

## 3.7 - Greenhouse Gas Emissions and Energy

### 3.7.1 - Introduction

This section describes the existing greenhouse gas (GHG) emissions setting as well as the relevant regulatory framework. This section also evaluates the possible impacts related to GHG emissions that could result from implementation of the proposed project. Information in this section is based on project-specific GHG emissions modeling outputs included in Appendix C. The following comments were received during the Environmental Impact Report (EIR) scoping period related to GHG emissions:

- Recommends including a vehicle miles traveled (VMT) analysis pursuant to City guidelines, or the Office of Planning and Research Draft Guidelines.
- Recommends including multimodal planning (Class II or Class IV bike lanes on Sand Creek Road); transit/para-transit services.
- Suggests including Transportation Demand Management to reduce VMT and GHG emissions.
- Suggests incorporating building electrification requirements into the proposed project to reduce project impacts related to GHG emissions.
- Recommends the conversion of gas to electric buildings to reaching zero emissions.
- Recommends that the City should apply a net-zero emissions GHG threshold to determine GHG impacts.
- Recommends the analysis of Gas Connections included as part of the proposed project.

### 3.7.2 - Environmental Setting

#### Greenhouse Effect, Global Warming, and Climate Change

Most of the energy that affects the Earth's climate comes from the sun. Some solar radiation is absorbed by the Earth's surface, and a smaller portion of this radiation is reflected by the atmosphere back toward space. As the Earth absorbs high-frequency solar radiation, its surface gains heat and then re-radiates lower frequency infrared radiation back into the atmosphere.<sup>1</sup>

Most solar radiation passes through gases in the atmosphere classified as GHGs; however, infrared radiation is selectively absorbed by GHGs. GHGs in the atmosphere play a critical role in maintaining the balance between the Earth's absorbed and radiated energy, the Earth's radiation budget,<sup>2</sup> by trapping some of the infrared radiation emitted from the Earth's surface that otherwise would have escaped to space (Figure 3.7-1). Radiative forcing is the difference between the incoming energy and outgoing energy.<sup>3</sup> Specifically, GHGs affect the radiative forcing of the atmosphere,<sup>4</sup> which in turn

<sup>1</sup> Frequencies at which bodies emit radiation are proportional to temperature. The Earth has a much lower temperature than the sun and emits radiation at a lower frequency (longer wavelength) than the high frequency (short-wavelength) solar radiation emitted by the sun.

<sup>2</sup> This includes all gains of incoming energy and all losses of outgoing energy; the planet is always striving to be in equilibrium.

<sup>3</sup> Positive forcing tends to warm the surface while negative forcing tends to cool it.

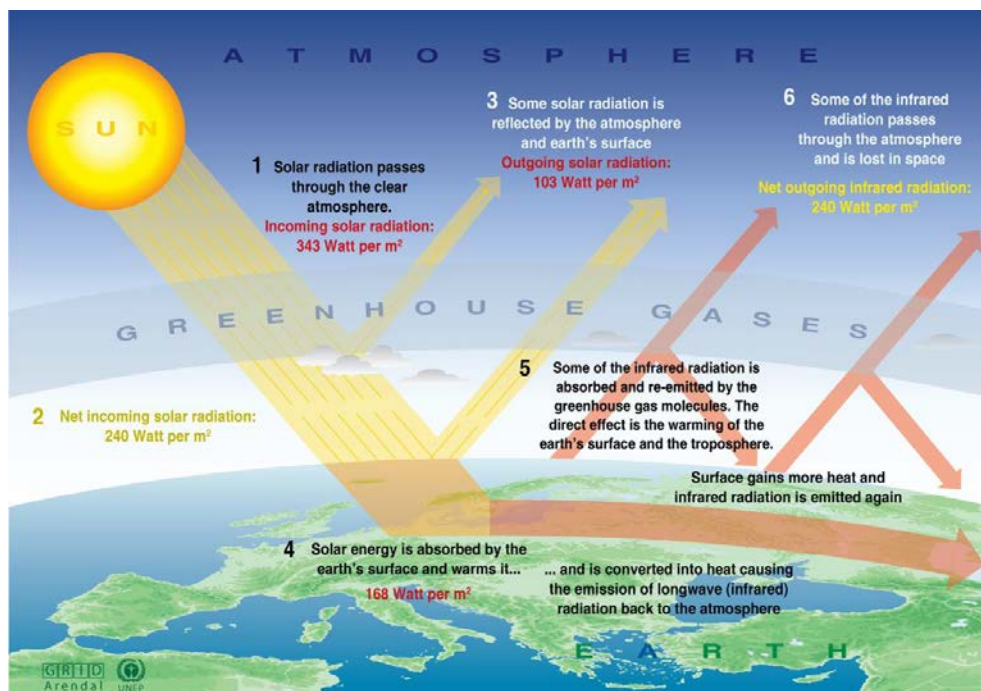
<sup>4</sup> This is the change in net irradiance at the tropopause after allowing stratospheric temperatures to readjust to radiative equilibrium, but with surface and tropospheric temperatures and state held fixed at the unperturbed values.

affects the Earth's average surface temperature. This phenomenon, the *greenhouse effect*, keeps the Earth's atmosphere near the surface warmer than it would be otherwise and allows successful habitation by humans and other forms of life.

Combustion of fossil fuels and deforestation release carbon into the atmosphere that historically has been stored underground in sediments or in surface vegetation, thus exchanging carbon from the geosphere and biosphere to the atmosphere in the carbon cycle. With the accelerated increase in fossil fuel combustion and deforestation since the Industrial Revolution of the 19<sup>th</sup> Century, concentrations of GHGs in the atmosphere have increased exponentially. Such GHG emissions in excess of natural ambient concentrations contribute to the enhancement of the natural greenhouse effect. This enhanced greenhouse effect has contributed to *global warming*, an increased rate of warming of the Earth's average surface temperature.<sup>5</sup> Specifically, increases in GHG emissions lead to increased absorption of infrared radiation by the Earth's atmosphere and warm the lower atmosphere further, thereby increasing temperatures and evaporation rates near the surface.

Variations in natural phenomena such as volcanoes and solar activity produced most of the global temperature increase that occurred during preindustrial times; more recently, however, increasing atmospheric GHG concentrations resulting from human activity have been responsible for most of the observed global temperature increase.<sup>6</sup>

**Figure 3.7-1: The Greenhouse Effect**



Source: UNEP/GRID-Arendal, 2005<sup>7</sup>

<sup>5</sup> This condition results when the Earth has to work harder to maintain its radiation budget, because when more GHGs are present in the atmosphere, the Earth must force emissions of additional infrared radiation out into the atmosphere.

<sup>6</sup> These basic conclusions have been endorsed by more than 45 scientific societies and academies of science, including all of the national academies of science of the major industrialized countries. Since 2007, no scientific body of national or international standing has maintained a dissenting opinion.

<sup>7</sup> Philippe Rekacewicz, UNEP/GRID-Arendal. Website: <https://www.grida.no/resources/6467>. Accessed on April 26, 2019.

Global warming affects global atmospheric circulation and temperatures; oceanic circulation and temperatures; wind and weather patterns; average sea level; ocean acidification; chemical reaction rates; precipitation rates, timing, and form; snowmelt timing and runoff flow; water supply; wildfire risks; and other phenomena, in a manner commonly referred to as *climate change*. Climate change is a change in the average weather of the Earth that is measured by alterations in wind patterns, storms, precipitation, and temperature. These changes are assessed using historical records of temperature changes occurring in the past, such as during previous ice ages. Many of the concerns regarding climate change use this data to extrapolate a level of statistical significance specifically focusing on temperature records from the last 150 years (the Industrial Age) that differ from previous climate changes in rate and magnitude.

### Temperature Predictions by the Intergovernmental Panel on Climate Change

The United Nations Intergovernmental Panel on Climate Change (IPCC) was established by the World Meteorological Organization and United Nations Environment Programme to assess scientific, technical, and socioeconomic information relevant to the understanding of climate change, its potential impacts, and options for adaptation and mitigation. The IPCC constructed several emission trajectories of GHGs needed to stabilize global temperatures and climate change impacts. In its Fourth Assessment Report, the IPCC predicted that the global mean temperature change from 1990 to 2100, given six scenarios, could range from 1.1°C (degrees Celsius) to 6.4°C. Regardless of analytical methodology, global average temperatures and sea levels are expected to rise under all scenarios.<sup>8</sup> The report also concluded that “[w]arming of the climate system is unequivocal,” and that “[m]ost of the observed increase in global average temperatures since the mid-20<sup>th</sup> Century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations.” Warming of the climate system is now considered to be unequivocal,<sup>9</sup> with the global surface temperature increasing approximately 1.33°F (degrees Fahrenheit) over the last 100 years. The IPCC predicts increases in global average temperature of between 2°F and 11°F over the next 100 years, depending on the scenario.<sup>10</sup>

### GHGs and Global Emission Sources

Gases that trap heat in the atmosphere are referred to as GHGs. The effect is analogous to the way a greenhouse retains heat. Prominent GHGs that naturally occur in the Earth’s atmosphere are water vapor, carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), oxides of nitrogen (NO<sub>x</sub>), and ozone. Anthropogenic (human-caused) GHG emissions include releases of these GHGs plus release of human-made gases with high global warming potential (GWP) (ozone-depleting substances such as chlorofluorocarbons [CFCs]<sup>11</sup> and aerosols, hydrofluorocarbons [HFCs], perfluorocarbons [PFCs], and sulfur hexafluoride [SF<sub>6</sub>]). The GHGs listed by the IPCC (CO<sub>2</sub>, methane, nitrous oxide, HFCs, PFCs, and sulfur hexafluoride) are discussed below, in order of abundance in the atmosphere. Water vapor, despite being the most

<sup>8</sup> Intergovernmental Panel on Climate Change (IPCC). 2007. *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller [eds.]). Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. Website: [www.ipcc.ch/publications\\_and\\_data/ar4/wg1/en/contents.html](http://www.ipcc.ch/publications_and_data/ar4/wg1/en/contents.html). Accessed December 27, 2019.

<sup>9</sup> Ibid.

<sup>10</sup> Ibid.

<sup>11</sup> Chlorofluorocarbons (CFCs) destroy stratospheric ozone. The Montreal Protocol on Substances that Deplete the Ozone Layer prohibited CFCs production in 1987.

abundant GHG, is not discussed below because natural concentrations and fluctuations far outweigh anthropogenic influences, making it impossible to predict. Ozone is not included because it does not directly affect radiative forcing. Ozone-depleting substances, which include chlorofluorocarbons, halons, carbon tetrachloride, methyl chloroform, and hydrochlorofluorocarbons, are not included because they have been primarily replaced by HFCs and PFCs.

The global warming potential is the potential of a gas or aerosol to trap heat in the atmosphere. The global warming potential of a gas is essentially a measurement of the radiative forcing of a GHG compared with the reference gas, carbon dioxide (CO<sub>2</sub>).

Individual GHG compounds have varying potential for contributing to global warming. For example, methane is 25 times as potent as CO<sub>2</sub>, while sulfur hexafluoride is 22,200 times more potent than CO<sub>2</sub> on a molecule-per-molecule basis. To simplify reporting and analysis, methods have been set forth to describe emissions of GHGs in terms of a single gas. The most commonly accepted method for comparing GHG emissions is the GWP methodology defined in the IPCC reference documents.<sup>12</sup> The IPCC defines the GWP of various GHG emissions on a normalized scale that recasts all GHG emissions in terms of carbon dioxide equivalents (CO<sub>2</sub>e), which compares the gas in question to that of the same mass of CO<sub>2</sub> (by definition, CO<sub>2</sub> has a GWP of 1). The global warming potential of a GHG is a measure of how much a given mass of a GHG is estimated to contribute to global warming. Thus, to describe how much global warming a given type and amount of GHG may cause, the CO<sub>2</sub>e is used. A CO<sub>2</sub>e is the mass emissions of an individual GHG multiplied by its global warming potential. As such, a high GWP represents high absorption of infrared radiation and a long atmospheric lifetime compared to CO<sub>2</sub>. One must also select a time horizon to convert GHG emissions to equivalent CO<sub>2</sub> emissions to account for chemical reactivity and lifetime differences among various GHG species. The standard time horizon for climate change analysis is 100 years. Generally, GHG emissions are quantified in terms of metric tons (MT) of CO<sub>2</sub>e (MT CO<sub>2</sub>e) emitted per year.

The atmospheric residence time of a gas is equal to the total atmospheric abundance of the gas divided by its rate of removal.<sup>13</sup> The atmospheric residence time of a gas is, in effect, a half-life measurement of the length of time a gas is expected to persist in the atmosphere when accounting for removal mechanisms such as chemical transformation and deposition.

Table 3.7-1 lists the GWP of each GHG and its lifetime. Units commonly used to describe the concentration of GHGs in the atmosphere are parts per million (ppm), parts per billion (ppb), and parts per trillion (ppt), referring to the number of molecules of the GHG in a sampling of 1 million, 1 billion, or 1 trillion molecules of air. Collectively, HFCs, PFCs, and sulfur hexafluoride are referred to as high-GWP gases. CO<sub>2</sub> is by far the largest component of worldwide CO<sub>2</sub>e emissions, followed by methane, nitrous oxide, and high-GWP gases, in order of decreasing contribution to CO<sub>2</sub>e.

The primary human processes that release GHGs include the burning of fossil fuels for transportation, heating, and electricity generation; agricultural practices that release methane, such as livestock grazing and crop residue decomposition; and industrial processes that release smaller amounts of high-GWP gases. Deforestation and land cover conversion have also been identified as

<sup>12</sup> International Panel on Climate Change (IPCC). 2001. Changes in Atmospheric Constituents on Radiative Forcing (Chapter 2). Website: <https://www.ipcc.ch/site/assets/uploads/2018/02/ar4-wg1-chapter2-1.pdf>. Accessed December 10, 2019.

<sup>13</sup> Seinfeld, J.H. and Pandis, S.N. 2006. Atmospheric Chemistry and Physics: From Air Pollution to Climate Change, 2<sup>nd</sup> Edition. New York. John Wiley & Sons.

contributing to global warming by reducing the Earth’s capacity to remove CO<sub>2</sub> from the air and altering the Earth’s albedo or surface reflectance, thus allowing more solar radiation to be absorbed. Specifically, CO<sub>2</sub> emissions associated with fossil fuel combustion are the primary contributors to human-induced climate change. CO<sub>2</sub>, methane, and nitrous oxide emissions associated with human activities are the next largest contributors to climate change.

