameda County	X	X
Alameda	X	X
Albany	X	X
Berkeley	X	X
Dublin	X	X
Emeryville	X	X
Fremont	X	X
Hayward	X	X
Livermore	X	X
Newark	X	X

Jurisdiction	Completed Community Emissions Inventory	Finalized and Adopted Community Climate Action Plan
Oakland	X	X
Piedmont	X	X
Pleasanton	X	X
San Leandro	X	X
Union City	X	X
Contra Costa County	X	X
Antioch	X	X
Brentwood	—	—
Clayton	—	—
Concord	X	X
Danville	X	X
El Cerrito	X	X
Hercules	X	—
Lafayette	X	—
Martinez	X	X
Moraga	X	X
Oakley	X	—
Orinda	X	—
Pinole	X	—
Pittsburg	X	—
Pleasant Hill	—	—
Richmond	X	X
San Pablo	X	X
San Ramon	X	X
Walnut Creek	X	X
Marin County	X	X
Belvedere	X	X
Corte Madera	X	X
Fairfax	X	X
Larkspur	X	X
Mill Valley	X	X
Novato	X	X
Ross	X	X
San Anselmo	X	X
San Rafael	X	X
Sausalito	X	X
Tiburon	X	X
Napa County	X	X
American Canyon	X	X
Calistoga	X	X
Napa	X	—
St. Helena	X	X

Jurisdiction	Completed Community Emissions Inventory	Finalized and Adopted Community Climate Action Plan
Yountville	X	X
San Francisco	X	X
San Mateo County	X	X
Atherton	X	X
Belmont	X	X
Brisbane	X	X
Burlingame	X	X
Colma	X	X
Daly City	X	X
East Palo Alto	X	X
Foster City	X	X
Half Moon Bay	—	—
Hillsborough	X	X
Menlo Park	X	X
Millbrae	X	—
Pacifica	X	X
Portola Valley	X	—
Redwood City	X	X
San Bruno	X	X
San Carlos	X	X
San Mateo	X	X
South San Francisco	X	X
Woodside	X	X
Santa Clara County	X	X
Campbell	—	—
Cupertino	X	X
Gilroy	X	—
Los Altos	X	X
Los Altos Hills	X	X
Los Gatos	X	X
Milpitas	X	X
Monte Sereno	—	—
Morgan Hill	X	—
Mountain View	X	X
Palo Alto	X	X
San Jose	X	X
Santa Clara	X	X
Saratoga	X	—
Sunnyvale	X	X
Solano County	X	X
Benicia	X	X
Dixon	X	—

Jurisdiction	Completed Community Emissions Inventory	Finalized and Adopted Community Climate Action Plan
Fairfield	X	—
Rio Vista	X	—
Suisun City	X	—
Vacaville	X	X
Vallejo	X	X
Sonoma County	X	X
Cloverdale	X	—
Cotati	X	—
Healdsburg	X	—
Petaluma	X	—
Rohnert Park	X	—
Sebastopol	X	—
Santa Rosa	X	X
Sonoma (city)	X	—
Windsor	X	—
Regional Total	103	79

Source: CARB 2021d

The region's CAPs seek to help local jurisdictions achieve state emissions goals. They identify recommendations for meeting emissions goals, often in terms of different land uses or categories, including transportation, land use, energy, water, waste, and green infrastructure, and require monitoring of emissions over time. While not required above, a majority of jurisdictions in the region participate in the creation of both emissions inventories and CAPs.

Community Choice Aggregation Programs

Several Community Choice Aggregation (CCA) programs operate in the Bay Area. A CCA allows local governments to partner with local utilities to procure power on behalf of its residents, businesses, and municipal accounts. CCAs use the transmission and distribution services of a utility while supporting a municipality's choice to obtain energy from typically greener sources. CCAs in the Plan area include East Bay Community Energy, Peninsula Clean Energy, MCE, CleanPowerSF, San Jose Clean Energy, Silicon Valley Clean Energy, and Sonoma Clean Power, all of which have partnered with PG&E.

San Francisco Bay Plan

BCDC is charged with the protection, enhancement, and responsible use of the San Francisco Bay. The agency's jurisdiction includes the bay itself, all land within 100 feet of the bay shoreline, salt ponds, managed wetlands, and certain waterways named in BCDC's law. BCDC guides uses of the bay and its shoreline through policies set forth in the McAteer-Petris Act; the Suisun Marsh Preservation Act; the San Francisco Bay Plan, originally adopted in 1968; and the Suisun Marsh Protection Plan, originally adopted in 1977. The policies included in the Bay Plan address the uses of both the Bay and shoreline, water quality, and the approach to bay fill. Additionally, the Bay Plan has a number of proposals, including the development of ports, land preservation, development of parks and recreation, maintaining wildlife, and managing shipping channels. In 2019, BCDC amended its Bay Plan to allow for more substantial fill when addressing sea level rise with multi-benefit adaptation projects, as well as added an Environmental Justice and Social Equity Amendment establishing new equity-focused requirements for project sponsors (BCDC 2020).

County Sea Level Rise Programs

San Francisco Sea Level Rise Action Plan

In March 2016, the City and County of San Francisco released its *Sea Level Rise Action Plan* to identify actions that San Francisco can take now and in the near future to meet the challenge of sea level rise.

This plan addresses the immediate and long-term threats of sea level rise to the San Francisco shoreline through development of a comprehensive understanding of the threat of sea level rise and creation of a decisive plan of action. In general, the San Francisco Sea Level Rise Action Plan recommends one or a combination of three options to address sea level rise: accommodate (raise or waterproof assets in place), protect (create natural or engineered barriers, such as wetlands or levees), or retreat (relocate sensitive assets to low-risk areas and/or transition high-risk areas to lower-risk uses) (City of San Francisco 2016).

Resilient San Mateo Flood and Sea Level Rise Resiliency District

In 2018, the County of San Mateo and its 20 cities decided to modify the existing Flood Control District, operating since 1959, to expand its scope and restructure its governance. The modified agency, known as the Flood and Sea Level Rise Resiliency District, addresses sea level rise, flooding, coastal erosion, and regional stormwater infrastructure across the county, with an emphasis on multijurisdictional solutions. It coordinates with the county's Flood Resilience Program, created in 2016, which helps address cross-jurisdictional flood risks (San Mateo 2018a). The San Mateo County Sea Level Rise Vulnerability Assessment, which the agency completed in 2018, found that a midlevel 2100 sea level rise scenario could inundate property assessed at $34 billion. On the coastal side, $932 million in assessed property value could be at risk of erosion north of Half Moon Bay (San Mateo 2018b).

Marin Ocean Coast Sea Level Rise Adaptation Report

The Marin Ocean Coast Sea Level Rise Adaptation Report was released in February 2018. This plan for Marin County's ocean coast builds off of a 2015 vulnerability assessment, which measured the vulnerability of parcels and homes, transportation networks, utilities, working lands, natural resources, recreational activities, emergency services, and historic and archaeological resources. The report plans on 3 feet of sea level rise inundation by 2100, and presents actions for the coast to accommodate, protect, or retreat from sea level rise inundation and storms. The report highlights plans for each of the coastal communities, and suggests potential implementation for adaptation strategies for the area. Adaptation strategies are prioritized by timeline and suggest potential partners for development (County of Marin 2018).

Solano County Sea Level Rise Strategic Program

In June 2011, Solano County released its Sea Level Rise Strategic Program (SLRSP) to address climate change and associated sea level rise at the local level. As directed by the county's general plan, the SLRSP investigates the potential effects of sea level rise on Solano County, including the effects on specific properties and resources, and presents protection and adaptation strategies. The SLRSP considers two inundation scenarios: 16 inches by midcentury and 55 inches by the end of the century.

Major roads and highways, along with railways, in the county are considered to be highly sensitive and vulnerable to the effects of sea level rise, with low adaptive capacity. Residential, industrial, and commercial developments are also all highly sensitive and vulnerable to sea level rise, although the adaptive capacity of these uses is low to medium, given the ability for residents and businesses with resources to pursue alternative locations. For all new transportation infrastructure and development, the SLRSP recommends designing projects to tolerate periodic flooding and providing for new development that can be adapted or relocated. The SLRSP notes the difficulty in determining adaptive strategies for transportation infrastructure, as they will be developed based on future vulnerability and

risk analyses specific to each asset. However, it specifically recommends collaborating with MTC and Caltrans on adaptation planning for affected roadways (County of Solano 2011).