GHGs of California concern are defined by California Assembly Bill (AB) 32 (see the Regulatory Environment subsection below for a description) and include CO<sub>2</sub>, CH<sub>4</sub>, NO<sub>x</sub>, HFCs, PFCs, and SF<sub>6</sub>. A seventh GHG, nitrogen trifluoride (NF<sub>3</sub>), was also added under the California Health and Safety Code Section 38505(g)(7) as a GHG of concern. These GHGs are described in terms of their physical description and properties, global warming potential, atmospheric residence lifetime, sources, and atmospheric concentration in 2005 in Table 3.7-1.

**Table 3.7-1: Description of Greenhouse Gases of California Concern**

Greenhouse Gas	Physical Description and Properties	Global Warming Potential (100 years)	Atmospheric Residence Lifetime (years)	Sources
Carbon dioxide (CO <sub>2</sub> )	Odorless, colorless, natural gas.	1	50-200	burning coal, oil, natural gas, and wood; decomposition of dead organic matter; respiration of bacteria, plants, animals, and fungus; oceanic evaporation; volcanic outgassing; cement production; land use changes.
Methane (CH <sub>4</sub> )	Flammable gas and is the main component of natural gas.	25	12	geological deposits (natural gas fields) extraction; landfills; fermentation of manure; and decay of organic matter.
Nitrous oxide (N <sub>2</sub> O)	Nitrous oxide (laughing gas) is a colorless GHG.	298	114	microbial processes in soil and water; fuel combustion; industrial processes.
Chloro-fluoro-carbons (CFCs)	Nontoxic, nonflammable, insoluble, and chemically unreactive in the troposphere (level of air at the Earth’s surface); formed synthetically by replacing all hydrogen atoms in methane or ethane with chlorine and/or fluorine atoms.	3,800-8,100	45-640	refrigerants aerosol propellants; cleaning solvents.

**Table 3.7-1 (cont.): Description of Greenhouse Gases of California Concern**

Greenhouse Gas	Physical Description and Properties	Global Warming Potential (100 years)	Atmospheric Residence Lifetime (years)	Sources
Hydro-fluoro-carbons (HFCs)	Synthetic human-made chemicals used as a substitute for CFCs and contain carbon, chlorine, and at least one hydrogen atom.	140 to 11,700	1-50,000	automobile air conditioners; refrigerants.
Per-fluoro-carbons (PFCs)	Stable molecular structures and only break down by ultraviolet rays about 60 kilometers above Earth's surface.	6,500 to 9,200	10,000-50,000	primary aluminum production; semiconductor manufacturing.
Sulfur hexafluoride (SF <sub>6</sub> )	Human-made, inorganic, odorless, colorless, and nontoxic, nonflammable gas.	22,800	3,200	electrical power transmission equipment insulation; magnesium industry, semiconductor manufacturing; a tracer gas.
Nitrogen trifluoride (NF <sub>3</sub> )	Inorganic, is used as a replacement for PFCs, and is a powerful oxidizing agent.	17,200	740	electronics manufacture for semiconductors and liquid crystal displays.
Sources: Intergovernmental Panel on Climate Change (IPCC). 2007. Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller [eds.]). Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, Website: <a href="https://www.ipcc.ch/report/ar4/wg1/">https://www.ipcc.ch/report/ar4/wg1/</a> . Accessed December 18, 2019.  Intergovernmental Panel on Climate Change (IPCC). 2007. Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (Core Writing Team, Pachauri, R.K. and Reisinger, A. [eds.]). IPCC, Geneva, Switzerland. Website: <a href="https://www.ipcc.ch/report/ar4/syr/">https://www.ipcc.ch/report/ar4/syr/</a> . Accessed December 18, 2019.				

The State has begun the process of addressing pollutants referred to as short-lived climate pollutants. Senate Bill (SB) 605, approved by the Governor on September 14, 2014 required the California Air Resources Board (ARB) to complete a comprehensive strategy to reduce emissions of short-lived climate pollutants by January 1, 2016. The ARB released the Proposed Short-Lived Climate Pollutant Reduction Strategy in April 2016. The ARB has completed an emission inventory of these pollutants, identified research needs, identified existing and potential new control measures that offer co-benefits, and coordinated with other state agencies and districts to develop measures.

The short-lived climate pollutants include three main components: black carbon, fluorinated gases, and methane. Fluorinated gases and methane are described in Table 3.7-1 and are already included in the California GHG inventory. Black carbon has not been included in past GHG inventories; however, the ARB will include it in its comprehensive strategy.<sup>14</sup>

Black carbon is a component of fine particulate matter. Black carbon is formed by incomplete combustion of fossil fuels, biofuels, and biomass. Sources of black carbon within a jurisdiction may include exhaust from diesel trucks, vehicles, and equipment, as well as smoke from biogenic combustion. Biogenic combustion sources of black carbon include the burning of biofuels used for transportation, the burning of biomass for electricity generation and heating, prescribed burning of agricultural residue, and natural and unnatural wildfires. Black carbon is not a gas but an aerosol—particles or liquid droplets suspended in air. Black carbon only remains in the atmosphere for days to weeks, whereas other GHGs can remain in the atmosphere for years. Black carbon can be deposited on snow, where it absorbs sunlight, reduces sunlight reflectivity, and hastens snowmelt. Direct effects include absorbing incoming and outgoing radiation; indirectly, black carbon can also affect cloud reflectivity, precipitation, and surface dimming (cooling).

Global warming potentials for black carbon were not defined by the IPCC in its Fourth Assessment Report. The ARB has identified a global warming potential of 3,200 using a 20-year time horizon and 900 using a 100-year time horizon from the IPCC Fifth Assessment. Sources of black carbon are already regulated by the ARB, and air district criteria pollutant and toxic regulations that control fine particulate emissions from diesel engines and other combustion sources.<sup>15</sup> Additional controls on the sources of black carbon specifically for their GHG impacts beyond those required for toxic and fine particulates are not likely to be needed.

Ozone is another short-lived climate pollutant that will be part of the strategy. Ozone affects evaporation rates, cloud formation, and precipitation levels. Ozone is not directly emitted, so its precursor emissions, volatile organic compounds (VOCs) and oxides of nitrogen (NO<sub>x</sub>) on a regional scale and CH<sub>4</sub> on a hemispheric scale will be subject of the strategy.<sup>16</sup>

Water vapor is also considered a GHG. Water vapor is an important component of our climate system and is not regulated. Increasing water vapor leads to warmer temperatures, which causes more water vapor to be absorbed into the air. Warming and water absorption increase in a spiraling cycle. Water vapor feedback can also amplify the warming effect of other GHGs, such that the warming brought about by increased carbon dioxide allows more water vapor to enter the atmosphere.<sup>17</sup>

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<sup>14</sup> California Air Resources Board (ARB). 2015. Short-Lived Climate Pollutant Reduction Strategy, Concept Paper. May. Website: [http://www.arb.ca.gov/cc/shortlived/concept\\_paper.pdf](http://www.arb.ca.gov/cc/shortlived/concept_paper.pdf). Accessed December 27, 2019.

<sup>15</sup> California Air Resources Board (ARB). 2015. Short-Lived Climate Pollutant Reduction Strategy, Concept Paper. May. Website: [http://www.arb.ca.gov/cc/shortlived/concept\\_paper.pdf](http://www.arb.ca.gov/cc/shortlived/concept_paper.pdf). Accessed December 27, 2019.

<sup>16</sup> Ibid.

<sup>17</sup> National Aeronautics and Space Administration (NASA). 2015. Global Climate Change, Vital Signs of the Planet. Website: <http://climate.nasa.gov/causes/>. Accessed December 27, 2019.

## Introduction to Global Climate Change

Global climate change is defined as the change in average meteorological conditions on Earth with respect to temperature, precipitation, and storms. Global temperatures are regulated by naturally occurring atmospheric gases such as water vapor, CO<sub>2</sub>, N<sub>2</sub>O, CH<sub>4</sub>, hydrofluorocarbons, perfluorocarbons and SF<sub>6</sub>. These particular gases are important because of their residence time (duration they stay) in the atmosphere, which ranges from 10 years to more than 100 years. These gases allow solar radiation into the Earth's atmosphere, but prevent radioactive heat from escaping, thus warming the Earth's atmosphere. Global climate change can occur naturally as it has in the past with the previous ice ages. According to the ARB, the climate change since the industrial revolution differs from previous climate changes in both rate and magnitude.

Gases that trap heat in the atmosphere are often referred to as GHGs. GHGs are released into the atmosphere by both natural and anthropogenic (human) activity. Without the natural greenhouse effect, the Earth's average temperature would be approximately 61°F cooler than it is currently. The cumulative accumulation of these gases in the Earth's atmosphere is considered to be the cause for the observed increase in the Earth's temperature.

Although California's rate of growth of GHG emissions is slowing, the State is still a substantial contributor to the U.S. emissions inventory total. In 2004, California is estimated to have produced 492 million metric tons (MMT) of carbon dioxide equivalents (MMT CO<sub>2</sub>e) GHG emissions. Despite a population increase of 16 percent between 1990 and 2004, California has significantly slowed the rate of growth of GHG emissions because of the implementation of energy efficiency programs as well as adoption of strict emission controls.

## Global Climate Change Issue

Climate change is a global problem because GHGs are global pollutants, unlike criteria air pollutants and hazardous air pollutants (also called toxic air contaminants), which are pollutants of regional and local concern. Pollutants with localized air quality effects have relatively short atmospheric lifetimes, approximately 1 day; by contrast, GHGs have long atmospheric lifetimes, several years to several thousand years. GHGs persist in the atmosphere for a long enough time to be dispersed around the globe.

Although the exact lifetime of any particular GHG molecule depends on multiple variables and cannot be pinpointed, more CO<sub>2</sub> is currently emitted into the atmosphere than is sequestered. CO<sub>2</sub> sinks, or reservoirs, include vegetation and the ocean, which absorb CO<sub>2</sub> through photosynthesis and dissolution, respectively. These are two of the most common processes of CO<sub>2</sub> sequestration. Of the total annual human-caused CO<sub>2</sub> emissions, approximately 54 percent is sequestered through ocean uptake, Northern Hemisphere forest regrowth, and other terrestrial sinks within a year, whereas the remaining 46 percent of human-caused CO<sub>2</sub> emissions is stored in the atmosphere.<sup>18</sup>

Similarly, effects of GHGs are borne globally, as opposed to the localized air quality effects of criteria air pollutants and hazardous air pollutants. The quantity of GHGs that it takes to ultimately result in

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<sup>18</sup> Seinfeld, J. H. and Pandis, S. N. 1998. Atmospheric Chemistry and Physics from Air Pollution to Climate Change. New York. John Wiley & Sons.



climate change is not precisely known and cannot be quantified, and no single project would be expected to measurably contribute to a noticeable incremental change in the global average temperature, or to global or local climates or microclimate.

Emissions of GHGs have the potential to adversely affect the environment because such emissions contribute, on a cumulative basis, to global climate change. A cumulative discussion and analysis of project impacts on global climate change is presented in this EIR because, although it is unlikely that a single project will contribute significantly to climate change, cumulative emissions from many projects affect global GHG concentrations and the climate system.

Global climate change has the potential to result in sea level rise (resulting in flooding of low-lying areas), to affect rainfall and snowfall (leading to changes in water supply), to affect temperatures and habitats (affecting biological resources and public health), and to result in many other adverse environmental consequences.

Although the international, national, State, and regional communities are beginning to address GHGs and the potential effects of climate change, worldwide GHG emissions will likely continue to rise over the next decades.

### **Climate and Topography**

Climate is the accumulation of daily and seasonal weather events over a long period of time, whereas weather is defined as the condition of the atmosphere at any particular time and place. For a detailed discussion of existing regional and project site climate and topography, see Section 3.2, Air Quality.

### **Existing GHG Emissions**

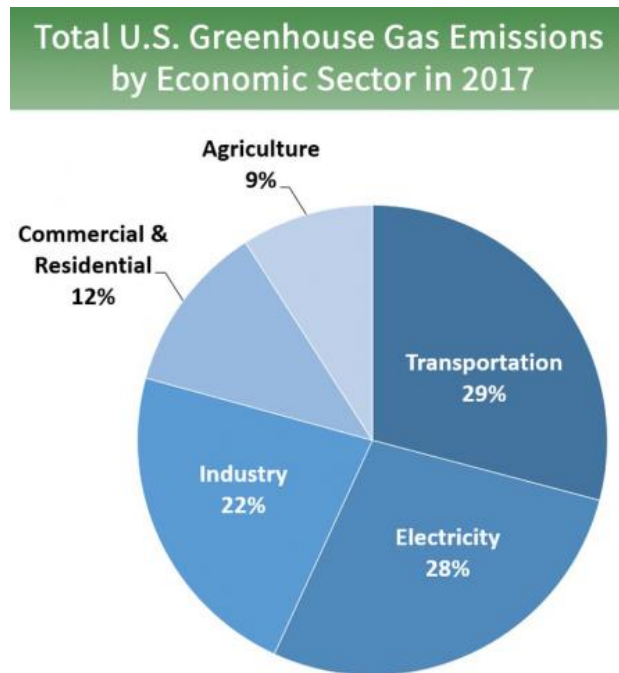
#### ***U.S. GHG Inventory***

Total U.S. GHG emissions were approximately 0.5 percent lower in 2017 than in 2016.<sup>19</sup> This decrease was largely driven by a decrease in emissions from fossil fuel combustion, which was a result of multiple factors including a continued shift from coal to natural gas and increased use of renewables in the electric power sector, and milder weather that contributed to less overall electricity use. Figure 3.7-2 presents 2017 U.S. GHG emissions by economic sector. Total U.S. GHG emissions increased by 3.6 percent from 1990 to 2017 (from 6,233.2 MMT CO<sub>2</sub>e in 1990 to 6,456.7 MMT CO<sub>2</sub>e in 2017).

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<sup>19</sup> United States Environmental Protection Agency (EPA). 2019. Inventory of U.S. Greenhouse Gas Emissions and Sinks. April 11. Website: <https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks>. Accessed September 20, 2019.

Figure 3.7-2: 2017 U.S. Greenhouse Gas Emissions by Economic Sector



Note: Emissions shown do not include carbon sinks such as change in land uses and forestry.  
Source: EPA 2019<sup>20</sup>

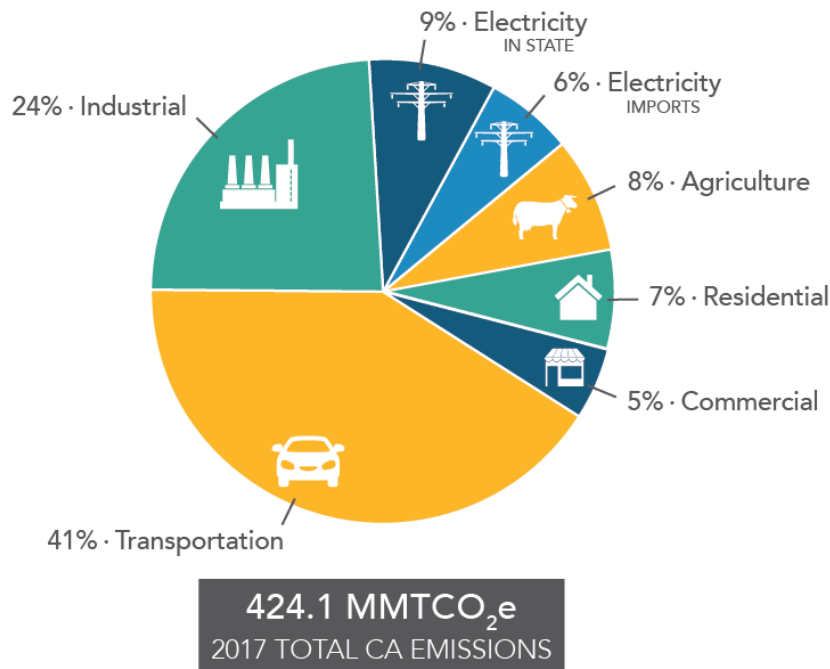
### California GHG Inventory

As the second largest emitter of GHG emissions in the U.S. and the 12<sup>th</sup> to 16<sup>th</sup> largest GHG emissions emitter in the world, California contributes a large quantity (424.1 MMT CO<sub>2</sub>e in 2017) of GHG emissions to the atmosphere.<sup>21</sup> Emissions of CO<sub>2</sub> are byproducts of fossil-fuel combustion and are attributable in large part to human activities associated with transportation, industry/manufacturing, electricity and natural gas consumption, and agriculture. In California, the transportation sector is the largest emitter at 41 percent of GHG emissions, followed by industry/manufacturing at 24 percent of GHG emissions (Figure 3.7-3).

<sup>20</sup> Ibid.

<sup>21</sup> California Climate Change Center. (CCCC). 2006. Our Changing Climate, Assessing the Risks to California: A Summary Report from the California Climate Change Center. Website: [http://meteora.ucsd.edu/cap/pdffiles/CA\\_climate\\_Scenarios.pdf](http://meteora.ucsd.edu/cap/pdffiles/CA_climate_Scenarios.pdf). Accessed December 27, 2019.

**Figure 3.7-3: 2017 California Greenhouse Gas Emissions by Sector**



Sources: ARB 2019<sup>22</sup>

**Bay Area Air Quality Management District GHG Inventory**

The Bay Area Air Quality Management District (BAAQMD) published a GHG inventory for the San Francisco Bay Area (Bay Area), which provides an estimate of GHG emissions in the base year 2011 for all counties located in the jurisdiction of BAAQMD: Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, Napa, and the southern portions of Solano and Sonoma counties.<sup>23</sup> This GHG inventory is based on the standards for criteria pollutant inventories and is intended to support BAAQMD’s climate protection activities.

Table 3.7-2 shows the 2011 breakdown of emissions by end-use sector for each county within BAAQMD’s jurisdiction. The estimated GHG emissions are presented in CO<sub>2</sub>e, which weights each GHG by its GWP. The GWPs used in the BAAQMD inventory are from the Second Assessment Report of the IPCC.

In 2011, GHG emissions from Contra Costa County accounted for approximately 31 percent of the Bay Area’s total GHG emissions with 17.8 percent of the Bay Area’s total GHG emissions coming from the industrial/commercial land uses in Contra Costa County.<sup>24</sup> Transportation is the largest GHG emissions sector in the Bay Area, followed by industrial/commercial, electricity generation and cogeneration, and residential fuel usage. In Contra Costa County, the largest amount of GHG

<sup>22</sup> California Air Resources Board (ARB). 2019. California Greenhouse Gas Emission Inventory Program. Website: <https://ww2.arb.ca.gov/our-work/programs/ghg-inventory-program>. Accessed September 20, 2019.

<sup>23</sup> Bay Area Air Quality Management District (BAAQMD). 2015. Bay Area Emissions Inventory Summary Report: Greenhouse Gases Base Year 2011. January. Website: [http://www.baaqmd.gov/~media/files/planning-and-research/emission-inventory/by2011\\_ghgsummary.pdf](http://www.baaqmd.gov/~media/files/planning-and-research/emission-inventory/by2011_ghgsummary.pdf). Accessed December 27, 2019.

<sup>24</sup> Bay Area Air Quality Management District (BAAQMD). 2015. Bay Area Emissions Inventory Summary Report: Greenhouse Gases Base Year 2011. January. Website: [http://www.baaqmd.gov/~media/files/planning-and-research/emission-inventory/by2011\\_ghgsummary.pdf](http://www.baaqmd.gov/~media/files/planning-and-research/emission-inventory/by2011_ghgsummary.pdf). Accessed December 27, 2019.

emissions are generated by the industrial/commercial sector, followed by the electricity/cogeneration sector.

**Table 3.7-2: 2011 County GHG Emissions by Sector (MMT CO<sub>2</sub>e/Year)**

Sector	Alameda	Contra Costa	Marin	Napa	San Francisco	San Mateo	Santa Clara	Solano*	Sonoma*
Industrial/Commercial	2.7	17.8	0.4	0.2	1.2	1.4	4.1	2.7	0.5
Residential Fuel	1.3	1.0	0.3	0.1	0.9	0.8	1.5	0.3	0.4
Electricity/Cogeneration	0.9	7.2	0.1	0.1	0.5	0.4	2.2	0.4	0.2
Off-Road Equipment	0.2	0.2	0.0	0.0	0.2	0.1	0.4	0.0	0.
Transportation	7.9	5.0	1.3	0.9	3.0	5.0	7.6	1.6	2.0
Agriculture/Farming	0.1	0.2	0.2	0.1	0.0	0.0	0.2	0.1	0.2
<b>Total</b>	<b>13.2</b>	<b>31.4</b>	<b>2.4</b>	<b>1.5</b>	<b>5.7</b>	<b>7.7</b>	<b>16.0</b>	<b>5.1</b>	<b>3.5</b>

Notes:  
 \* Portion within BAAQMD jurisdiction  
 CO<sub>2</sub>e = carbon dioxide equivalent  
 Source: Bay Area Air Quality Management District (BAAQMD). 2015. Bay Area Emissions Inventory Summary Report: Greenhouse Gases Base Year 2011. January. Website: [http://www.baaqmd.gov/~media/files/planning-and-research/emission-inventory/by2011\\_ghgsummary.pdf](http://www.baaqmd.gov/~media/files/planning-and-research/emission-inventory/by2011_ghgsummary.pdf). Accessed December 27, 2019.

### **Contra Costa County**

A community-wide baseline (2005) GHG emissions inventory was conducted for Contra Costa County as part of the development of the Climate Action Plan (CAP).<sup>25</sup> Table 3.7-3 provides the estimated 2005 baseline by sector for Contra Costa County.

**Table 3.7-3: 2005 Unincorporated County GHG Emissions Baseline by Sector (excluding Stationary Source Emissions)**

Sector	Metric Tons CO <sub>2</sub> e/Year	Percentage of Total
Residential Energy	274,690	20
Nonresidential Energy	118,770	8
Solid Waste	48,450	3
Landfill	193,950	14
On-road Transportation	628,200	45
Off-Road Equipment	71,880	5
Water and Wastewater	8,080	1
BART	2,300	<1

<sup>25</sup> Contra Costa County. 2015. Contra Costa County Climate Action Plan (CAP). December 15. Website: <http://www.co.contra-costa.ca.us/4554/Climate-Action-Plan>. Accessed February 25, 2019.

**Table 3.7-3 (cont.): 2005 Unincorporated County GHG Emissions Baseline by Sector (excluding Stationary Source Emissions)**

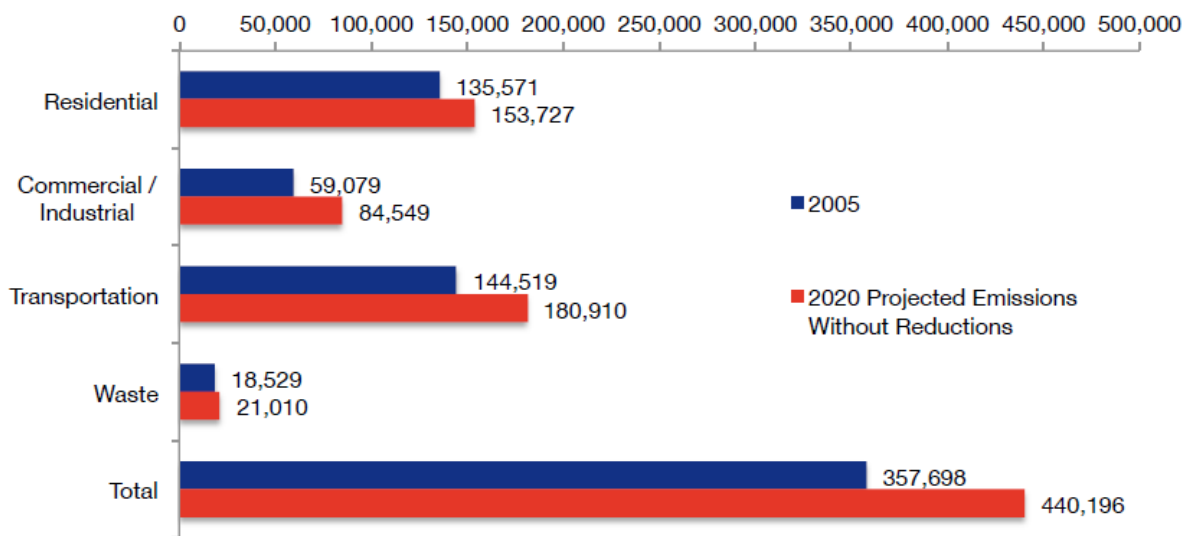
Sector	Metric Tons CO <sub>2</sub> e/Year	Percentage of Total
Agriculture	57,320	4
Total	1,403,610	100

Source: Contra Costa County Climate Action Plan (CAP), December 2015.

**City of Antioch**

Antioch’s community-wide baseline (2005) GHG emissions inventory was completed as part of a grant with Local Governments for Sustainability (ICLEI) in February 2008.<sup>26</sup> Figure 3.7-4 provides the estimated 2005 baseline by sector for the City of Antioch.

**Figure 3.7-4: Community Emissions Projected Growth by Sector (MT CO<sub>2</sub>e)**



Source: City of Antioch. 2011. Antioch Community Climate Action Plan. Website: <https://www.antiochca.gov/fc/environment/climate/Antioch%20CCAP%20Final.pdf>. Accessed September 20, 2019.

**Project Site**

The project site currently includes a cattle-grazing operation, a single-family residence, and various barns and outbuildings that generate limited GHG emissions from sources such as vehicle trips and typical residential uses of energy, water, and waste. Consistent with the project-specific transportation impact assessment, the baseline vehicle trips and associated emissions were assumed to be zero. GHG emissions were not quantified for the existing buildings.

<sup>26</sup> City of Antioch. 2011. Antioch Community Climate Action Plan. Website: <https://www.antiochca.gov/fc/environment/climate/Antioch%20CCAP%20Final.pdf>. Accessed September 20, 2019.

## Energy Basics

Energy is generally transmitted either in the form of electricity, measured in kilowatts (kW) or megawatts (MW),<sup>27, 28</sup> or natural gas measured in therms.<sup>29</sup> Fuel, such as gasoline or diesel, is measured in gallons or liters.

### **Electricity**

Electricity is used primarily for lighting, appliances, and other uses associated with residential, commercial and industrial uses.

### **Natural Gas**

Natural gas is used primarily for heating, water heating, and cooking purposes and is typically associated with commercial and residential uses.

### **Fuel**

Fuel is used primarily for powering off-road equipment, trucks, and worker vehicles. The typical fuel types used are diesel and gasoline.

## Electricity Generation, Distribution, and Use

### **State of California**

The State of California generates approximately 206,336 GWh of electricity. Approximately 43.4 percent of the energy generation is sourced from natural gas, 29.7 percent from renewable sources (i.e., solar, wind, and geothermal), 17.9 percent from large hydroelectric sources, and the remaining 9 percent is sourced from coal, nuclear, oil, and other non-renewable sources.

In 2016, California ranked third in the nation in conventional hydroelectric generation, second in net electricity generation from all other renewable energy resources combined, and first as a producer of electricity from solar, geothermal, and biomass resources. California leads the nation in solar thermal electricity capacity and generation. In 2016, California generated 71 percent of the nation's solar thermal-sourced utility-scale electricity.<sup>30</sup>

Electricity and natural gas are distributed through the various electric load-serving entities (LSEs) in California. These entities include investor-owned utilities, publicly owned LSEs, rural electric cooperatives, community choice aggregators, and electric service providers.<sup>31</sup>

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<sup>27</sup> 1 kW = 1,000 watts; A watt is a derived unit of power that measure rate of energy conversion. 1 watt is equivalent to work being done at a rate of 1 joule of energy per second. In electrical terms, 1 watt is the power dissipated by a current of 1 ampere flowing across a resistance of 1 volt.

<sup>28</sup> 1 MW = 1 million watts

<sup>29</sup> A unit for quantity of heat that equals 100,000 British Thermal Units (BTU). A BTU is the quantity of heat required to raise the temperature of 1 pound of liquid water 1°F at a constant pressure of 1 atmosphere.

<sup>30</sup> United States Energy Information Administration (EIA). California State Profile and Energy Estimates. Website: <https://www.eia.gov/state/?sid=CA>. Accessed December 27, 2019.