3.6.3 Impact Analysis

SIGNIFICANCE CRITERIA

The issue of global climate change is inherently a cumulative issue because the GHG emissions of individual projects cannot be shown to have any material effect on global climate. Thus, the proposed Plan's impact on climate change is addressed only as a cumulative impact.

The following significance criteria are based on Section 15064.4 of the CEQA Guidelines and relevant portions of Appendix G of the CEQA Guidelines, which recommend that a lead agency consider a project's consistency with relevant, adopted plans, and discuss any inconsistencies with applicable regional plans, including plans to reduce GHG emissions, and Appendix F of the CEQA Guidelines, which requires consideration of potentially significant energy implications of a project.

With respect to GHG emissions, the CEQA Guidelines Section 15064.4(a) 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 resulting from a project. The CEQA Guidelines note that an agency has the discretion to either quantify a project's GHG emissions or rely on a "qualitative analysis or performance-based standards" (Section 15064.4[a]). A lead agency may use a "model or methodology" to estimate GHG emissions and has the discretion to select the model or methodology it considers "most appropriate to enable decision makers to intelligently take into account the project's incremental contribution to climate change" (Section 15064.4[c]). The CEQA Guidelines provide that the lead agency should consider the following when determining the significance of impacts from GHG emissions on the environment (Section 15064.4[b]):

- The extent a project may increase or reduce GHG emissions as compared to the existing environmental setting.
- Whether the project emissions exceed a threshold of significance that the lead agency determines applies to the project.
- 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.

Based on Appendix F and Appendix G of the CEQA Guidelines, guidance provided by BAAQMD, and professional judgment, implementation of the proposed Plan would have a potentially significant adverse impact if it would:

- Result in a net increase in greenhouse gas emissions, either directly or indirectly, compared to 2015 conditions, that may have a significant impact on the environment (Criterion GHG-1);
- Conflict with the Bay Area region's achievement of the GHG emissions reduction target of 19 percent below 2005 emissions by 2035 established by CARB pursuant to SB 375 (Criterion GHG-2);
- Conflict with an applicable state plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases (Criterion GHG-3);
- Conflict with an applicable local plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases (Criterion GHG-4); or

- Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation (Criterion EN-1);
- Conflict with or obstruct a state or local plan for renewable energy or energy efficiency (Criterion EN-2).

METHOD OF ANALYSIS

Greenhouse Gas Emissions

In general, the baseline for this analysis reflects 2015 conditions, as it is the most recent year for which comprehensive data on emissions, energy, demographics, and travel volume are available for the Bay Area region. However, a 2005 baseline is used for the analysis under GHG-2 to satisfy statutory requirements of Senate Bill 375 for benchmarking the year used for comparison to the proposed Plan's requisite greenhouse gas reduction targets. A 1990 baseline is used for GHG-3 for an assessment of the proposed Plan's consistency with SB 32, which calls for a statewide reduction of GHG emissions to 40 percent from 1990 levels by 2030.

Global Warming Potential Factors

To stay consistent with BAAQMD's 2015 GHG inventory for the Bay Area, 100-year timeframe GWP factors from the IPCC Fifth Assessment Report (FAR) were applied to calculate CO_2e. BAAQMD specifically chose FAR for their inventory to keep up with the latest science on climate, which differs from the Fourth Assessment Report assumptions utilized by CARB. Under FAR, CH_4, and N_2O are considered to have GWP factors of 34 and 298, respectively (IPCC 2014, BAAQMD 2017). Only CO_2, CH_4, and N_2O emissions were considered for analysis, reflecting BAAMQD's standard, as other GHGs were considered to be negligible.

Construction Emissions

GHG emissions from operation of construction equipment can vary depending on the level of activity, the specific operations taking place, the equipment being operated, and other factors. A qualitative analysis of potential GHG emissions from construction activity associated with projected land use development and proposed transportation projects was conducted. At the program level of analysis, it is not possible to accurately quantify the amount of emissions expected from implementation of the proposed Plan because of variability in the extent of construction based on site conditions throughout the Bay Area, and the fact that project details needed to conduct such an analysis are not and cannot be known at this level of analysis.

Operational Emissions

Land use emissions and motor vehicle emissions are modeled differently, and thus, are explained separately. Land use emissions are modeled using the California Emissions Estimator Model (CalEEMod). Motor vehicle emissions are modeled separately due to inconsistencies in CalEEMod's default trip assumptions with MTC's travel models. For further explanation, please see the sections below, with further details available in Appendix D.

Land Use Emissions

Emissions from the operation of forecasted development under the proposed Plan were based on the growth forecast of the Plan. The land use emissions associated with the Plan were calculated using default model assumptions in the California Emissions Estimator Model (CalEEMod) Version 2016.3.2 as well as county- and region-specific emission factors (CAPCOA 2017). The energy intensity rates (e.g., therms per 1,000 square feet) for new land uses built between 2015 and 2050 were assumed to meet 2019 Title 24 standards, which became effective in 2020 (CEC 2021). While this approach may undercount emissions from new land uses built between 2015 and 2020, overall it will conservatively

capture energy efficiency of new land uses built between 2015 and 2050 because the majority of the Plan period is expected to be subject to increasingly stringent efficiency standards.

To compare operational GHG emissions from land use under existing conditions to those forecasted under the Plan buildout, the analysis assumes that the net change in emissions between existing conditions and buildout would be equivalent to emissions from the operation of:

- New land uses built between 2015 and 2050 using 2050 emission factors, minus
- Existing land uses that would be removed between 2015 and 2050 using 2015 emission factors.

Existing land uses that are removed are expected to be replaced by denser residential and commercial land use development. For further detail on land use emissions modeling, please see Appendix D.

The proposed Plan includes two environmental strategies that when implemented would result in lower emissions and energy use. Strategy EN02, "Provide Means-Based Financial Support to Retrofit Existing Residential Buildings" would result in building ordinances and building retrofits to meet higher energy standards, among other things. Similarly, Strategy EN03, "Fund Energy Upgrades to Enable Carbon Neutrality in All Existing Commercial and Public Buildings" would support the electrification and resilient power system upgrades leading to lower building emissions. The strategies only apply to existing structures, which cannot be readily incorporated into the modeling of new growth in the region. As a result, the emissions and/or energy use reductions of these two strategies, EN02 and EN03, were not quantified for the impact discussions below.

This analysis excludes emissions from high GWP gases, agriculture, and large industrial stationary sources (e.g., petroleum refineries). The proposed Plan does not include policies or provisions that would affect high GWP gases, large industrial stationary sources, nor regulate agricultural land uses.

Motor Vehicle Emissions

Motor vehicle, or mobile source, emissions were calculated using MTC's travel demand forecasting model, Travel Model 1.5, and mobile source emission factors developed by the California Air Resources Board (CARB). Vehicle activity projections are correlated to changes in demographic, housing, and socioeconomic factors. As shown in Table 2-11, between 2015 and 2050, the Bay Area is projected to add about 2.8 million people (a 37 percent increase) and 1.4 million jobs (a 40 percent increase). Based on expected future growth, the total vehicles miles traveled would increase by 18 percent, which means that VMT is projected to grow at a much slower rate than both population and jobs in the region. This can be attributed to the anticipated job growth in the region, consistent with recent trends. MTC also projects that much of the region's housing will grow along transit corridors and near job centers, further reducing VMT. For more information on the land use development pattern see Chapter 2, "Project Description."

Travel Model 1.5, released in 2020, produces forecasts of travel behavior and vehicle activity, and updates Travel Model One with the inclusion of ride-hailing, taxis, and autonomous vehicles. The Travel Model has been extensively reviewed by federal and State agencies and refined in connection with the application to air quality analyses of various kinds. Key model outputs for use in air quality analyses include total daily vehicle trips, VMT, and distribution of VMT by speed. This information was then used to determine total emissions from transportation activity in the Bay Area using motor vehicle emission factors from CARB's Emission Factor (EMFAC) model.

A detailed description of EMFAC 2021 is included in Section 3.4, "Air Quality," and a detailed description of the MTC travel demand forecasting model is included in Section 3.15, "Transportation."