<sup>31</sup> California Energy Commission. Electric Load-Serving Entities (LSEs) in California. Website: [https://ww2.energy.ca.gov/almanac/electricity\\_data/utilities.html](https://ww2.energy.ca.gov/almanac/electricity_data/utilities.html). Accessed December 27, 2019.

### **Contra Costa County**

Pacific Gas and Electric (PG&E) provides electricity to many of the cities throughout Contra Costa County. Most of the County's energy is consumed by residential activities (41 percent), followed by major industrial activities (34 percent) and all other nonresidential activities (25 percent).<sup>32</sup>

### **City of Antioch**

PG&E provides electricity to the City of Antioch.

### **Project Site**

The project site currently includes a single-family residence and various barns and outbuildings located on the eastern portion of the site that consume electricity. As noted in Chapter 2, Project Description, electricity for the project site is provided by PG&E.

### **Climate Change Trends and Effects**

CO<sub>2</sub> accounts for more than 75 percent of all anthropogenic GHG emissions, the atmospheric residence time of CO<sub>2</sub> is decades to centuries, and global atmospheric concentrations of CO<sub>2</sub> continue to increase at a faster rate than ever previously recorded. Thus, the warming impacts of CO<sub>2</sub> will persist for hundreds of years after mitigation is implemented to reduce GHG concentrations.

### **California**

Substantially higher temperatures, more extreme wildfires, and rising sea levels are just some of the direct effects of climate change experienced in California.<sup>33,34</sup> As reported by the California Natural Resources Agency in 2009, despite annual variations in weather patterns, California has seen a trend of increased average temperatures, more extreme hot days, fewer cold nights, longer growing seasons, less winter snow, and earlier snowmelt and rainwater runoff. Statewide average temperatures increased by about 1.7°F from 1895 to 2011, and a larger proportion of total precipitation is falling as rain instead of snow.<sup>35</sup> Sea level rose by as much as seven inches along the California coast over the last century, leading to increased erosion and adding pressure to the State's infrastructure, water supplies, and natural resources.

These observed trends in California's climate are projected to continue in the future. Research indicates that California will experience overall hotter and drier conditions with a continued reduction in winter snow (with concurrent increases in winter rains), as well as increased average temperatures and accelerating sea level rise. The frequency, intensity, and duration of extreme weather events such as heat waves, wildfires, droughts, and floods will also change.<sup>36</sup> In addition,

<sup>32</sup> Contra Costa County. 2015. Contra Costa County Climate Action Plan. Website: <http://www.co.contra-costa.ca.us/4554/Climate-Action-Plan>. Accessed February 26, 2019.

<sup>33</sup> California Natural Resources Agency (CNRA). 2009. 2009 California Climate Adaptation Strategy: A Report to the Governor of the State of California in Response to Executive Order S-13-2008. Website: [http://resources.ca.gov/docs/climate/Statewide\\_Adaptation\\_Strategy.pdf](http://resources.ca.gov/docs/climate/Statewide_Adaptation_Strategy.pdf). Accessed December 27, 2019.

<sup>34</sup> California Energy Commission (CEC). 2012. Our Changing Climate 2012: Vulnerability & Adaptation to the Increasing Risks from Climate Change in California. Website: <http://www.energy.ca.gov/2012publications/CEC-500-2012-007/CEC-500-2012-007.pdf>. Accessed December 27, 2019.

<sup>35</sup> California Energy Commission (CEC). 2006. Inventory of California Greenhouse Gas Emissions and Sinks: 1990 to 2004. Draft Final Report. CEC-600-2006-013-D. Website: <http://www.energy.ca.gov/2006publications/CEC-600-2006-013/CEC-600-2006-013-D.PDF>. Accessed December 27, 2019.

<sup>36</sup> California Natural Resources Agency (CNRA). 2009. 2009 California Climate Adaptation Strategy: A Report to the Governor of the State of California in Response to Executive Order S-13-2008. Website: <https://ww2.energy.ca.gov/2009publications/CNRA-1000-2009-027/CNRA-1000-2009-027-F.PDF>. Accessed December 27, 2019.

increased air pollution and spread of insects potentially carrying infectious diseases will also occur as the climate-associated temperature and associated species clines shift in latitude.

The following is a summary of climate change factors and predicted trends specific to California.

In California, climate change may result in the following consequences:<sup>37,38</sup>

- **A reduction in the quality and supply of water from the Sierra snowpack.** If heat-trapping emissions continue unabated, more precipitation will fall as rain instead of snow, and the snow that does fall will melt earlier, reducing the Sierra Nevada spring snowpack by as much as 70 to 90 percent. This can lead to challenges in securing adequate water supplies. It can also lead to a potential reduction in hydropower.
- **Increased risk of large wildfires.** If rain increases as temperatures rise, wildfires in the grasslands and chaparral ecosystems of Southern California are estimated to increase by approximately 30 percent toward the end of the 21<sup>st</sup> century because more winter rain will stimulate the growth of more plant “fuel” available to burn in the fall. In contrast, a hotter, drier climate could promote up to 90 percent more Northern California fires by the end of the century by drying out and increasing the flammability of forest vegetation.
- **Reductions in the quality and quantity of certain agricultural products.** The crops and products likely to be adversely affected include wine grapes, fruit, nuts, and milk.
- **Exacerbation of air quality problems.** If temperatures rise to the medium warming range, there could be 75 to 85 percent more days with weather conducive to ozone formation in Los Angeles and the San Joaquin Valley, relative to today’s conditions. This is more than twice the increase expected if rising temperatures remain in the lower warming range. This increase in air quality problems could result in an increase in asthma and other health-related problems.
- **A rise in sea levels resulting in the displacement of coastal businesses and residences.** During the past century, sea levels along California’s coast have risen about seven inches. If emissions continue unabated and temperatures rise into the higher anticipated warming range, sea level is expected to rise an additional 22 to 35 inches by the end of the century. Elevations of this magnitude would inundate coastal areas with salt water, accelerate coastal erosion, threaten vital levees and inland water systems, and disrupt wetlands and natural habitats.
- **An increase temperature and extreme weather events.** Climate change is expected to lead to increases in the frequency, intensity, and duration of extreme heat events and heat waves in California. More heat waves can exacerbate chronic disease or heat-related illness.
- **A decrease in the health and productivity of California’s forests.** Climate change can cause an increase in wildfires, an enhanced insect population, and establishment of non-native species.

<sup>37</sup> California Climate Change Center. (CCCC). 2006. Our Changing Climate, Assessing the Risks to California: A Summary Report from the California Climate Change Center. July 2006. CEC-500-2006-077. Website: [http://meteora.ucsd.edu/cap/pdffiles/CA\\_climate\\_Scenarios.pdf](http://meteora.ucsd.edu/cap/pdffiles/CA_climate_Scenarios.pdf). Accessed December 27, 2019.

<sup>38</sup> Moser et al. 2009. Moser, Susie, Guido Franco, Sarah Pittiglio, Wendy Chou, Dan Cayan. 2009. The Future Is Now: An Update on Climate Change Science Impacts and Response Options for California. California Energy Commission, PIER Energy-Related Environmental Research Program. CEC-500-2008-071. Website: [www.energy.ca.gov/2008publications/CEC-500-2008-071/CEC-500-2008-071.PDF](http://www.energy.ca.gov/2008publications/CEC-500-2008-071/CEC-500-2008-071.PDF). Accessed May 7, 2013.



## **Bay Area**

The following is a summary of climate change factors and predicted trends specific to the Bay Area.

### *Temperature, Heat, Drought, and Wildfire Events*

The Bay Area is expected to experience warming over the rest of the 21<sup>st</sup> Century. Consistent with Statewide projections, the annual average temperature in the Bay Area will likely increase by 2.7°F between 2000 and 2050, based on GHGs that have already been emitted into the atmosphere. By the end of the century, the increase in the Bay Area’s annual average temperature may range from approximately 3.5°F to 11°F relative to the average annual temperature simulated for the 1961–1990 baseline period used for the study, depending on the GHG emissions scenarios.<sup>39</sup> The projected rate of warming, especially in the latter half of the 21<sup>st</sup> Century, is considerably greater than warming rates derived from historical observed data.

Specific predictions related to temperature/heat are summarized below.

- The annual average temperature in the Bay Area has been increasing over the last several decades.
- The Bay Area is expected to see an increase in average annual temperature of 2.7°F by 2050, and 3.5°F to 11°F by 2100. Projections show a greater warming trend during the summer season. The coastal parts of the Bay Area will experience the most moderate warming trends.<sup>40</sup>
- Extreme heat events are expected to increase in duration, frequency, and severity by 2050. Extreme freeze events are expected to decrease in frequency and severity by 2100, but occasional colder-than-historical events may occur by 2050.<sup>41</sup>

### *Precipitation, Rainfall, and Flooding Events*

Studies of the effect of climate change on the long-term average precipitation for California show some disagreement.<sup>42</sup> Considerable variability exists across individual models, and examining the average changes can mask more extreme scenarios that project much wetter or drier conditions. California is expected to maintain a Mediterranean climate through the next century, with dry summers and wet winters that vary between seasons, years, and decades. Wetter winters and drier springs are also expected, but overall annual precipitation is not projected to change substantially. By mid-century, more precipitation is projected to occur in winter in the form of less frequent but larger events. The majority of global climate models predict drying trends across the State by 2100.<sup>43</sup>

<sup>39</sup> California Climate Change Center (CCCC). 2009. Climate Change Scenarios and Sea Level Rise Estimates for the California 2009 Climate Change Scenarios Assessment. Final Paper. CEC-500-2009-014-F. Website: <http://www.energy.ca.gov/2009publications/CEC-500-2009-014/CEC-500-2009-014-F.PDF>. Accessed December 27, 2019.

<sup>40</sup> Cal-Adapt. 2014. Climate Tools. Website: <http://cal-adapt.org/tools/>. Accessed December 27, 2019.

<sup>41</sup> Ibid.

<sup>42</sup> California Climate Change Center (CCCC). 2009. Climate Change Scenarios and Sea Level Rise Estimates for the California 2009 Climate Change Scenarios Assessment. Final Paper. CEC-500-2009-014-F. Website: <http://www.energy.ca.gov/2009publications/CEC-500-2009-014/CEC-500-2009-014-F.PDF>. Accessed December 27, 2019.

<sup>43</sup> California Natural Resources Agency (CNRA). 2009. 2009 California Climate Adaptation Strategy: A Report to the Governor of the State of California in Response to Executive Order S-13-2008. Website: <https://ww2.energy.ca.gov/2009publications/CNRA-1000-2009-027/CNRA-1000-2009-027-F.PDF>. Accessed December 27, 2019.

Specific factors related to precipitation/rainfall/extreme events are summarized below.

- The Bay Area has not experienced substantial changes in rainfall depth or intensities over the past 30 years.
- The Bay Area will continue to experience a Mediterranean climate, with little change in annual precipitation projected by 2050, although a high degree of variability may persist.
- An annual drying trend is projected to occur by 2100. The greatest decline in precipitation is expected to occur during the spring months, while minimal change is expected during the winter months.
- Increases in drought duration and frequency coupled with higher temperatures, as experienced in 2012, 2013, and 2014, will increase the likelihood of wildfires.
- California is expected to see increases in the magnitude of extreme events, including increased precipitation delivered from atmospheric river events, which would bring high levels of rainfall during short time periods and increase the chance of flash floods. The Bay Area is also expected to see an increase in precipitation intensities, but possibly through less frequent events.<sup>44</sup>

#### *Reduced Sierra Nevada Snowpack and Water Supply Shortages*

If heat-trapping emissions continue unabated, more precipitation will fall as rain instead of snow, and the snow that does fall will melt earlier, reducing the Sierra Nevada spring snowpack by as much as 70 to 90 percent. This can lead to challenges in securing adequate surface water supplies.

#### *Vectors and Disease Events*

Climate change will likely increase the vectors of insects and, in turn, may increase the risk of some infectious diseases, particularly those diseases that appear in warm areas and are spread by mosquitoes and other insects, such as malaria, dengue fever, yellow fever, and encephalitis.

#### *Air Quality and Pollution Events*

Respiratory disorders will be exacerbated by warming-induced increases in the frequency of smog (ground-level ozone) events and particulate air pollution.<sup>45</sup> Although there could be health effects resulting from changes in the climate and the consequences that can occur, inhalation of GHGs at levels currently in the atmosphere would not result in adverse health effects, with the exception of ozone and aerosols (particulate matter). The potential health effects of ozone and particulate matter are discussed in criteria pollutant analyses. At very high indoor concentrations (not at levels existing outside), carbon dioxide, methane, SF<sub>6</sub>, and some chlorofluorocarbons can cause suffocation as the gases can displace oxygen.<sup>46,47</sup>

<sup>44</sup> California Climate Change Center (CCCC). 2009. Climate Change Scenarios and Sea Level Rise Estimates for the California 2009 Climate Change Scenarios Assessment. Final Paper. CEC-500-2009-014-F. Website: <http://www.energy.ca.gov/2009publications/CEC-500-2009-014/CEC-500-2009-014-F.PDF>. Accessed December 27, 2019.

<sup>45</sup> United States Environmental Protection Agency (EPA). 2009. Ozone and your Health. EPA-456/F-09-001. Website: <https://www3.epa.gov/airnow/ozone-c.pdf>. Accessed December 27, 2019.

<sup>46</sup> Centers for Disease Control and Prevention (CDC). 2010. Department of Health and Human Services, the National Institute for Occupational Safety and Health. Carbon Dioxide. Website: [www.cdc.gov/niosh/npg/npgd0103.html](http://www.cdc.gov/niosh/npg/npgd0103.html). Accessed December 27, 2019.

<sup>47</sup> Occupational Safety and Health Administration (OSHA). 2003. United States Department of Labor. Safety and Health Topics: Methane. Website: [www.osha.gov/dts/chemicalsampling/data/CH\\_250700.html](http://www.osha.gov/dts/chemicalsampling/data/CH_250700.html). Accessed December 27, 2019.

## **Contra Costa County**

### *Drought and Wildfires*

Fire hazards present a considerable problem to vegetation and wildlife habitats throughout Contra Costa County. Grassland fires are easily ignited, particularly in dry seasons. (See Section 3.8, Hazards, Hazardous Materials, and Wildfire, for a more detailed discussion related to wildfire hazard areas and wildfire-conducive conditions.) The potential for increased temperatures and drought conditions due to climate change could result in increased risk from wildfire in these areas.

As described in Section 3.8, the project site is located in an incorporated local responsibility area and the area just south of the project site is designated as a moderate fire hazard severity zone.<sup>48</sup> The vegetation on the project site consists of annual grassland and ruderal plants. According to the General Plan EIR, areas of potential wildland fire hazard exist within the southern, mostly unincorporated portions of the General Plan study area, including rural, hilly terrain, as well as areas adjacent to or covered by natural grassland or brush. New development within or near such areas are more likely to be subject to wildfire hazards.

### *Reduced Sierra Nevada Snowpack and Water Supply Shortages*

As described in Section 3.15, Utilities and Service Systems, Contra Costa County receives potable water from the Contra Costa Water District (CCWD), which pumps water from four intakes in the San Joaquin Delta. The CCWD's water source is provided by the Central Valley Project, which receives water from storage releases from Shasta, Folsom, and Clair Eagle reservoirs into the Sacramento River in the San Joaquin Delta.<sup>49</sup> Originating in the Sierra Nevada Mountains, water flows into the Sacramento and San Joaquin Rivers into the Delta where it is drawn and transported via Contra Costa Canal. The availability of surface water supply could decline if climate change results in reduced snowpack in the Sierra Nevada.

## **City of Antioch**

### *Temperature and Heat*

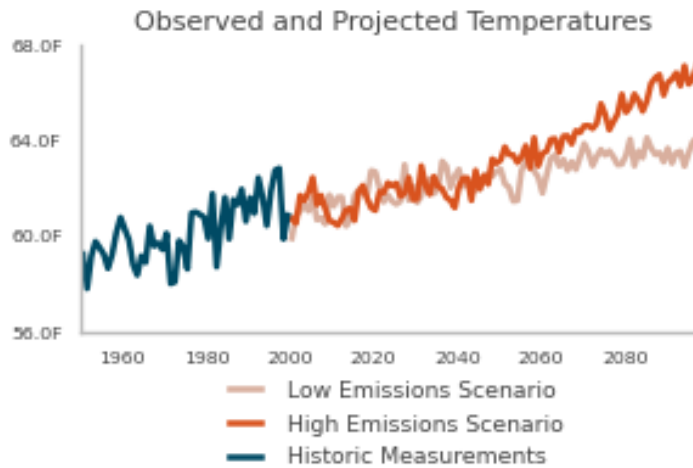
Figure 3.7-5 displays a chart of measured historical (i.e., observed) and projected annual average temperatures in the project area. As shown in the figure, temperatures are expected to rise as part of both the low and high GHG emissions scenarios.<sup>50</sup> The results indicate that temperatures are predicted to increase by 3.4°F under the low emission scenario and 5.8°F under the high emissions scenario.<sup>51</sup>

<sup>48</sup> California Department of Forestry and Fire Protection. Contra Costa County FHSZ Map. December 15, 2019. Available at: [https://osfm.fire.ca.gov/media/6662/fhszs\\_map7.pdf](https://osfm.fire.ca.gov/media/6662/fhszs_map7.pdf). Accessed July 6, 2017.

<sup>49</sup> United States Bureau of Reclamation. 2019. Central Valley Project (CVP) Mid-Pacific Region. Website: <https://www.usbr.gov/mp/cvp/>. Accessed March 19, 2019.

<sup>50</sup> The low and high GHG emissions scenarios are based on IPCC's Special Report on Emissions Scenarios B1 and A1, respectively. The higher global GHG emissions scenario (A1) assumes a global trend of rapid economic growth. The lower GHG emissions scenario (B1) assumes the same global population as in the A1 storyline but with rapid changes in economic structures toward a service and information economy, with reductions in material intensity, and the introduction of clean and resource-efficient technologies. Overall, the B1 scenario places more focus on global environmental sustainability rather than rapid economic growth.

<sup>51</sup> CalAdapt. 2019. Local Climate Snapshots. Website: <http://cal-adapt.org/tools/factsheet/>. Accessed September 30, 2019.

**Figure 3.7-5: Observed and Projected Temperatures in Project Area**

Source: CalAdapt 2019<sup>52</sup>

### **Project Site**

### **3.7.3 - Regulatory Framework**

#### **International**

##### ***Kyoto Protocol***

The Kyoto Protocol is an international agreement linked to the United Nations Framework Convention on Climate Change. The major feature of the Kyoto Protocol is that it sets binding targets for 37 industrialized countries and the European community for reducing GHG emissions at average of five percent against 1990 levels over the five-year period from 2008–2012. The Convention (as discussed above) encouraged industrialized countries to stabilize emissions; however, the Protocol commits them to do so. Developed countries have contributed more emissions over the last 150 years; therefore, the Protocol places a heavier burden on developed nations under the principle of “common but differentiated responsibilities.”

In 2001, President George W. Bush indicated that he would not submit the treaty to the U.S. Senate for ratification, which effectively ended American involvement in the Kyoto Protocol. In December 2009, international leaders met in Copenhagen to address the future of international climate change commitments post-Kyoto. No binding agreement was reached in Copenhagen; however, the Committee identified the long-term goal of limiting the maximum global average temperature increase to no more than 2°C above pre-industrial levels, subject to a review in 2015. The Climate Change Committee held additional meetings in Durban, South Africa in November 2011; Doha, Qatar in November 2012; and Warsaw, Poland in November 2013. The meetings are gradually gaining consensus among participants on individual climate change issues.

On September 23, 2014, more than 100 heads of state and government, and leaders from the private sector and civil society met at the Climate Summit in New York hosted by the United Nations. At the Summit, heads of government, business and civil society announced actions in areas that

<sup>52</sup> Ibid.

would have the greatest impact on reducing emissions, including climate finance, energy, transport, industry, agriculture, cities, forests, and building resilience.

### ***United Nations Climate Change Framework Convention***

On March 21, 1994, the United States joined a number of countries around the world in signing the United Nations Climate Change Framework Convention. Under the Convention, governments agreed to gather and share information on GHG emissions, national policies, and best practices; launch national strategies for addressing GHG emissions and adapting to expected impacts, including the provision of financial and technological support to developing countries; and cooperate in preparing for adaptation to the impacts of climate change.

### ***Paris Climate Change Agreement***

Parties to the United Nations Framework Convention on Climate Change (UNFCCC) reached a landmark agreement on December 12, 2015, in Paris, charting a fundamentally new course in the two-decade-old global climate effort. Culminating a 4-year negotiating round, the new treaty ends the strict differentiation between developed and developing countries that characterized earlier efforts, replacing it with a common framework that commits all countries to put forward their best efforts and to strengthen them in the years ahead. This includes, for the first time, requirements that all parties report regularly on their emissions and implementation efforts, and undergo international review.

The agreement and a companion decision by parties were the key outcomes of the conference, known as the 21<sup>st</sup> session of the UNFCCC Conference of the Parties, or “COP 21.” Together, the Paris Agreement and the accompanying COP decision:

- Reaffirm the goal of limiting global temperature increase well below 2 degrees Celsius, while urging efforts to limit the increase to 1.5 degrees;
- Establish binding commitments by all parties to make “nationally determined contributions” (NDCs), and to pursue domestic measures aimed at achieving them;
- Commit all countries to report regularly on their emissions and “progress made in implementing and achieving” their NDCs, and to undergo international review;
- Commit all countries to submit new NDCs every 5 years, with the clear expectation that they will “represent a progression” beyond previous ones;
- Reaffirm the binding obligations of developed countries under the UNFCCC to support the efforts of developing countries, while for the first time encouraging voluntary contributions by developing countries too;
- Extend the current goal of mobilizing \$100 billion a year in support by 2020 through 2025, with a new, higher goal to be set for the period after 2025;
- Extend a mechanism to address “loss and damage” resulting from climate change, which explicitly will not “involve or provide a basis for any liability or compensation;”
- Require parties engaging in international emissions trading to avoid “double counting;” and

- Call for a new mechanism, similar to the Clean Development Mechanism under the Kyoto Protocol, enabling emission reductions in one country to be counted toward another country's NDC.<sup>53</sup>

On June 1, 2017, President Trump announced the decision for the United States to withdraw from the Paris Climate Accord.<sup>54</sup> California remains committed to combating climate change through programs aimed to reduce GHGs.<sup>55</sup>

## Continental

### ***Western Climate Initiative (Western North America Cap-and-Trade Program)***

Cap-and-trade refers to a policy tool where emissions are limited to a certain amount and can be traded, or provides flexibility on how the emitter can comply. Each emitter caps carbon dioxide emissions from power plants, auctions carbon dioxide emission allowances, and invests the proceeds in strategic energy programs that further reduce emissions, save consumers money, create jobs, and build a clean energy economy. The Western Climate Initiative partner jurisdictions have developed a comprehensive initiative to reduce North America GHG emissions to 15 percent below 2005 levels by 2020. The partners are California, British Columbia, Manitoba, Ontario, and Quebec. Currently only California and Quebec are participating in the cap-and-trade program.<sup>56</sup>

## Federal

### ***Clean Air Act***

Coinciding with the 2009 meeting in Copenhagen, on December 7, 2009, the United States Environmental Protection Agency (EPA) issued an Endangerment Finding under Section 202(a) of the Clean Air Act, opening the door to federal regulation of GHGs. The Endangerment Finding notes that GHGs threaten public health and welfare and are subject to regulation under the Clean Air Act. To date, the EPA has not promulgated regulations on GHG emissions, but it has already begun to develop them.

Previously the EPA had not regulated GHGs under the Clean Air Act, because it asserted that the Act did not authorize it to issue mandatory regulations to address global climate change and that such regulation would be unwise without an unequivocally established causal link between GHGs and the increase in global surface air temperatures. In *Massachusetts v. Environmental Protection Agency et al.* (127 S. Ct. 1438 (2007)), however, the U.S. Supreme Court held that GHGs are pollutants under the Clean Air Act and directed the EPA to decide whether the gases endangered public health or welfare (see discussion below).

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<sup>53</sup> Center for Climate and Energy Solutions (C2ES). 2015. Outcomes of the U.N. Climate Change Conference. Website: <http://www.c2es.org/international/negotiations/cop21-paris/summary>. Accessed December 27, 2019.

<sup>54</sup> The White House. Statement by President Trump on the Paris Climate Accord. Website: <https://www.whitehouse.gov/briefings-statements/statement-president-trump-paris-climate-accord/>. Accessed December 27, 2019.

<sup>55</sup> California Air Resources Board (ARB). 2017. New Release: California and China Team Up to Push for Millions More Zero-emission Vehicles. Website: <https://ww2.arb.ca.gov/news/california-and-china-team-push-millions-more-zero-emission-vehicles>. Accessed December 27, 2019.

<sup>56</sup> Center for Climate and Energy Solutions (C2ES). 2015b. Multi-State Climate Initiatives. Website: <http://www.c2es.org/category/policy-hub/state/>. Accessed December 27, 2019.

The EPA had also not moved aggressively to regulate GHGs because it expected Congress to make progress on GHG legislation, primarily from the standpoint of a cap-and-trade system. However, proposals circulated in both the House of Representative and Senate have been controversial and it may be some time before the U.S. Congress adopts major climate change legislation. The EPA's Endangerment Finding paves the way for federal regulation of GHGs with or without Congress.

### ***U.S. Clean Air Act Permitting Programs (New GHG Source Review)***

The EPA issued a final rule on May 13, 2010, that establishes thresholds for GHGs that define when permits under the New Source Review Prevention of Significant Deterioration and Title V Operating Permit programs are required for new and existing industrial facilities. This final rule “tailors” the requirements of these Clean Air Act permitting programs to limit which facilities will be required to obtain Prevention of Significant Deterioration and Title V permits. In the preamble to the revisions to the federal code of regulations, the EPA states:

This rulemaking is necessary because without it the Prevention of Significant Deterioration and Title V requirements would apply, as of January 2, 2011, at the 100 or 250 tons per year levels provided under the Clean Air Act, greatly increasing the number of required permits, imposing undue costs on small sources, overwhelming the resources of permitting authorities, and severely impairing the functioning of the programs. EPA is relieving these resource burdens by phasing in the applicability of these programs to greenhouse gas sources, starting with the largest greenhouse gas emitters. This rule establishes two initial steps of the phase-in. The rule also commits the agency to take certain actions on future steps addressing smaller sources, but excludes certain smaller sources from Prevention of Significant Deterioration and Title V permitting for greenhouse gas emissions until at least April 30, 2016.

The EPA estimates that facilities responsible for nearly 70 percent of the national GHG emissions from stationary sources will be subject to permitting requirements under this rule. This includes the nation's largest GHG emitters—power plants, refineries, and cement production facilities.

### ***Energy Independence and Security Act***

The Energy Policy Act of 2005 created the Renewable Fuel Standard program. The Energy Independence and Security Act of 2007 expanded this program by:

- Expanding the Renewable Fuel Standard program to include diesel in addition to gasoline;
- Increasing the volume of renewable fuel required to be blended into transportation fuel from 9 billion gallons in 2008 to 36 billion gallons by 2022;
- Establishing new categories of renewable fuel, and setting separate volume requirements for each one; and
- Requiring EPA to apply life-cycle GHG performance threshold standards to ensure that each category of renewable fuel emits fewer GHGs than the petroleum fuel it replaces.

This expanded Renewable Fuel Standard program lays the foundation for achieving substantial reductions of GHG emissions from the use of renewable fuels, reducing the use of imported petroleum, and encouraging the development and expansion of the nation's renewable-fuels sector.

Signed on December 19, 2007, by President George W. Bush, the Energy Independence and Security Act (EISA) of 2007 aims to:

- move the United States toward greater energy independence and security;
- increase the production of clean renewable fuels;
- protect consumers;
- increase the efficiency of products, buildings, and vehicles;
- promote research on and deploy GHG capture and storage options;
- improve the energy performance of the Federal Government; and
- increase U.S. energy security, develop renewable fuel production, and improve vehicle fuel economy.

EISA reinforces the energy reduction goals for federal agencies put forth in Executive Order 13423, as well as introduces more aggressive requirements. The three key provisions enacted are the Corporate Average Fuel Economy Standards, the Renewable Fuel Standard, and the appliance/lighting efficiency standards.