Travel Model 1.5 is not sensitive to the full range of strategies in the proposed Plan. Marketing and education campaigns, as well as non-capacity-increasing transportation investments like bikeshare programs (i.e., Strategy EN09, "Expand Travel Demand Management Strategies"), are examples of strategies with the potential to change behavior in ways that result in reduced vehicle emissions. Travel Model 1.5 and EMFAC do not estimate reductions in emissions in response to these types of changes in traveler behavior. As such, an "off-model" approach was used to quantify the VMT and GHG reduction benefits of these important programs. Off-model analyses estimate GHG emission reductions from strategies based on evidence from empirical data and research and are standard elements of an SCS. CARB provides guidance on the off-model analyses in the Final Sustainable Communities Strategy Program and Evaluation Guidelines Appendix D (November 2019) and CARB reviews "the development, quantification, and effectiveness and potential adjustments of the MPO's off-model strategies" as part of their evaluation of MTC's SCS technical methodology (CARB 2019).

In evaluating Criterions GHG-1 and GHG-3, MTC used EMFAC 2021 to calculate the GHG emissions from motor vehicle sources. EMFAC 2014 is used only for the analysis of Criterion GHG-2, as described below. CARB officially released EMFAC 2021 (v1.0.0) to the public in January 2021. EMFAC 2021 is the latest emission inventory model that CARB uses to assess emissions from on-road motor vehicles in California and was used to model emissions for GHG-1 and GHG-3. It does not account for some of the recent and developing legislation on mobile source emissions, such as N-79-20. For Criterion GHG-1, the analysis incorporates operational land use and mobile source emissions. Unlike Criterion GHG-2, mobile source emissions are modeled solely using EMFAC 2021, which improves upon prior versions of EMFAC with updated emissions factor data, and the incorporation of various GHG reduction policies, including projections of zero-emission vehicle (ZEV) populations.

Impact GHG-2 addresses Criterion GHG-2 using a conservative approach where emissions exclude reductions in mobile source emissions because of the implementation of the Advanced Clean Cars (ACC) program/Pavley rule and LCFS, as required per SB 375 protocol.

Unlike EMFAC 2021, mobile source emissions from EMFAC 2014 are output only as CO_2 values, which is the largest contributor of GHG emissions for motor vehicle sources. Because the emissions model is based on travel demand forecast model outputs, it accounts for the projected land use development as well as transportation projects outlined in the proposed Plan. The emissions model also accounts for the effects of congestion (changes in average vehicle speeds) on CO_2 emissions. MTC then prepared an "off-model" calculation to account for CO_2 reduction estimates in strategy EN09. The EN09 strategy includes a car share program, the development of a regional electric vehicle charger network, and other strategies aimed at reducing GHG emissions. Detailed information on how the strategy reductions were calculated and details on the assumed implementation year for each policy are included in Plan Bay Area 2050's Forecasting and Modeling Report found at: planbayarea.org/reports.

For Criterion GHG-2, the analysis focuses on consistency with CARB's reduction targets pursuant to SB 375 pertaining to CO_2 emissions related to the operation of passenger vehicles and light duty trucks. Analysis for Criterion GHG-2 relies on EMFAC 2014 run in SB 375 mode, in accordance with CARB guidance.

Consistency with Greenhouse Gas Reduction Policies and Plans

The assessment for Criterion GHG-3 evaluates the proposed Plan's likelihood to impede implementation of state policies and plans, including statewide goals set by SB 32 and EO S-3-05 and the *2017 Scoping Plan*, by comparing emissions projected by the Plan with the state's long-term goals. SB 32 and EO S-3-05 call for a statewide reduction of GHG emissions to 40 percent below 1990 levels by 2030 and 80 percent below 1990 by 2050, respectively. The 2050 goals in the EO are also supported by a scientific consensus regarding GHG reduction needed to avoid dangerous climate change. Pursuant to these statewide targets, the 2017 Scoping Plan limits local plans from setting GHG targets

greater than 6 $MTCO_2e$ per capita by 2030 and 2 $MTCO_2e$ per capita by 2050, which were developed in accordance with the 2017 Scoping Plan guidelines by dividing the state's targeted mass emissions in 2030 and 2050 by the anticipated population growth.

The analysis in this Section focuses on transportation and non-agricultural land-related emissions generated by the proposed Plan, which accounts for electricity consumption, on-site building energy use (e.g., natural gas, propane), and waste management sectors. The emissions analysis excludes emissions from high-GWP gases, agriculture, and large industrial stationary sources, such as those from petroleum refineries. Based on these constraints, a custom weighted GHG reduction target was calculated using:

- the 2017 Scoping Plan's 2030 mass emissions targets for transportation and the relevant land use sectors (Residential and Commercial, Electric Power, Recycling and Waste) (CARB 2017: Table 3),
- the state's 2015 emissions from transportation and the relevant land use sectors (Residential and Commercial, Electric Power, Recycling and Waste) (CARB 2018),
- the Bay Area's 2015 emissions from transportation, modeled by MTC, and the relevant land use sectors from BAAQMD's 2017 Clean Air Plan (Electricity, Buildings, and Waste management) (BAAQMD 2017: Table 3-2).

Consequently, to be consistent with the statewide GHG reduction targets, land use and transportation emissions in the Bay Area under the proposed Plan should show a 41 percent reduction from 2015 levels by 2030 and an 83 percent reduction from 2015 levels by 2050 to be consistent with statewide goals. The resulting custom targets are slightly higher than the state's overall target primarily due to the greater burden the State has put on the energy and transportation sectors to reduce emissions compared to the sectors that were excluded from this analysis (e.g., agriculture, high GWP). Detailed quantification of this weighted target is shown in Appendix E.

Assessment for Criterion GHG-4 evaluates the plan in the context of local climate action plans and General Plans within the jurisdiction of MTC/ABAG. This analysis, in contrast to other Impacts within the chapter, is assessed qualitatively. For further information on the region's local plans, please see **Table 3.6 7** in Section 3.6.2. "Regulatory Setting," above.

Energy

The total levels of energy consumption by the proposed Plan residential and commercial sectors, measured in gigawatt-hours of electricity, BTU of natural gas, gallons of gasoline, and gallons of diesel fuel, were estimated for the baseline year (2015) and the Plan horizon year (2050). Lesser-used forms of energy were excluded from the analysis, including fuel and heating oils, which are typically used in more rural settings than the Plan jurisdiction, and propane, which is difficult to model due to its various forms. The year 2015 was used for the baseline due to the availability of data for this single calendar year from State and local sources. This includes data on energy consumption from CEC; emission inventories from CARB (which can be used as a surrogate for energy consumption); default values for the consumption of electricity and natural gas from CalEEMod); and land use and demographic estimates from ABAG. In addition, the lack of regional land use data for more recent years makes forecasting energy consumption difficult as estimates that are not based on accurate small-scale geographic land uses, like parcels, are less accurate. Strategy EN02, "Provide Means-Based Financial Support to Retrofit Existing Residential Buildings," and Strategy EN03, "Fund Energy Upgrades to Enable Carbon-Neutrality In All Existing Commercial and Public Buildings," also anticipate energy reduction through energy-focused building retrofits, but their benefits are not able to be modeled with CalEEMod, as the strategies focus on only existing buildings, and specific land use types. As a result, their impacts are measured qualitatively.

Table 3.6-8 summarizes the levels of energy consumption for each year by source estimated for the Plan area.

Table 3.6-8: Net Change in Energy Consumption[1]

Land Use/Energy Type	Net Change in Energy Consumption From 2015 to 2050[4]	Units
Single-Family Residential		
Electricity	1,345,000	MWh/year
Natural Gas[2]	3,539,000	MMBTU/year
Apartments High Rise		
Electricity	3,605,000	MWh/year
Natural Gas[2]	5,163,000	MMBTU/year
Apartments Mid Rise		
Electricity	754,000	MWh/year
Natural Gas[2]	1,238,000	MMBTU/year
Apartments Low Rise		
Electricity	216,200	MWh/year
Natural Gas[2]	474,300	MMBTU/year
Office		
Electricity	1,966,000	MWh/year
Natural Gas[2]	1,909,000	MMBtu/year
Retail		
Electricity	48,600	MWh/year
Natural Gas[2]	-105,400	MMBtu/year
Industrial		
Electricity	-187,600	MWh/year
Natural Gas[2]	-725,700	MMBtu/year
All Land Uses in Plan Area		
Electricity	7,809,000	MWh/year
Natural Gas[2]	12,432,000	MMBTU/year

Note: MWh = megawatt hour; MMBtu = one million British thermal units; MG = million gallons.

[1] Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100, above 1,000,000 to the nearest 1,000). Figures may not sum due to independent rounding.

[2] Does not include natural gas from hearths (e.g., fireplaces).

[3] Emissions from hearths are based on natural gas hearths only.