The EPA is committed to developing, implementing, and revising both regulations and voluntary programs under the following subtitles in EISA, among others:

- Increased Corporate Average Fuel Economy Standards
- Federal Vehicle Fleets
- Renewable Fuel Standard
- Biofuels Infrastructure
- Carbon Capture and Sequestration<sup>57</sup>

### ***EPA and National Highway Traffic Safety Administration Light-Duty Vehicle GHG Emission Standards and Corporate Average Fuel Economy Standards Final Rule***

Congress first passed the Corporate Average Fuel Economy law in 1975 to increase the fuel economy of cars and light duty trucks. The law has become more stringent over time. On May 19, 2009, the President put in motion a new national policy to increase fuel economy for all new cars and trucks sold in the United States. On April 1, 2010, the EPA and the United States Department of Transportation's National Highway Traffic Safety Administration (NHTSA) announced a joint final rule establishing a national program that would reduce GHG emissions and improve fuel economy for new cars and trucks sold in the United States.

The first phase of the national program would apply to passenger cars, light-duty trucks, and medium-duty passenger vehicles, covering model years 2012 through 2016. They require these

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<sup>57</sup> United States Environmental Protection Agency (EPA). Summary of the Energy Independence and Security Act. Website: <https://www.epa.gov/laws-regulations/summary-energy-independence-and-security-act>. Accessed December 27, 2019.



vehicles to meet an estimated combined average emissions level of 250 grams of CO<sub>2</sub> per mile, equivalent to 35.5 miles per gallon if the automobile industry were to meet this CO<sub>2</sub> level solely through fuel economy improvements. Together, these standards would cut CO<sub>2</sub> emissions by an estimated 960 MMT and 1.8 billion barrels of oil over the lifetime of the vehicles sold under the program (model years 2012–2016).

The EPA and the NHTSA issued final rules on a second-phase joint rulemaking, establishing national standards for light-duty vehicles for model years 2017 through 2025 in August 2012.<sup>58</sup> The new standards for model years 2017 through 2025 apply to passenger cars, light-duty trucks, and medium duty passenger vehicles. The final standards are projected to result in an average industry fleet wide level of 163 grams/mile of CO<sub>2</sub> in model year 2025, which is equivalent to 54.5 miles per gallon (mpg) if achieved exclusively through fuel economy improvements.

The EPA and NHTSA issued final rules for the first national standards to reduce GHG emissions and improve fuel efficiency of heavy-duty trucks and buses on September 15, 2011, which became effective November 14, 2011. For combination tractors, the agencies are proposing engine and vehicle standards that began in the 2014 model year and achieve up to a 20-percent reduction in CO<sub>2</sub> emissions and fuel consumption by the 2018 model year. For heavy-duty pickup trucks and vans, the agencies are proposing separate gasoline and diesel truck standards, which phase in starting in the 2014 model year and achieve up to a 10-percent reduction for gasoline vehicles, and a 15-percent reduction for diesel vehicles by 2018 model year (12 and 17 percent respectively if accounting for air conditioning leakage). Lastly, for vocational vehicles, the engine and vehicle standards would achieve up to a 10-percent reduction in fuel consumption and CO<sub>2</sub> emissions from the 2014 to 2018 model years.

The State of California has received a waiver from the EPA to have separate, stricter corporate average fuel economy standards. Although global climate change did not become an international concern until the 1980s, efforts to reduce energy consumption began in California in response to the oil crisis in the 1970s, resulting in the incidental reduction of GHG emissions. In order to manage the State's energy needs and promote energy efficiency, AB 1575 created the California Energy Commission (CEC) in 1975. On September 19, 2019, the EPA announced a formal revocation of California's waiver of preemption, and together with the NHTSA issued a final action entitled the "One National Program Rule" to enable the government to provide nationwide uniform fuel economy and greenhouse gas emission standards for automobile and light duty trucks.<sup>59</sup> On November 15, 2019, California and 23 other states filed suit against the EPA over the vehicle waiver revocation. The ARB has announced that during the period the federal action is in effect, the ARB will administer the affected portions of its program on a voluntary basis, including issuing certifications for the greenhouse gas emissions and zero-emissions vehicle programs.<sup>60</sup>

<sup>58</sup> United States Environmental Protection Agency (EPA). 2012. Final Rule for Model Year 2017 and Later Light-Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards. Website: <https://www.epa.gov/regulations-emissions-vehicles-and-engines/final-rule-model-year-2017-and-later-light-duty-vehicle>. Accessed December 15, 2019.

<sup>59</sup> United States Environmental Protection Agency (EPA). 2019. One National Program Rule on Federal Preemption of State Fuel Economy Standards. September 19. Website: <https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockkey=P100X14W.pdf>. Accessed March 4, 2020.

<sup>60</sup> California Air Resources Board (ARB). 2020. ARB Waiver Timeline. Website: <https://ww2.arb.ca.gov/resources/documents/carb-waiver-timeline>. Accessed March 4, 2020.

***Massachusetts et al. v. EPA (U.S. Supreme Court GHG Endangerment Ruling)***

*Massachusetts et al. v. EPA* (Supreme Court Case 05-1120) was argued before the United States (U.S.) Supreme Court on November 29, 2006, in which it was petitioned that the EPA regulate four GHGs, including CO<sub>2</sub>, under Section 202(a)(1) of the Clean Air Act (CAA). A decision was made on April 2, 2007, in which the Supreme Court found that GHGs are air pollutants covered by the CAA. The Court held that the Administrator must determine whether emissions of GHGs from new motor vehicles cause or contribute to air pollution, which may reasonably be anticipated to endanger public health or welfare, or whether the science is too uncertain to make a reasoned decision. On December 7, 2009, the EPA Administrator signed two distinct findings regarding GHGs under section 202(a) of the CAA:

- **Endangerment Finding:** The Administrator finds that the current and projected concentrations of the six key well-mixed greenhouse gases—CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, HFCs, PFCs, and SF<sub>6</sub>—in the atmosphere threaten the public health and welfare of current and future generations; and
- **Cause or Contribute Finding:** The Administrator finds that the combined emissions of these well-mixed greenhouse gases from new motor vehicles and new motor vehicle engines contribute to the greenhouse gas pollution, which threatens public health and welfare.

These findings do not impose requirements on industry or other entities. However, this was a prerequisite for implementing GHG emissions standards for vehicles, as discussed under “Clean Vehicles” below. After a lengthy legal challenge, the U.S. Supreme Court declined to review an Appeals Court ruling upholding that upheld the EPA Administrator findings.

***U.S. Consolidated Appropriations Act (Mandatory GHG Reporting)***

The Consolidated Appropriations Act of 2008, passed in December 2007, requires the establishment of mandatory GHG reporting requirements. On September 22, 2009, the EPA issued the Final Mandatory Reporting of Greenhouse Gases Rule, which became effective January 1, 2010. The rule requires reporting of GHG emissions from large sources and suppliers in the United States, and is intended to collect accurate and timely emissions data to inform future policy decisions. Under the rule, suppliers of fossil fuels or industrial GHGs, manufacturers of vehicles and engines, and facilities that emit 25,000 metric tons or more per year of GHG emissions are required to submit annual reports to the EPA. The first annual reports for the largest emitting facilities, covering calendar year 2010, were submitted to EPA in 2011.

**State*****California AB 1493: Pavley Regulations and Fuel Efficiency Standards***

California AB 1493, enacted on July 22, 2002, required the ARB to develop and adopt regulations that reduce GHGs emitted by passenger vehicles and light duty trucks. Implementation of the regulation was delayed by lawsuits filed by automakers and by the EPA’s denial of an implementation waiver. The EPA subsequently granted the requested waiver in 2009, which was upheld by the by the U.S. District Court for the District of Columbia in 2011.<sup>61</sup>

<sup>61</sup> California Air Resources Board (ARB). 2013. Clean Car Standards—Pavley, Assembly Bill 1493. Website: <https://ww3.arb.ca.gov/cc/ccms/ccms.htm>. Accessed December 27, 2019.

The standards are to be phased in during the 2009 through 2016 model years. When fully phased in, the near-term (2009–2012) standards will result in an approximately 22-percent reduction compared with the 2002 fleet, and the mid-term (2013–2016) standards will result in about a 30 percent reduction. Several technologies stand out as providing significant reductions in emissions at favorable costs. These include discrete variable valve lift or camless valve actuation to optimize valve operation rather than relying on fixed valve timing and lift as has historically been done; turbocharging to boost power and allow for engine downsizing; improved multi-speed transmissions; and improved air conditioning systems that operate optimally, leak less, and/or use an alternative refrigerant.<sup>62</sup>

The second phase of the implementation for the Pavley bill was incorporated into Amendments to the Low Emission Vehicle (LEV) Program referred to as LEV III or the Advanced Clean Cars program. The Advanced Clean Car program combines the control of smog-causing pollutants and GHG emissions into a single coordinated package of requirements for model years 2017 through 2025. The regulation will reduce GHGs from new cars by 34 percent from 2016 levels by 2025. The new rules will reduce pollutants from gasoline and diesel-powered cars, and deliver increasing numbers of zero-emission technologies, such as full battery electric cars, newly emerging plug-in hybrid electric vehicles and hydrogen fuel cell cars. The regulations will also ensure adequate fueling infrastructure is available for the increasing numbers of hydrogen fuel cell vehicles planned for deployment in California.<sup>63</sup>

#### **California Executive Order S-3-05 (GHG Emissions Reduction Targets)**

Former California Governor Arnold Schwarzenegger announced on June 1, 2005, through Executive Order S-3-05, the following reduction targets for GHG emissions:

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

The 2050 reduction goal represents what some scientists believe is necessary to reach levels that will stabilize the climate. The 2020 goal was established to be a mid-term target.

#### **California AB 32: Global Warming Solutions Act and Scoping Plan**

In response to Executive Order S-3-05, the California State Legislature enacted AB 32, the California Global Warming Solutions Act of 2006. AB 32 required that GHGs emitted in California be reduced to 1990 levels by the year 2020. “Greenhouse gases” as defined under AB 32 include CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, HFCs, PFCs, and SF<sub>6</sub>. Since AB 32 was enacted, a seventh chemical, nitrogen trifluoride, has also been added to the list of GHGs. The ARB is the State agency charged with monitoring and regulating sources of GHGs.

The ARB approved the 1990 GHG emissions level of 427 MMT CO<sub>2</sub>e on December 6, 2007.<sup>64</sup> Therefore, to meet the State’s target, emissions generated in California in 2020 are required to be equal to or less than 427 MMT CO<sub>2</sub>e. Emissions in 2020 in a Business as Usual (BAU) scenario were

<sup>62</sup> California Air Resources Board (ARB). 2013. Facts About the Clean Cars Program. Website: [http://www.arb.ca.gov/msprog/zevprog/factsheets/advanced\\_clean\\_cars\\_eng.pdf](http://www.arb.ca.gov/msprog/zevprog/factsheets/advanced_clean_cars_eng.pdf). Accessed December 27, 2019.

<sup>63</sup> California Air Resources Board (ARB). 2011. Status of Scoping Plan Recommended Measures. Website: [https://ww3.arb.ca.gov/cc/scopingplan/status\\_of\\_scoping\\_plan\\_measures.pdf](https://ww3.arb.ca.gov/cc/scopingplan/status_of_scoping_plan_measures.pdf). Accessed December 27, 2019.

<sup>64</sup> California Air Resources Board (ARB). 2007. Staff Report. California 1990 Greenhouse Gas Level and 2020 Emissions Limit. November 16, 2007. Website: [https://ww3.arb.ca.gov/cc/inventory/pubs/reports/staff\\_report\\_1990\\_level.pdf](https://ww3.arb.ca.gov/cc/inventory/pubs/reports/staff_report_1990_level.pdf). Accessed December 27, 2019.

estimated to be 596 MMT CO<sub>2</sub>e, which do not account for reductions from AB 32 regulations.<sup>65</sup> At that rate, a 28 percent reduction was required to achieve the 427 MMT CO<sub>2</sub>e 1990 inventory. In October 2010, the ARB prepared an updated 2020 forecast to account for the effects of the 2008 recession and slower forecasted growth. The 2020 inventory without the benefits of adopted regulation is now estimated at 545 MMT CO<sub>2</sub>e. Therefore, under the updated forecast, a 21.7 percent reduction from BAU is required to achieve 1990 levels.<sup>66</sup>

The State has made steady progress in implementing AB 32 and achieving targets included in Executive Order S-3-05. The progress is shown in updated emission inventories prepared by ARB for 2000 through 2012 to show progress achieved to date.<sup>67</sup> The State has also achieved the Executive Order S-3-05 target for 2010 of reducing GHG emissions to 2000 levels. The 2010 emission inventory achieved this target.

The ARB Climate Change Scoping Plan (Scoping Plan) contains measures designed to reduce the State's emissions to 1990 levels by the year 2020 to comply with AB 32.<sup>68</sup> The Scoping Plan identifies recommended measures for multiple GHG emission sectors and the associated emission reductions needed to achieve the year 2020 emissions target—each sector has a different emission reduction target. Most of the measures target the transportation and electricity sectors. As stated in the Scoping Plan, the key elements of the strategy for achieving the 2020 GHG target include:

- Expanding and strengthening existing energy efficiency programs as well as building and appliance standards;
- Achieving a Statewide renewables energy mix of 33 percent;
- Developing a California cap-and-trade program that links with other Western Climate Initiative partner programs to create a regional market system;
- Establishing targets for transportation-related GHG emissions for regions throughout California and pursuing policies and incentives to achieve those targets;
- Adopting and implementing measures pursuant to existing State laws and policies, including California's clean car standards, goods movement measures, and the Low Carbon Fuel Standard; and
- Creating targeted fees, including a public goods charge on water use, fees on high global warming potential gases, and a fee to fund the administrative costs of the State's long-term commitment to AB 32 implementation.

In addition, the Scoping Plan differentiates between “capped” and “uncapped” strategies. Capped strategies are subject to the proposed cap-and-trade program. The Scoping Plan states that the

<sup>65</sup> California Air Resources Board (ARB). 2008. (includes edits made in 2009) Climate Change Scoping Plan, a framework for change. Website: [https://ww3.arb.ca.gov/cc/scopingplan/document/adopted\\_scoping\\_plan.pdf](https://ww3.arb.ca.gov/cc/scopingplan/document/adopted_scoping_plan.pdf). Accessed December 27, 2019.

<sup>66</sup> California Air Resources Board (ARB). 2010. 2020 Greenhouse Gas Emissions Projection and BAU Scenario Emissions Estimate. Website: [https://ww3.arb.ca.gov/cc/inventory/archive/captrade\\_2010\\_projection.pdf](https://ww3.arb.ca.gov/cc/inventory/archive/captrade_2010_projection.pdf). Accessed December 27, 2019.

<sup>67</sup> California Air Resources Board (ARB). 2014. California Greenhouse Gas Emissions for 2000 to 2012—Trends of Emissions and Other Indicators. Website: [https://ww3.arb.ca.gov/cc/inventory/pubs/reports/ghg\\_inventory\\_00-12\\_report.pdf](https://ww3.arb.ca.gov/cc/inventory/pubs/reports/ghg_inventory_00-12_report.pdf). Accessed December 27, 2019.

<sup>68</sup> California Air Resources Board (ARB). 2008. (includes edits made in 2009) Climate Change Scoping Plan, a framework for change. Website: [https://ww3.arb.ca.gov/cc/scopingplan/document/adopted\\_scoping\\_plan.pdf](https://ww3.arb.ca.gov/cc/scopingplan/document/adopted_scoping_plan.pdf). Accessed December 27, 2019.

inclusion of these emissions within the cap-and trade program will help ensure that the year 2020 emission targets are met despite some degree of uncertainty in the emission reduction estimates for any individual measure. Implementation of the capped strategies is calculated to achieve a sufficient amount of reductions by 2020 to achieve the emission target contained in AB 32. Uncapped strategies that will not be subject to the cap-and-trade emissions caps and requirements are provided as a margin of safety by accounting for additional GHG emission reductions.<sup>69</sup>

ARB approved the First Update to the Scoping Plan (Update) on May 22, 2014. The Update identifies the next steps for California's climate change strategy. The Update shows how California continues on its path to meet the near-term 2020 GHG limit, but also sets a path toward long-term, deep GHG emission reductions. The report establishes a broad framework for continued emission reductions beyond 2020, on the path to 80 percent below 1990 levels by 2050. The Update identifies progress made to meet the near-term objectives of AB 32 and defines California's climate change priorities and activities Climate for the next several years. The Update does not set new targets for the State, but describes a path that would achieve the long term 2050 goal of Executive Order S-05-03 for emissions to decline to 80 percent below 1990 levels by 2050.

AB 32 does not give ARB a legislative mandate to set a target beyond the 2020 target from AB 32 or to adopt additional regulations to achieve a post-2020 target. SB 32 (discussed below) is intended to pick up where AB 32 left off.

The Cap-and-Trade Program is a key element of the Scoping Plan. It sets a Statewide limit on sources responsible for 85 percent of California's GHG emissions, and establishes a price signal needed to drive long-term investment in cleaner fuels and more efficient use of energy. The program is designed to provide covered entities the flexibility to seek out and implement the lowest cost options to reduce emissions. The program conducted its first auction in November 2012. Compliance obligations began for power plants and large industrial sources in January 2013. Other significant milestones include linkage to Quebec's cap-and-trade system in January 2014 and starting the compliance obligation for distributors of transportation fuels, natural gas, and other fuels in January 2015.<sup>70</sup>

The Cap-and-Trade Program provides a firm cap, ensuring that the 2020 Statewide emission limit will not be exceeded. An inherent feature of the Cap-and-Trade program is that it does not guarantee GHG emissions reductions in any discrete location or by any particular source. Rather, GHG emissions reductions are only guaranteed on an accumulative basis. As summarized by ARB in the First Update:

The Cap-and-Trade Regulation gives companies the flexibility to trade allowances with others or take steps to cost-effectively reduce emissions at their own facilities. Companies that emit more have to turn in more allowances or other compliance instruments. Companies that can cut their GHG emissions have to turn in fewer allowances. But as the cap declines, aggregate emissions must be reduced. In other words, a covered entity theoretically could increase its GHG emissions every year and still comply with the Cap-and-Trade Program if there is a reduction in GHG

<sup>69</sup> California Air Resources Board (ARB). 2008 (includes edits made in 2009). Climate Change Scoping Plan, a framework for change. Website: [http://www.arb.ca.gov/cc/scopingplan/document/adopted\\_scoping\\_plan.pdf](http://www.arb.ca.gov/cc/scopingplan/document/adopted_scoping_plan.pdf). Accessed December 27, 2019.

<sup>70</sup> California Air Resources Board (ARB). 2015. ARB Emissions Trading Program. Website: [http://www.arb.ca.gov/cc/capandtrade/guidance/cap\\_trade\\_overview.pdf](http://www.arb.ca.gov/cc/capandtrade/guidance/cap_trade_overview.pdf). Accessed December 27, 2019.

emissions from other covered entities. Such a focus on aggregate GHG emissions is considered appropriate because climate change is a global phenomenon, and the effects of GHG emissions are considered cumulative.<sup>71</sup>

The Cap-and-Trade Program works with other direct regulatory measures and provides an economic incentive to reduce emissions. If California’s direct regulatory measures reduce GHG emissions more than expected, then the Cap-and-Trade Program will be responsible for relatively fewer emissions reductions. If California’s direct regulatory measures reduce GHG emissions less than expected, then the Cap-and-Trade Program will be responsible for relatively more emissions reductions. Thus, the Cap-and-Trade Program assures that California will meet its 2020 GHG emissions reduction mandate:

The Cap-and-Trade Program establishes an overall limit on GHG emissions from most of the California economy—the “capped sectors.” Within the capped sectors, some of the reductions are being accomplished through direct regulations, such as improved building and appliance efficiency standards, the [Low Carbon Fuel Standard] LCFS, and the 33 percent [Renewables Portfolio Standard] RPS. Whatever additional reductions are needed to bring emissions within the cap is accomplished through price incentives posed by emissions allowance prices. Together, direct regulation and price incentives assure that emissions are brought down cost-effectively to the level of the overall cap. The Cap-and-Trade Regulation provides assurance that California’s 2020 limit will be met because the regulation sets a firm limit on 85 percent of California’s GHG emissions. In sum, the Cap-and-Trade Program will achieve aggregate, rather than site specific or project-level, GHG emissions reductions. Also, due to the regulatory architecture adopted by ARB in AB 32, the reductions attributed to the Cap-and-Trade Program can change over time depending on the State’s emissions forecasts and the effectiveness of direct regulatory measures.<sup>72</sup>

### **California SB 375: Sustainable Communities and Climate Protection Act**

SB 375 was signed into law on September 30, 2008. According to SB 375, the transportation sector is the largest contributor of GHG emissions, which emits over 40 percent of the total GHG emissions in California. SB 375 states, “Without improved land use and transportation policy, California will not be able to achieve the goals of AB 32.” SB 375 does the following: (1) requires metropolitan planning organizations to include sustainable community strategies in their regional transportation plans for reducing GHG emissions, (2) aligns planning for transportation and housing, and (3) creates specified incentives for the implementation of the strategies.

Concerning CEQA, SB 375, as codified in Public Resources Code Section 21159.28, states that CEQA findings determinations for certain projects are not required to reference, describe, or discuss (1) growth inducing impacts or (2) any project-specific or cumulative impacts from cars and light-duty truck trips generated by the project on global warming or the regional transportation network if the project:

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<sup>71</sup> California Air Resources Board (ARB). 2014. First Update to the Climate Change Scoping Plan. Website: <https://ww3.arb.ca.gov/cc/scopingplan/document/updatedscopingplan2013.htm>. Accessed December 27, 2019.

<sup>72</sup> Ibid.

1. Is in an area with an approved sustainable communities strategy or an alternative planning strategy that the ARB accepts as achieving the greenhouse gas emission reduction targets;
2. Is consistent with that strategy (in designation, density, building intensity, and applicable policies); and
3. Incorporates the mitigation measures required by an applicable prior environmental document.

### ***California SB 1368: Emission Performance Standards***

In 2006, the State Legislature adopted SB 1368, which was subsequently signed into law by the Governor. SB 1368 directs the California Public Utilities Commission to adopt a performance standard for GHG emissions for the future power purchases of California utilities. SB 1368 seeks to limit carbon emissions associated with electrical energy consumed in California by forbidding procurement arrangements for energy longer than 5 years from resources that exceed the emissions of a relatively clean, combined cycle natural gas power plant. Because of the carbon content of its fuel source, a coal-fired plant cannot meet this standard because such plants emit roughly twice as much carbon as natural gas, combined cycle plants. Accordingly, the new law effectively prevents California's utilities from investing in, otherwise financially supporting, or purchasing power from new coal plants located in or out of the State. The California Public Utilities Commission adopted the regulations required by SB 1368 on August 29, 2007. The regulations implementing SB 1368 establish a standard for baseload generation owned by, or under long-term contract to publicly owned utilities, of 1,100 lbs CO<sub>2</sub> per megawatt-hour (MWh).

### ***California Executive Order S-01-07: Low Carbon Fuel Standard***

The Governor signed Executive Order S 01-07 on January 18, 2007. The order mandates that a Statewide goal shall be established to reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020. In particular, the executive order established a Low Carbon Fuel Standard (LCFS) and directed the Secretary for Environmental Protection to coordinate the actions of the California Energy Commission, the ARB, the University of California, and other agencies to develop and propose protocols for measuring the "life-cycle carbon intensity" of transportation fuels. This analysis supporting development of the protocols was included in the State Implementation Plan for alternative fuels (State Alternative Fuels Plan adopted by California Energy Commission on December 24, 2007) and was submitted to ARB for consideration as an "early action" item under AB 32. The ARB adopted the Low Carbon Fuel Standard on April 23, 2009.

The Low Carbon Fuel Standard was subject to legal challenge in 2011. Ultimately, on August 8, 2013, the Fifth District Court of Appeal (California) ruled that the ARB failed to comply with CEQA and the Administrative Procedure Act (APA) when adopting regulations for Low Carbon Fuel Standards. In a partially published opinion, the Court of Appeal directed that Resolution 09-31 and two Executive Orders of ARB approving LCFS regulations promulgated to reduce GHG emissions be set aside. However, the court tailored its remedy to protect the public interest by allowing the LCFS regulations to remain operative while ARB complies with the procedural requirements it failed to satisfy.

To address the Court ruling, ARB was required to bring a new LCFS regulation to the Board for consideration in February 2015. The proposed LCFS regulation was required to contain revisions to the 2010 LCFS as well as new provisions designed to foster investments in the production of the low-carbon fuels, offer additional flexibility to regulated parties, update critical technical information, simplify and streamline program operations, and enhance enforcement. The second public hearing for the new LCFS regulation was held on September 24, 2015 and September 25, 2015, where the LCFS Regulation was adopted. The Final Rulemaking Package adopting the regulation was filed with the Office of Administrative Law (OAL) on October 2, 2015. The OAL approved the regulation on November 16, 2015.<sup>73</sup>

### ***California Executive Order S-13-08***

Executive Order S-13-08 states that “climate change in California during the next century is expected to shift precipitation patterns, accelerate sea level rise and increase temperatures, thereby posing a serious threat to California’s economy, to the health and welfare of its population and to its natural resources.” Pursuant to the requirements in the order, the 2009 California Climate Adaptation Strategy was adopted, which is the “. . . first Statewide, multi-sector, region-specific, and information-based climate change adaptation strategy in the United States.” Objectives include analyzing risks of climate change in California, identifying and exploring strategies to adapt to climate change, and specifying a direction for future research.

### ***California SBX 7-7: Water Conservation Act***

This 2009 legislation directs urban retail water suppliers to set individual 2020 per capita water use targets and begin implementing conservation measures to achieve those goals. Meeting this Statewide goal of 20 percent decrease in demand will result in a reduction of almost 2 million acre-feet in urban water use in 2020.

### ***California SB 97 and the CEQA Guidelines Update***

Passed in August 2007, SB 97 added Section 21083.05 to the Public Resources Code. The Code states “(a) On or before July 1, 2009, the Office of Planning and Research shall prepare, develop, and transmit to the Resources Agency guidelines for the mitigation of GHG emissions or the effects of GHG emissions as required by this division, including, but not limited to, effects associated with transportation or energy consumption. (b) On or before January 1, 2010, the Resources Agency shall certify and adopt guidelines prepared and developed by the Office of Planning and Research pursuant to subdivision (a).”

Section 21097 was also added to the Public Resources Code, which provided an exemption until January 1, 2010 for transportation projects funded by the Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006 or projects funded by the Disaster Preparedness and Flood Prevention Bond Act of 2006, in stating that the failure to analyze adequately the effects of GHGs would not violate CEQA. The Natural Resources Agency completed the approval process and the Amendments became effective on March 18, 2010.

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<sup>73</sup> California Air Resources Board (ARB). 2015e. Low Carbon Fuel Standard Regulation. Website: <https://ww3.arb.ca.gov/regact/2015/lcfs2015/lcfs2015.htm>. Accessed December 27, 2019.



The 2010 CEQA Amendments provide guidance to public agencies regarding the analysis and mitigation of the effects of GHG emissions in CEQA documents. The CEQA Amendments fit within the existing CEQA framework by amending existing CEQA Guidelines to reference climate change.

Section 15064.4(b) of the CEQA Guidelines provides direction for lead agencies for assessing the significance of impacts of GHG emissions:

- The extent to which the 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; or
- 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. Such regulations or requirements must be adopted by the relevant public agency through a public review process and must include specific requirements that reduce or mitigate the project's incremental contribution of GHG emissions. If there is substantial evidence that the possible effects of a particular project are still cumulatively considerable notwithstanding compliance with the adopted regulations or requirements, an EIR must be prepared for the project.

The CEQA Guidelines amendments do not identify a threshold of significance for GHG emissions, nor do they prescribe assessment methodologies or specific mitigation measures. Instead, they call for a "good-faith effort, based on available information, to describe, calculate, or estimate the amount of greenhouse gas emissions resulting from a project." The amendments encourage lead agencies to consider many factors in performing a CEQA analysis and preserve lead agencies' discretion to make their own determinations based upon substantial evidence. The amendments also encourage public agencies to make use of programmatic mitigation plans and programs from which to tier when they perform individual project analyses.

Also amended were CEQA Guidelines Sections 15126.4 and 15130, which address mitigation measures and cumulative impacts, respectively. GHG mitigation measures are referenced in general terms, but no specific measures are championed. The revision to the cumulative impact discussion requirement (Section 15130) simply directs agencies to analyze GHG emissions in an EIR when a project's incremental contribution of emissions may be cumulatively considerable; however, it does not answer the question of when emissions are cumulatively considerable.