[4] Energy consumption forecasts do not account for expected reductions from the implementation of strategies EN02 or EN03.

Source: Data compiled by Ascent Environmental 2021

The total levels of gasoline and diesel fuel consumption in the region were estimated based on the analysis of VMT in the region estimates of mobile-source GHGs in the region provided by MTC, fleet-average CO_2 emission rates for the region, and the carbon content of both fuel types. Fleet-average CO_2 emission rates for the region for both 2015 and 2050 were developed using CARB's emission factor model, EMFAC2021. Table 3.6-9: summarizes the levels of gasoline and diesel consumption for each year by vehicle category in the Plan area.

Table 3.6-9: Daily Levels of Gasoline and Diesel Consumption[1]

Vehicle Category	2015			2050			Net Change		
	Gasoline (thousands gal/day)[2]	Diesel (thousands gal/day)[2]	Natural Gas (thousands gal/day)[2]	Gasoline (thousands gal/day)[2]	Diesel (thousands gal/day[2]	Natural Gas (thousands gal/day)[2]	Gasoline (thousands gal/day)[2]	Diesel (thousands gal/day)[2]	Natural Gas (thousands gal/day)[2]
Passenger Vehicles	6,200	40	0	4,800	10	0	-1,300	-30	0
Trucks	400	1,100	20	190	950	40	-210	-150	20
Buses	40	80	2	10	30	1	-30	-40	-1
Other Vehicles	40	4	0	30	4	0	-10	1	0
All Vehicle Types	6,700	1,200	20	4,300	1,100	40	-2,400	-160	20

Notes: Gal/yea = gallons per year.

[1] Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100, above 1,000,000 to the nearest 1,000). Figures may not sum due to independent rounding.

[2] Gasoline and diesel consumption forecasts do not account for expected reductions from the implementation of strategies EN08 or EN09.

Source: Data compiled by MTC/ABAG in 2021.

The proposed Plan's forecasted land use growth, sea level rise adaptation projects, and transportation projects would be expected to result in the consumption of energy in the form of gasoline and diesel fuel during construction activities. Because detailed construction information was not available, the energy analysis addresses these potential impacts at a program level.

IMPACTS AND MITIGATION MEASURES

Impact GHG-1: Result in a net increase in greenhouse gas emissions, either directly or indirectly, compared to 2015 conditions that may have a significant impact on the environment (PS)

Land Use, Sea Level Rise Adaptation, and Transportation System Impacts

Construction Emissions

The level of GHG emissions from construction activity would depend on the type and scale of projects being constructed under the Plan. Generally, GHGs could be generated from a variety of activities and emission sources (e.g., exhaust emissions from off-road construction equipment, material delivery trips, and construction worker-commute trips). These emission types and associated levels fluctuate greatly depending on the particular type, number, and duration of usage for the varying equipment. The site preparation phase typically generates the most substantial emission levels because of the on-site equipment and ground-disturbing activities associated with grading, compacting, and excavation. Site preparation equipment and activities typically include backhoes, bulldozers, loaders, and excavation equipment (e.g., graders and scrapers).

Construction activity tends to be temporary in nature and would be expected to occur throughout the proposed Plan's implementation period through 2050 because of the various land use development, sea level rise adaptation infrastructure, and transportation projects that could be constructed. Where existing regulatory requirements or permitting requirements exist that are legally or otherwise binding on responsible agencies and project sponsors, it is reasonable to assume that they would be implemented, thereby reducing impacts. However, because construction emissions may not be reduced to net zero in all cases, this impact would be potentially significant (PS).

Operational Emissions

As explained in Chapter 2, "Project Description," the regional growth forecast for the Bay Area projects that by 2050 the region will support an additional 2.8 million residents and 1.4 million jobs, resulting in 1.4 million new households. The projected development would increase indirect and direct GHG emissions from building electricity and natural gas use, water use, wastewater treatment, waste generation, and landscaping equipment. However, the proposed Plan was designed to accommodate the people, households, and jobs identified in the regional growth forecast, and includes land use strategies that would allow for denser or more compact development in designated growth geographies. These strategies would allow greater densities for new commercial development in select PDAs and select transit-rich areas and provide incentives to employers to shift jobs to housing-rich areas well served by transit. The proposed growth pattern would thereby limit an increase in emissions. In addition, improved building energy efficiency standards and increased renewable energy sources for electricity would reduce future GHG emissions from new land use. An overview of GHG emissions related to land use projects is shown in **Table 3.6-10**, by land use type and source, and **Table 3.6-11**, by county. Strategy EN02 and Strategy EN03 propose additional building retrofits on existing residential and commercial properties that would further increase energy efficiency, though as described above, their effects are not quantified in the analysis.

Operational GHG emissions from projected development were determined based on existing and forecasted single family and multifamily occupied housing units and existing and forecasted jobs by sector. As shown in **Table 3.6-10**, GHG emissions from the net change in land uses would result in a net increase of 0.589 $MMTCO_2e$ in the Plan area.

The proposed Plan's sea level rise adaptation infrastructure is not anticipated to generate or emit greenhouse gas emissions during operation.

Table 3.6-10: Net Change in Annual Land Use GHG Emissions by GHG Source

County	County/GHG Source	Net Change in Activity	Activity Units	Net Change in $MTCO_2e$/year between 2015-2050
Single-Family Residential	Electricity	1,335,000	MWh/year	-8,800
	Natural Gas[1]	3,539,000	MMBTU/year	190,000
Multi-Family Residential (Low/Mid-Rise)	Electricity	970,000	MWh/year	-5,300
	Natural Gas[1]	1,713,000	MMBTU/year	92,000
Multi-Family Residential (High Rise)	Electricity	3,656,000	MWh/year	0[2]
	Natural Gas[1]	6,109,000	MMBTU/year	328,000
Residential Subtotal				596,000
Office	Electricity	1,966,000	MWh/year	-34,300
	Natural Gas[1]	1,909,000	MMBTU/year	102,500
Retail	Electricity	48,600	MWh/year	-98,200
	Natural Gas[1]	105,400	MMBTU/year	-5,700
Industrial	Electricity	9,700	MWh/year	-43,500
	Natural Gas[1]	536,200	MMBTU/year	-39,000
Non-Residential Subtotal				-118,139
All Land Uses in Plan Area	Electricity	7,809,000	MWh/year	-233,600
	Natural Gas[1]	12,432,000	MMBTU/year	667,500
	Water and Wastewater[3]	159,600	MG/year	102,900

County	County/GHG Source	Net Change in Activity	Activity Units	Net Change in $MTCO_2e$/year between 2015-2050
	Waste	831,500	Tons	35,300
	Hearths[4]	n/a[5]	n/a[5]	14,100
	Landscaping	n/a[5]	n/a[5]	3,300
Regional Total				589,400

Notes: Activity and emissions estimates modeled using CalEEMod v. 2016.3.2. NA = not available, MWh = megawatt hour, MMBtu = one million British thermal units, MG = million gallons, $MTCO_2e$ = metric tons of carbon dioxide equivalent. Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100, above 1,000,000 to the nearest 1,000). Figures may not sum due to independent rounding. Net changes do not account for expected reductions from the implementation of strategies EN02 or EN03.

[1] Does not include natural gas from hearths.

[2] Value does not show decrease in emissions due to the assumption of increased high density development in the life of the Plan.

[3] Includes indoor and outdoor water use.

[4] Emissions from hearths are based on natural gas hearths only.

[5] CalEEMod Version 2016.3.2 does not output hearths and landscaping activity.

Source: Data compiled by MTC/ABAG in 2021

Table 3.6-11: Net Change in Annual Land Use GHG Emissions by County

County	County/GHG Source	Net Change in Activity	Activity Units	Net Change in $MTCO_2e$/year between 2015-2050
Alameda	Electricity	1,510,000	MWh/year	-42,300
	Natural Gas	2,795,000	MMBTU/year	150,000
	Other	-	-	219,400
	Alameda Total			327,200
Contra Costa	Electricity	950,100	MWh/year	-25,700
	Natural Gas	1,998,000	MMBTU/year	107,300
	Other	-	-	154,200
	Contra Costa Total			235,800
Marin	Electricity	24,100	MWh/year	-17,900
	Natural Gas	328,200	MMBTU/year	17.600
	Other	-	-	41,800
	Marin Total			41,400
Napa	Electricity	49,000	MWh/year	-2,900
	Natural Gas	127,000	MMBTU/year	6,800
	Other	-	-	11,200
	Napa Total			15,200
San Francisco	Electricity	41,900	MWh/year	-102,600
	Natural Gas	132,000	MMBTU/year	7,100
	Other	-	-	124,200
	San Francisco Total			28,600
San Mateo	Electricity	875,400	MWh/year	-10,600
	Natural Gas	1,385,000	MMBTU/year	74,400
	Other	-	-	59,400
	San Mateo Total			123,200

County	County/GHG Source	Net Change in Activity	Activity Units	Net Change in $MTCO_2e$/year between 2015-2050
Santa Clara	Electricity	3,604,000	MWh/year	-31,400
	Natural Gas	4,298,000	MMBTU/year	230,700
	Other	-	-	-362,900
	Santa Clara Total			-163,500
Solano	Electricity	477,600	MWh/year	-130
	Natural Gas	912,600	MMBTU/year	49,000
	Other	-	-	-62,100
	Solano Total			-13,300
Sonoma	Electricity	277,200	MWh/year	-140
	Natural Gas	457,300	MMBTU/year	24,600
	Other	-	-	29,600
	Sonoma Total			-5,200
Regional Total				589,400

Notes: Natural gas does not include natural gas from hearths; Other includes emissions from hearths, water use, wastewater treatment, solid waste generation, and landscaping equipment; Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100, above 1,000,000 to the nearest 1,000). Figures may not sum due to independent rounding. Net changes do not account for expected reductions from the implementation of strategies EN02 or EN03.
Source: Data compiled by MTC/ABAG 2021

The proposed Plan would result in a number of strategies aimed at reducing GHG emissions from mobile sources through reducing commute trips, expanding clean vehicle initiatives, and expanding transportation demand programs. However, with the operation of new transportation projects, as well as the growing number of residents and jobs in the region, total on-road transportation GHG emissions would be expected to increase over time if no standards were put in place. This analysis incorporates implementation of Pavley regulations over the life of the proposed Plan. As shown in **Table 3.6-12**, when these standards are considered, overall on-road vehicle GHG emissions decline by 21 percent for passenger vehicles. Pavley standards only affect passenger vehicles, but emissions of other vehicles decline by 64 percent for buses, by 21 percent for trucks, and by 25 percent for "Other Vehicles" due to recently adopted regulations such as Advanced Clean Trucks (ACT) and Heavy Duty Omnibus regulations (CARB 2021f).

Table 3.6-12: Existing and Forecasted Daily Transportation GHG Emissions by Vehicle Source ($MTCO_2e$)

Emission Source	2015 Baseline	2050 Proposed Plan	Change from Baseline	Percent Change from Baseline
Passenger Vehicles	53,300	41,900	-11,400	-21%
Trucks	14,900	11,700	-3,200	-21%
Buses	1,100	400	-700	-64%
Other Vehicles	400	300	-100	-25%
Total	69,700	54,300	-15,400	-22%

Notes: Values include clean car standards. Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100, above 1,000,000 to the nearest 1,000). Figures may not sum due to independent rounding. Estimates calculated using EMFAC 2021. MTC applied a ratio of 1:00:1:02 to all EMFAC2021 generated CO_2 estimates for conversion to CO_2e. Emissions were annualized by multiplying by 300 to take account for the fact that there is less traffic on weekends. Emission estimates do not account for expected reductions from the implementation of strategies EN08 or EN09.
Source: Data compiled by MTC 2021

Emissions are reported on a regional basis, with respect to mobile sources. Changes in land use and transportation activity under the proposed Plan would result in a net reduction of 4.0 $MMTCO_2e$, or 9 percent, from 2015 to 2050, as shown in **Table 3.6-13**. Therefore, there would be a less-than-significant (LS) impact.

Table 3.6-13: Annual GHG Emissions from Projected Land Use and Transportation Sources ($MTCO_2e$/year)

Sources	2015 Baseline	2030 Proposed Plan[1]	2050 Proposed Plan	Change from 2050 to Baseline	Percent Change from 2050 to Baseline
Land Use	23,810,000[2]	24,100,000	24,399,000[3]	+589,400	+2%
Transportation	20,910,000[4]	18,600,000	16,320,000[4]	-4,590,000	-22%
Regional Total	44,720,000	42,700,000	40,719,000	-4,001,000	-9%

Notes: Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100, above 1,000,000 to the nearest 1,000). Figures may not sum due to independent rounding. Emission estimates do not account for expected reductions from the implementation of strategies EN02, EN03, EN08, or EN09.

[1] Interpolated between 2015 and 2050.

[2] Based on emissions from electricity consumption, building energy usage (e.g. natural gas, propane), and waste management emissions from BAAQMD's 2015 Bay Area GHG Inventory (BAAQMD 2017: Table 3-2).

[3] Calculated by adding the calculated net change in to 2015 values. Calculations assume residential and nonresidential land uses built between 2015 and 2050 would be built to 2019 Title 24 building energy efficiency standards.

[4] Calculated by MTC using EMFAC2021.

Source: Data compiled by MTC 2021

Conclusion

Implementation of the proposed Plan is expected to result in a net reduction in GHG emissions in 2050 when compared to 2015 conditions. However, because construction emissions may not be reduced to net zero in all cases, this impact would be **potentially significant (PS)**. Mitigation Measure GHG-3 addresses this impact and is described below.

Mitigation Measures

Mitigation Measure GHG-1 Consistent with the recommendations in the 2017 Scoping Plan, the applicable lead agency can and should implement, where necessary and feasible to address site-specific construction climate change impacts, the following measures to avoid or minimize impacts related to construction GHG emissions:

- Project proponents shall require its contractors to restrict the idling of on- and off-road diesel equipment to no more than 5 minutes while the equipment is on-site.
- Project proponents of new facilities shall implement waste, disposal, and recycling strategies (i.e., 10 percent recycled content for Tier 1 and 15 percent recycled content for Tier 2) in accordance with the voluntary measures for non-residential land uses contained in Section A5.405 of the 2016 CALGreen Code or in accordance with any update to these requirements in future iterations of the CALGreen Code in place at the time of project construction.
- Project proponents of new facilities shall achieve or exceed the enhanced Tier 2 target for nonresidential land uses of recycling or reusing 80 percent of the construction waste as described in Section A5.408 of the 2016 CALGreen Code or in accordance with any update to these requirements in future iterations of the CALGreen Code in place at the time of project construction.
- Project proponents shall require all diesel-powered, off-road construction equipment meet EPA's Tier 3 or Tier 4 emissions standards as defined in 40 CFR 1039 and comply with the exhaust emission test procedures and provisions of 40 CFR Parts 1065 and 1068. This measure can also be achieved by using battery-electric off-road equipment as it becomes available.

- Project proponents shall implement a program that incentivizes construction workers to carpool, and/or use public transit or electric vehicles to commute to and from the project site.

Significance after Mitigation

Implementation of Mitigation Measure GHG-1 would mitigate the GHGs emitted during the construction phase of the projected land use pattern and planned transportation projects under the proposed Plan. Projects taking advantage of CEQA Streamlining provisions of SB 375 (PRC Sections 21155.1, 21155.2, and 21159.28) must apply the mitigation measures described above, as feasible, to address site-specific conditions. If these mitigation measures were adopted by the implementing agency, construction related impacts could be reduced, but not necessarily to a less-than-significant level, and this impact would be **significant and unavoidable** for purposes of this program-level review.

Impact GHG-2: Conflict with the Bay Area region's achievement of the GHG emissions reduction target of 19 percent below 2005 emissions by 2035 established by CARB pursuant to SB 375 (LTS)

Land Use, Sea Level Rise Adaptation, and Transportation System Impacts

The proposed Plan includes land use strategies that would allow for denser or more compact development in designated growth geographies. These strategies would allow greater densities for new commercial development in select growth geographies and provide incentives to employers to shift jobs to housing-rich areas well served by transit. As noted in Criterion GHG-1, the proposed growth pattern would thereby limit an increase in emissions.

The proposed Plan's sea level rise adaptation infrastructure is not expected to increase emissions. Instead, the adaptation infrastructure would alleviate risk from inundation of existing and forecasted development and transportation infrastructure and support the proposed Plan's core land use strategy to "focus growth" in existing communities along the existing transportation network.

The proposed Plan would also result in the implementation of transportation projects. However, several strategies in the proposed Plan would reduce emissions from cars and light duty trucks. As shown in **Table 3.6-14**, Strategy EN09, "Expand Transportation Demand Management Initiatives" includes strategies that are expected to reduce vehicle trips and, subsequently, on-road passenger vehicle emissions by nearly 6,300 $MTCO_2$ per day in 2035. As noted in the methodology, Travel Model 1.5 is not sensitive to the full range of strategies in the proposed Plan. As a result, the emissions reduction benefits of Strategy EN09 are calculated "off-model" consistent with guidance from CARB.

Table 3.6-14: Plan Bay Area 2050 Strategy EN09: Transportation Demand Management Initiatives $MTCO_2$ Reductions

Strategy	2035	
	Daily Reductions ($MTCO_2$)	Annual Reductions ($MTCO_2$)
Bike Share	10	4,100
Car Share	1,800	537,500
Targeted Transportation Alternatives	800	238,300
Vanpool Incentives	120	35,600
Regional EV Charger Network	670	201,600
Vehicle Buyback Program	2,900	864,000
Total	6,300	1,881,000

Notes: Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100, above 1,000,000 to the nearest 1,000). Figures may not sum due to independent rounding. Emissions are annualized by multiplying by 300 to take account for the fact that there is less traffic on weekends.

Source: Data compiled by MTC/ABAG 2021

Table 3.6-15 shows the change in daily and per-capita car and light duty truck CO_2 emissions between 2005 and future years. Emissions are expected to decline over time with and without the implementation of Strategy EN09. With Strategy EN09, the proposed Plan is expected to result in nearly a 22 percent decline in per capita CO_2 emissions from 2005 to 2035, exceeding the SB 375 target of 19 percent. This decline is attributable to numerous factors, most importantly the integrated land use and transportation strategies reflected in the proposed Plan that result in a land use development pattern that focuses growth into higher-density locations near transit services. This "focused growth" approach allows more efficient use of the existing transportation infrastructure. The integrated land use development pattern and transportation strategies are described in greater detail in Chapter 2, "Project Description."

Table 3.6-15: Analysis of Passenger Vehicle and Light Duty Truck CO_2 Emissions[1] Pursuant to SB 375

Year	Population	Modeled GHG Emissions ($MTCO_2$/ day)	Strategy EN09 Reductions relative to 2005 ($MTCO_2$/ day)	Emissions per Capita (kg CO_2)	Percent Reduction in Per Capita CO_2 Emissions Relative to 2005		
					Proposed Plan without Strategy EN09	Proposed Plan with Strategy EN09	Reduction Target Pursuant to SB 375 Target
2005	6,979,000	54,800	0	7.9	0	0	n/a
2035	9,167,000	62,600	-6,300	6.8	-13%	-22%	-19%

Notes: Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100, above 1,000,000 to the nearest 1,000). Figures may not sum due to independent rounding.

[1] Estimates calculated using EMFAC 2014, as per SB 375 protocol.

Source: Data compiled by MTC/ABAG 2021

As noted, per the requirements of SB 375, this analysis does not include emissions reductions associated with Pavley, LCFS standards, or any additional measures from the 2017 Scoping Plan, which are expected to further reduce CO_2 emissions and result in a decrease in total CO_2 emissions over time. Because the proposed Plan would reduce per capita passenger vehicle and light duty truck CO_2 emissions by over 19 percent by 2035 as compared to 2005 baseline, per the regional targets set by CARB pursuant to SB 375, there would be a less-than-significant impact (LTS).

Conclusion

Because implementation of the proposed Plan would reduce per capita passenger vehicle and light duty truck CO_2 emissions by over 19 percent by 2035 as compared to 2005 baseline, per the regional targets set by CARB pursuant to SB 375, there would be less-than-significant (LTS) impact. No mitigation measures are required.

Mitigation Measures

None required.

Impact GHG-3: Conflict with an applicable state plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases (PS)

Land Use, Sea Level Rise Adaptation, and Transportation System Impacts

As discussed under Impact GHG-1, implementation of the proposed Plan would result in a net reduction in GHG emissions from land use and transportation sources combined. As shown in Table 3.6-13, the net land use and transportation emissions under the Plan would be reduced by 9 percent from 2015 to 2030 and 9 percent from 2015 to 2050.

In order to determine whether the net land use and transportation emission reductions under the proposed Plan would conflict with implementation of state policies and plans, including statewide goals set by SB 32 and EO S-3-05 and the *2017 Scoping Plan*, the proposed Plan's reductions must be correlated to the statewide reduction of GHG emissions to 40 percent below 1990 levels by 2030 and 80 percent below 1990 by 2050, respectively. Based on the available data and assumptions described above under Method of Analysis, which include recommendations from CARB and BAAQMD for determining plan level significance of GHG emissions in relation to the State's goals, a reduction of 41 percent below 2015 levels by 2030 and 83 percent below 2015 levels would be needed for the proposed Plan to be consistent with the State's 2030 and 2050 target, respectively. See Appendix E for detailed quantification of this weighted target. As shown in **Table 3.6-13,** in 2015, land use and transportation accounted for nearly 48 $MMCO_2e$ in the Bay Area. Consequently, the proposed Plan would need to achieve a net reduction in land use and transportation emissions of 20 $MMTCO_2e$ from 2015 by 2030 and 40 $MMTCO_2e$ from 2015 by 2050 to be consistent with the State's 2030 and 2050 targets. As shown in **Table 3.6-15**, the proposed Plan would achieve an annual reduction of 2.0 $MMTCO_2e$ from 2015 land use and on-road transportation emissions by 2030 and 4.0 MMT CO_2e by 2050, which does not achieve the necessary reductions to be consistent with the State's targets. **Table 3.6-16**: below presents these calculations.

Table 3.6-16: Calculation of GHG Reduction and Targets from Land Use and Transportation relative to 1990 and 2015 levels

Year	Target Percent below 2015 Levels ($MTCO_2e$/year)	Historical and Targeted Bay Area Transportation and Land Use Emissions ($MTCO_2e$/year)	Reductions needed from 2015 ($MTCO_2e$/year)	Reductions from 2015 Proposed Plan ($MTCO_2e$/year)	Additional Reductions Needed ($MTCO_2e$/year)
2015	n/a	44,720,000[1]	n/a	n/a	n/a
2030	-41%[2]	26,385,000	-18,335,000	-2,020,000	-16,315,000
2050	-83%[3]	7,602,000	-37,118,000	-4,001,000	-33,117,000

Notes: Whole numbers have been rounded (between 0 and 10 to the nearest whole number, between 11 and 999 to the nearest 10, between 1,000 and 1,000,000 to the nearest 100, above 1,000,000 to the nearest 1,000). Figures may not sum due to independent rounding. Emission estimates do not account for expected reductions from the implementation of strategies EN02, EN03, EN08, or EN09.

[1] Based on land use emissions from BAAQMD's 2017 Clean Air Plan (electricity consumption, building energy usage (e.g. natural gas, propane), and waste management emissions) and transportation estimates from MTC.

[2] Based on Reflects the SB 32 Target. See Appendix E for calculations of Plan-adjusted target.

[3] Reflects B-30-15 Target. See Appendix E for calculations of Plan-adjusted target.

Source: Data compiled by MTC/ABAG 2021

As discussed under GHG-2, the proposed Plan's 35 integrated strategies across the 4 elements—housing, the economy, transportation, and the environment— will enable the Bay Area to reduce forecasted per-capita GHG emissions from cars and light duty trucks as required under SB 375. However, since the inception of the 2017 Scoping Plan, CARB has acknowledged MPOs' meeting the 2018 revised GHG emissions reduction targets alone will not meet the emissions reductions necessary to meet state climate goals (CARB 2019). These goals are expected to be achieved, in large part, with additional State legislation and regulation. A 2018 CARB Progress Report noted that California has not yet been able to identify sufficient "system and structural changes to how we build and invest in communities that are needed to meet state climate goals." (CARB 2018). Importantly, this is not unique to the Bay Area; all MPOs in California are faced with the same challenge. Thus, without sufficient State legislation and regulation, attainment of state goals is extremely difficult. This would be a potentially significant (PS) impact.

Conclusion

The anticipated land use and transportation emissions under the Plan relative to the region's 2015 emissions may conflict with the State's GHG reduction plans under SB 32 and EO-S-3-05, as shown in Table 3.6-16. While MTC and ABAG have developed a set of land use and transportation strategies that exceed SB 375 goals for reducing emissions from cars and light duty trucks and place the Bay Area on a downward trajectory in net GHG emissions, CARB has identified that meeting SB 375 goals alone will not meet statewide goals under the Scoping Plan. Because the proposed Plan will not meet the target reductions of 41 percent below 2015 levels by 2030 and 83 percent below 2015 levels by 2050, it may conflict with an applicable plan, policy, or regulation adopted to reduce emissions of GHGs. This impact is considered **potentially significant (PS).** Mitigation Measure GHG-3 addresses this impact and is described below.

Mitigation Measures

- Implement Mitigation Measures TRA-2a and TRA-2b

Mitigation Measure GHG-3 Consistent with the recommendations in the 2017 Scoping Plan, implementing agencies and/or project sponsors shall implement the following, where feasible and necessary based on project- and site-specific considerations:

- CAP support programs: MTC and ABAG, in partnership with the BAAQMD, shall provide technical assistance to the counties and cities in the Bay Area to adopt qualified GHG reduction plans (e.g., CAPs). The CAPs can be regional or adopted by individual jurisdictions, so long as they meet the standards of a GHG reduction program as described in CEQA Guidelines Section 15183.5. At the regional level, the cumulative emissions reduction of individual CAPs within the region or a regional CAP should demonstrate an additional Bay Area-wide reduction of 33 $MMTCO_2e$ from land uses and on-road transportation compared with projected 2050 emissions levels already expected to be achieved by the Plan. (This is based on the 2015 Bay Area land use and on-road transportation emissions of 37 $MMTCO_2e$, the statewide GHG reduction target of 80 percent below 1990 levels by 2050, and a two percent increase in statewide emissions between 1990 and 2015). However, MTC and ABAG do not have jurisdiction over the adoption of CAPs by individual jurisdictions.

- Energy reduction incentive programs: These reductions can be achieved through a combination of programs supported by BayREN, which focus on energy reduction by homeowners, multifamily property owners, and businesses through energy retrofits of existing buildings. BayREN also supports other programs that help local jurisdictions reduce building energy use through improved design and construction standards, such as updated Title 24 energy standards, and including ZNE in new construction. These programs and other measures supported by MTC and ABAG may be included so long as the additional l 33 $MMTCO_2e$ reduction (by 2050) can be demonstrated. However, MTC and ABAG cannot require engagement in these programs. This target can be adjusted depending on the progress of statewide legislation or regulations in reducing statewide GHG emissions, so long as a trajectory to achieve this target in the Bay Area is maintained.

While many local jurisdictions in the region have released CAPs, the additional implementation of CAPs in the region would continue to help to reduce GHG emissions from the land use projects that would be constructed under the Plan, as well as reducing GHG emissions from existing uses. Energy reduction incentive programs, such as those supported by BayRen, would help with reduce GHG emissions from energy usage in existing and new structures in the region.

Significance after Mitigation

Implementation of CAPs or other supporting programs, including energy reduction incentive programs, would reduce GHG emissions. Projects taking advantage of the CEQA streamlining provisions of SB 375 (PRC Sections 21155.1, 21155.2, and 21159.28) must apply the mitigation measures described above, as applicable, to address site-specific conditions.

However, there is no assurance that this level of mitigation would achieve the regional reductions needed to attain the statewide 2030 and 2050 targets. Additional regulatory action that results in substantial GHG reductions throughout all sectors of the State economy and based on State-adopted regulations would likely be needed to attain such goals, and they are beyond the feasible reach of MTC and ABAG and local jurisdictions. Moreover, MTC and ABAG cannot require local implementing agencies to adopt the above mitigation measure, and it is ultimately the responsibility of a lead agency to determine and adopt mitigation. Even with full implementation of the mitigation measure, forecasted emissions would not be reduced to target levels under SB 32 and EO-S-3-05. Therefore, this impact would be **significant and unavoidable (SU).**

Impact GHG-4: Conflict with an applicable local plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases (LTS)

Land Use, Sea Level Rise Adaptation, and Transportation System Impacts

The proposed Plan's forecasted growth pattern is not expected to conflict with any climate action plans and General Plans of cities and counties located in the proposed Plan area, or with any local regulations adopted with the intent to reduce GHG emissions. The Regulatory Setting, above, describes the plans, policies, and regulations relevant to the proposed Plan that are related to the reduction of GHG emissions.

Local CAPs or GHG reduction plans are adopted by local jurisdictions to comply with the goals set for local governments in CARB's Scoping Plan and are therefore designed to support the same State-mandated goals and targets for GHG reduction outlined above. It is ultimately local jurisdictions that determine whether land use development projects are consistent with local plans and policies. MTC and ABAG do not have jurisdiction over land use development projects approval within the region.

The proposed Plan does not address all the potential reduction measures, goals, and GHG targets that are identified in local CAPs, general plans, and other plans that address climate change; local jurisdictions set targets based on state, regional, or local conditions. Further, not all plans will have the same reduction goals and implementation measures because they account for various local factors and considerations (see **Table 3.6-6** in the Regulatory Setting for a list of local jurisdictions with GHG inventories and adopted CAPs). The proposed Plan identifies land use strategies that lead to a focused growth land use development pattern and transportation strategies that will make the regional system more efficient, resulting in reductions to per capita and overall GHG emissions. However, some variations may exist on the local level. For instance, the proposed Plan's focused growth pattern may not support an individual jurisdiction's efforts to meet its GHG target because the proposed Plan's growth patterns may not constrain growth in that particular jurisdiction. While some variations may exist between the proposed Plan and specific local CAPs, these variations would need to be assessed at the local level. In addition, the proposed Plan is not binding; it does not constrain a local jurisdiction from exercising Its discretion to make different land use decisions. In general, it is expected that local CAPs and the proposed Plan would be complementary efforts towards the reduction of GHG emissions in line with State goals and mandates.

Conclusion

The land use development pattern, sea level rise adaptation infrastructure, and transportation projects that may result from implementation of the proposed Plan is not expected to conflict with local climate action or GHG reduction plans, and the impact is considered to be **less than significant (LTS)**. No mitigation is required.

Mitigation Measures

None required.

Impact EN-1: Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation (LTS)

Land Use Impacts

As explained in Section 2, "Project Description," the proposed Plan integrates 35 strategies to accommodate projected household and employment growth in the nine-county Plan area. As shown in **Table 2-3**, the proposed Plan's 35 integrated strategies would result in 88 percent of forecasted new housing units (2015 to 2050) to be built as multi-family units compared to single-family homes. This distinction is important because the levels of energy consumption associated with both the construction and operation of multi-family units is generally less than for single-family homes. The average multi-family unit has a lower floor-to-area ratio resulting in less ground disturbance during construction and is designed to house more inhabitants per unit of floor area. With fewer exterior walls and more interior walls shared by multiple units, the space heating and cooling of multi-family units is generally more energy efficient than single-family homes.

The proposed Plan serves as a comprehensive set of strategies to accommodate forecasted regional growth. The strategies would result in an increase in the building of multi-family units compared to single-family residential dwelling units, as described above. Therefore, as compared to existing conditions, wherein current land use trends remain consistent with existing general plans, per capita energy consumption associated with the proposed Plan would be lower due to the increased energy efficiency on a per capita basis of multi-family housing. While total energy consumption is projected to increase for both multi-family and single-family housing types, this projected increase is the result of accommodating the region's forecasted 1.4 million new household and 1.4 million new jobs through 2050 as shown in **Table 2-1** in Chapter 2, "Project Description." As summarized in Table 2-4 in Chapter 2, "Project Description," the region is projected to accommodate this level of new households with a regional trend towards multi-family housing. Therefore, although overall energy consumption in the region is forecasted to increase, per capita energy consumption is expected to decrease due to the proposed Plan's strategies which result in a more compact land use development pattern. For further information, of reduced emissions from land use strategies in the proposed Plan, see **Table 3.6-11**.

Additionally, Strategy EN02, "Provide Means-Based Financial Support to Retrofit Existing Residential Buildings" would result in building ordinances and building retrofits to meet higher energy standards, among other things. Similarly, Strategy EN03, "Fund Energy Upgrades to Enable Carbon Neutrality in All Existing Commercial and Public Buildings" would support the electrification and resilient power system upgrades leading to lower building emissions. EN02 and EN03 would result in decreased energy demand region-wide but, as stated previously, were not estimated in the energy demand presented in Table 3.6-8. Therefore, it is foreseeable that implementation of EN02 and EN03 would result in less energy consumption than what has been estimated for this analysis, and would further increase the energy efficiency of the proposed Plan.

In addition, as described in Section 3.6.2, "Regulatory Setting," it is assumed that future construction and operation of residential and non-residential buildings would be more energy efficient than the current 2019 California Energy Code as the standards are periodically updated on an approximate

three-year cycle to accommodate technological improvements in efficiency. To assist the state in meeting the renewable resource targets mandated by SB 100, future versions of the California Building Code are anticipated to become not only more energy efficient, but allow less on-site natural gas usage, also known as decarbonization pursuant to the findings of the 2018 IEPR and CPUC's Rule Making 19-01-011, which entails implementing SB 1477 (summarized in Section 3.6.2, "Regulatory Setting,") and establishing a building decarbonization policy framework.

Implement of the proposed Plan's land use development pattern would also require the consumption of gasoline and diesel fuel associated with worker commute, material movement, and excavation trips and operation of heavy-duty equipment. The total amount of gasoline and diesel fuel that would be required to complete construction of the land use development projects is unknown at this time due the uncertainty surrounding the magnitude, timing, distance of haul route and worker commute trips, type of heavy-duty equipment used, and level of project-level mitigation that could be applied. While construction of the land use types under the proposed Plan would result in gasoline and diesel fuel consumption, this level would be considered necessary to provide adequate housing and commercial, retail, and industrial land use to accommodate the projected increasing in population, housing, and employment that the Plan area would realize by 2050. Thus, this use of energy would not be considered inefficient, unnecessary, or wasteful. For these reasons, this would be a less-than-significant (LTS) impact.

Sea-Level Rise Adaptation Impacts

Energy would be consumed during the construction of sea-level rise adaptation infrastructure. Gasoline would be consumed from worker commute trips, and diesel fuel would be consumed from the movement of haul trucks to and from project sites and use of heavy-duty construction equipment. The exact amount of gasoline and diesel fuel use is unknown at this time to the magnitude, timing, and the type of heavy-duty construction equipment used. This consumption would be inherently short-term and would facilitate the construction of adaptation infrastructure that would improve the resiliency of the Plan area to rising sea levels. Moreover, energy-related infrastructure could be located in areas that are vulnerable to sea-level rise; therefore, the adaptation infrastructure would improve the resiliency of electrical and natural gas infrastructure (see Impact PUF-1 in Section 3.14, "Public Utilities and Facilities").

Sea level rise has been identified as a major secondary climate change impact that will greatly affect the San Francisco Bay Area. Sea level has risen approximately 20 centimeters over the last 100 years, and depending on future GHG emissions scenarios, sea level along the California coast would rise by 0.74 to 1.37 meters by 2100 (OPR et al. 2018). Thus, while energy would be consumed in the form of gasoline and diesel fuel for construction of sea-level rise and resiliency projects, this consumption would be necessary to bolster the resiliency of the Plan area to future inundation by rising rides. Thus, because this energy consumption would not be considered unnecessary, the energy associated with sea-level rise and resiliency projects would be less than significant (LTS).

Transportation System Impacts

The proposed Plan is designed to increase the efficiency of transportation in the region by reducing per capita VMT in passenger vehicles and light-duty trucks. Thus, the proposed Plan inherently increases the energy efficiency of mobility in the region. As shown in **Table 3.6-9**, implementation of the proposed Plan would result in a decrease in gasoline consumption and an increase in diesel consumption per year. The decrease in gasoline consumption is also attributable to increasing fuel efficiency standards on passenger vehicles and light-duty trucks. The projected increase in diesel consumption is attributable to a projected increase in the level of VMT by diesel-powered heavy trucks in the region. Accounting for the fact that the energy-content of diesel is approximately 15 percent greater than gasoline, implementation of the proposed Plan would result in reduced consumption of automotive fuel by 272.8 trillion BTU. Much of this decrease in gasoline and diesel

consumption would be due to the improved energy efficiency of passenger vehicles from more stringent emission and fuel efficiency standards established by CARB. As described in the methodology, recent state legislation that could not be accounted for in modeling is expected to provide additional reductions to these values.

Notably, Table 3.6-9 does not account for implementation of strategies EN08 or EN09, which would result in an additional reduction in the consumption of gasoline and diesel fuel from passenger cars. It is foreseeable, then, that the reductions identified in Table 3.6-9 underrepresent the actual fuel reductions that would be achieved in 2050 through implementation of the Proposed Plan and its associated strategies. Therefore, this is a less-than-significant (LTS) impact.

Conclusion

Construction and operation of the proposed Plan's land use development pattern, sea-level rise adaptation infrastructure, and transportation projects would not result in the wasteful, unnecessary, or inefficient use of energy because the energy associated with these projects would be serving necessary regional needs, would be subject to Plan strategies that result in increased efficiency, and would comply with applicable regulations and standards (e.g., RPS, California Energy Code). Therefore, energy impacts would be **less-than-significant (LTS).** No mitigation is required.

Mitigation Measures

None required.

Impact EN-2: Conflict with or obstruct a state or local plan for renewable energy or energy efficiency (LTS)

Land Use Impacts

Implementation of the proposed Plan's forecasted development pattern would not conflict with or obstruct a state or local plan for increasing renewable energy or energy efficiency. The proposed Plan would result in development or redevelopment to accommodate the regional growth forecast of households and jobs, thereby increasing the demand for electricity and natural gas; however, as discussed in Chapter 2, "Project Description," the proposed Plan's land use strategies are directed at reducing automobile use through construction of compact and mixed-use development in areas that offer transportation choices such as walking, biking, and transit. Implementation of the proposed land uses pattern developed for the proposed Plan would also be subject to the GHG reduction policies of a CAP, where applicable. At the time of writing this Draft EIR, many cities and counties in the region have CAPs, GHG Reduction Plans, or Sustainability Plans that include policies to increase the use of renewable energy throughout the region. The proposed Plan's forecasted land use development pattern would not conflict with the applicability of the policies of a local or regional CAP or any other plan that serves to reduce GHG emissions or energy consumption to future development within the Plan area. The projected land uses would also be subject to the most recent iteration of the California Energy Code, which requires that single-family residential development include solar photovoltaics. Land use development projects would also be required to adhere to future iterations of the California Energy Code which is updated on a triennial basis (once every three years) and is expected to become increasingly more stringent over time to further the State's renewable energy and GHG reduction goals as stated in the 2018 IEPR (discussed above under Impact EN-1), which is a state plan that focused on improving the energy efficiency of the state. Therefore, this would be a less-than-significant (LTS) impact.

Sea Level Rise Adaptation Impacts

Sea level rise adaptation infrastructure would require the use of energy during construction phasing, as discussed in greater detail above under Impact EN-1. State and local plans that target increasing energy sourced from renewables and/or improving energy efficiency target operational energy

consumption. Operation of sea-level rise adaptation infrastructure would not have a large operational energy budget, if any. Thus, the need for renewable energy would not be required. This would be a less-than-significant (LTS) impact.

Transportation System Impacts

The proposed Plan would reduce dependence on petroleum products and increase reliance on renewable energy. For example, the proposed Plan's strategies would result in the automobile mode share to decrease as a share of all trips, and instead shifting to more sustainable active transportation modes. Strategy EN08, "Expand Clean Vehicle Initiatives" would expand investments in clean vehicles and relocate energy derived from petroleum combustion to the electricity grid, which, as discussed in 3.6.1, "Regulatory Setting," would be sourced by a greater portion of renewable energy as a result of SB 100 and the RPS. While VMT would ultimately go up by 2050, statewide regulatory mechanisms, such as the ZEV Action Plan, SB 100, and RPS would minimize the amount of fuel consumed from passenger vehicles as the transportation system is electrified and the energy sector becomes increasingly more renewable. Transportation projects developed for the proposed Plan would not conflict with the implementation of the aforementioned regulations and statewide plans.

City and county policies derived from general plans, CAPs, or any other a plan that seeks to reduce GHG emissions would apply to transportation infrastructure in the Plan area. It is common practice for CAPs to develop local measures to reduce gasoline and diesel fuel consumption which directly results in decreased emissions of GHGs. Implementation of the proposed transportation system improvements would not interfere or conflict with any local or regional plan that serves to reduce gasoline and diesel consumption. For example, CAP policies that seek to improve the region's EV infrastructure would continue to apply with implementation of the proposed Plan. Therefore, this would be a less-than-significant (LTS) impact.

Conclusion

Implementation of the proposed Plan itself would result in the densification of land use, increased energy efficiency from residential uses, and a net reduction in the consumption of automotive fuel and would increase reliance on renewable energy sources. Therefore, this impact would be **less than significant (LTS)**. No mitigation is required.

Mitigation Measures

None required.

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