Section 15183.5 permits programmatic GHG analysis and later project-specific tiering, as well as the preparation of GHG Reduction Plans. Compliance with such plans can support a determination that a project's cumulative effect is not cumulatively considerable, according to Section 15183.5(b).

In addition, the 2010 CEQA amendments revised Appendix F of the CEQA Guidelines, which focuses on Energy Conservation. The sample environmental checklist in CEQA Guidelines Appendix G was amended to include GHG questions. The most recent sample environmental checklist in Appendix G was further amended in 2018 to include two energy questions.

CEQA emphasizes that the effects of GHG emissions are cumulative, and should be analyzed in the context of CEQA's requirements for cumulative impacts analysis (CEQA Guidelines § 15130(f)).

### **California SB 350: Clean Energy and Pollution Reduction Act**

In 2015, the State legislature approved - and the Governor signed into law - SB 350 which reaffirms California's commitment to reducing its GHG emissions and addressing climate change. Key provisions include an increase in the renewables portfolio standard (RPS), higher energy efficiency requirements for buildings, initial strategies towards a regional electricity grid, and improved infrastructure for electric vehicle charging stations. Provisions for a 50 percent reduction in the use of petroleum Statewide were removed from the Bill due to opposition and concern that it would prevent the Bill's passage. Specifically, SB 350 requires the following to reduce Statewide GHG emissions:

- Increase the amount of electricity procured from renewable energy sources from 33 percent to 50 percent by 2030, with interim targets of 40 percent by 2024, and 25 percent by 2027.
- Double the energy efficiency in existing buildings by 2030. This target will be achieved through the California Public Utility Commission, the California Energy Commission, and local publicly owned utilities.
- Reorganize the Independent System Operator (ISO) to develop more regional electrify transmission markets and to improve accessibility in these markets, which will facilitate the growth of renewable energy markets in the western United States.<sup>74</sup>

### **California Executive Order B-30-15**

On April 29, 2015, an executive order was issued by the Governor to establish a California GHG emissions reduction target of 40 percent below 1990 levels by 2030. The Governor's executive order aligns California's GHG reduction targets with those of leading international governments ahead of the United Nations Climate Change Conference in Paris late 2015. The executive order sets a new interim Statewide GHG emission reduction target to reduce GHG emissions to 40 percent below 1990 levels by 2030 in order to ensure California meets its target of reducing GHG emissions to 80 percent below 1990 levels by 2050, and directs the ARB to update the Climate Change Scoping Plan to express the 2030 target in terms of MM CO<sub>2</sub>e. The executive order also requires the State's climate adaptation plan to be updated every three years and for the State to continue its climate change research program, among other provisions. As with Executive Order S-3-05, this executive order is not legally enforceable against local governments and the private sector. Legislation that would update AB 32 to make post 2020 targets and requirements a mandate is in process in the State Legislature.

### **California Senate Bill 32**

The Governor signed SB 32 in September of 2016, giving the ARB the statutory responsibility to include the 2030 target previously contained in Executive Order B-30-15 in the 2017 Scoping Plan Update. SB 32 states that "In adopting rules and regulations to achieve the maximum technologically feasible and cost-effective greenhouse gas emissions reductions authorized by this division, the state

<sup>74</sup> California Legislative Information (California Leginfo). 2015. Senate Bill 350 Clean Energy and Pollution Reduction Act of 2015. Website: [https://leginfo.ca.gov/faces/billNavClient.xhtml?bill\\_id=201520160SB350](https://leginfo.ca.gov/faces/billNavClient.xhtml?bill_id=201520160SB350). Accessed December 27, 2019.

[air resources] board shall ensure that statewide greenhouse gas emissions are reduced to at least 40 percent below the statewide greenhouse gas emissions limit no later than December 31, 2030.” The 2017 Climate Change Scoping Plan Update addressing the SB 32 targets was adopted on December 14, 2017. The major elements of the framework proposed to achieve the 2030 target are as follows:

1. SB 350
  - Achieve 50 percent Renewables Portfolio Standard (RPS) by 2030.
  - Doubling of energy efficiency savings by 2030.
2. Low Carbon Fuel Standard (LCFS)
  - Increased stringency (reducing carbon intensity 18 percent by 2030, up from 10 percent in 2020).
3. Mobile Source Strategy (Cleaner Technology and Fuels Scenario)
  - Maintaining existing GHG standards for light- and heavy-duty vehicles.
  - Put 4.2 million zero-emission vehicles (ZEVs) on the roads.
  - Increase ZEV buses, delivery and other trucks.
4. Sustainable Freight Action Plan
  - Improve freight system efficiency.
  - Maximize use of near-zero emission vehicles and equipment powered by renewable energy.
  - Deploy over 100,000 zero-emission trucks and equipment by 2030.
5. Short-Lived Climate Pollutant (SLCP) Reduction Strategy
  - Reduce emissions of methane and hydrofluorocarbons 40 percent below 2013 levels by 2030.
  - Reduce emissions of black carbon 50 percent below 2013 levels by 2030.
6. SB 375 Sustainable Communities Strategies
  - Increased stringency of 2035 targets.
7. Post-2020 Cap-and-Trade Program
  - Declining caps, continued linkage with Québec, and linkage to Ontario, Canada.
  - ARB will look for opportunities to strengthen the program to support more air quality co-benefits, including specific program design elements. In Fall 2016, ARB staff described potential future amendments including reducing the offset usage limit, redesigning the allocation strategy to reduce free allocation to support increased technology and energy investment at covered entities and reducing allocation if the covered entity increases criteria or toxics emissions over some baseline.
8. 20 percent reduction in GHG emissions from the refinery sector.
9. By 2018, develop Integrated Natural and Working Lands Action Plan to secure California’s land base as a net carbon sink.

### **California Code of Regulations Title 24**

#### *Part 6 (Energy Efficiency Standards for Residential and Nonresidential Buildings)*

California Code of Regulations Title 24 Part 6 (California’s Energy Efficiency Standards for Residential and Nonresidential Buildings), was first adopted in 1978 in response to a legislative mandate to reduce California’s energy consumption. The standards are updated periodically to allow consideration and possible incorporation of new energy efficient technologies and methods. Energy efficient buildings require less electricity; therefore, increased energy efficiency reduces fossil fuel consumption and decreases GHG emissions. The 2016 Building Energy Efficiency Standards went into effect on January 1, 2017.<sup>75</sup> The 2019 Building Energy Efficiency Standards are scheduled to go into effect on January 1, 2020.

#### *Part 11 (California Green Building Standards Code)*

California Code of Regulations Title 24, Part 11, is a comprehensive and uniform regulatory code for all residential, commercial, and school buildings that went in effect January 1, 2011. The code is updated on a regular basis, with the most recent update consisting of the 2016 California Green Building Code Standards that became effective January 1, 2017.<sup>76</sup> Local jurisdictions are permitted to adopt more stringent requirements, as state law provides methods for local enhancements. The Code recognizes that many jurisdictions have developed existing construction and demolition ordinances, and defers to them as the ruling guidance provided they provide a minimum 50-percent diversion requirement. The code also provides exemptions for areas not served by construction and demolition recycling infrastructure. State building code provides the minimum standard that buildings need to meet in order to be certified for occupancy, which is generally enforced by the local building official.

### **California Model Water Efficient Landscape Ordinance**

The Model Water Efficient Landscape Ordinance (Ordinance) was required by AB 1881 Water Conservation Act. The bill required local agencies to adopt a local landscape ordinance at least as effective in conserving water as the Model Ordinance by January 1, 2010. Reductions in water use of 20 percent consistent with (SBX-7-7) 2020 mandate are expected for Ordinance. Governor Brown’s Drought Executive Order of April 1, 2015 (EO B-29-15) directed DWR to update the Ordinance through expedited regulation. The California Water Commission approved the revised Ordinance on July 15, 2015, which became effective on December 15, 2015. New development projects that include landscaped areas of 500 square feet or more are subject to the Ordinance. The update requires:

- More efficient irrigation systems
- Incentives for graywater usage
- Improvements in on-site stormwater capture
- Limiting the portion of landscapes that can be planted with high water use plants
- Reporting requirements for local agencies.

<sup>75</sup> California Energy Commission (CEC). 2016. 2016 Building Energy Efficiency Standards Frequently Asked Questions. Website: [http://www.energy.ca.gov/title24/2016standards/rulemaking/documents/2016\\_Building\\_Energy\\_Efficiency\\_Standards\\_FAQ.pdf](http://www.energy.ca.gov/title24/2016standards/rulemaking/documents/2016_Building_Energy_Efficiency_Standards_FAQ.pdf). Accessed December 27, 2019.

<sup>76</sup> California Building Standards Commission (CBC). 2016. Green Building Standards. Website: [https://www.ladbs.org/docs/default-source/publications/code-amendments/2016-calgreen\\_complete.pdf?sfvrsn=6](https://www.ladbs.org/docs/default-source/publications/code-amendments/2016-calgreen_complete.pdf?sfvrsn=6). Accessed December 27, 2019.

### **California Green Building Code**

The Building Energy Efficiency Standards for Residential and Nonresidential Buildings (California Code of Regulations [CCR] Title 24, Part 6) were established in 1978 in response to a legislative mandate to reduce California’s energy consumption. The standards are updated periodically to allow consideration and possible incorporation of new energy efficiency technology and methods. The most recent update of standards became effective in January 1, 2017. California’s building efficiency standards (including standards for energy-efficient appliances). The Energy Commission staff has estimated that the implementation of the 2016 Building Energy Efficiency Standards may reduce Statewide annual electricity consumption by approximately 281 gigawatt-hours per year and reduce GHG emissions by 160 thousand metric tons CO<sub>2</sub>e per year.<sup>77</sup>

### **Regional**

#### **Bay Area 2017 Clean Air Plan**

BAAQMD is responsible for attaining and maintaining federal and state air quality standards in the San Francisco Bay Area Air Basin, as established by the federal CAA and the California Clean Air Act (CCAA), respectively. The CAA and CCAA require that plans be developed for areas that do not meet air quality standards. BAAQMD adopted the Bay Area Clean Air Plan: Spare the Air, Cool the Climate (Bay Area Clean Air Plan) on April 19, 2017, to provide a regional strategy to improve Bay Area air quality and meet public health goals.<sup>78</sup> The control strategy described in the Bay Area Clean Air Plan includes a wide range of control measures designed to reduce emissions and lower ambient concentrations of harmful pollutants, safeguard public health by reducing exposure to air pollutants that pose the greatest health risk, and reduce GHG emissions to protect the climate.

In addition, BAAQMD established a climate protection program to reduce pollutants that contribute to global climate change and affect air quality in the San Francisco Bay Area Air Basin. The program includes GHG-reduction measures that promote energy efficiency, reduce vehicle miles traveled, and develop alternative energy sources.<sup>79</sup>

The BAAQMD CEQA Air Quality Guidelines also assist lead agencies in complying with CEQA requirements regarding potentially adverse impacts on air quality. BAAQMD advises lead agencies to consider adopting a GHG reduction strategy capable of meeting AB 32 goals. This is consistent with the approach to analyzing GHG emissions described in State CEQA Guidelines Section 15183.5.

#### **Rules and Regulations**

All projects under the jurisdiction of the BAAQMD are required to comply with all applicable BAAQMD rules and regulations. Applicable BAAQMD’s regulations and rules include, but are not limited to, the following:

- Regulation 6: Particulate Matter and Visible Emissions

<sup>77</sup> California Energy Commission (CEC). 2016 Building Energy Efficiency Standards for Residential and Nonresidential Buildings. Website: <https://www.energy.ca.gov/2015publications/CEC-400-2015-037/CEC-400-2015-037-CMF.pdf>. Accessed December 27, 2019.

<sup>78</sup> Bay Area Air Quality Management District (BAAQMD). 2017. Spare the Air—Cool the Climate: A Blueprint for Clean Air and Climate Protection in the Bay Area. Final 2017 Clean Air Plan. Website: [https://www.baaqmd.gov/~media/files/planning-and-research/plans/2017-clean-air-plan/attachment-a\\_-proposed-final-cap-vol-1-pdf.pdf?la=en](https://www.baaqmd.gov/~media/files/planning-and-research/plans/2017-clean-air-plan/attachment-a_-proposed-final-cap-vol-1-pdf.pdf?la=en). Accessed December 27, 2019.

<sup>79</sup> Bay Area Air Quality Management District (BAAQMD). 2010. Climate Protection Planning Program. Website: <http://www.baaqmd.gov/plans-and-climate/climate-protection/climate-protection-program>. Accessed December 27, 2019.

- Rule 2: Commercial Cooking Equipment
- Rule 3: Wood-burning Devices

## Local

### **City of Antioch General Plan**

The City of Antioch General Plan was adopted November 24, 2003.<sup>80</sup> The following are applicable General Plan goals and policies related to GHG from the City of Antioch General Plan, including policies from Section 4.4.6.7 specific to the Sand Creek Focus Area:

- **Policy 4.4.6.7ff:** The Sand Creek Focus Area is intended to be “transit-friendly,” including appropriate provisions for public transit and non-motorized forms of transportation.
- **Objective 10.6.1:** Minimize air pollutant emissions within the Antioch Planning Area so as to assist in achieving state and federal air quality standards.
- **Policy 10.6.2b:** Require developers of large residential and non-residential projects to participate in programs and to take measures to improve traffic flow and/or reduce vehicle trips resulting in decreased vehicular emissions. Examples of such efforts may include, but are not limited to the following:
  - Development of mixed-use projects, facilitating pedestrian and bicycle transportation and permitting consolidation of vehicular trips.
  - Installation of transit improvements and amenities, including dedicated bus turnouts and sufficient rights-of-way for transit movement, bus shelters, and pedestrian easy access to transit.
  - Provision of bicycle and pedestrian facilities, including bicycle lanes and pedestrian walkways connecting residential areas with neighborhood commercial centers, recreational facilities, schools, and other public areas.
  - Contributions for off-site mitigation for transit use.
  - Provision of charging stations for electric vehicles within large employment-generating and retail developments.

### **City of Antioch Climate Action Planning**

In 2007, the City of Antioch joined the International Council for Local Environmental Initiatives (ICLEI). As a member of the ICLEI, the City drafted and adopted two Climate Action Plans, one for municipal operations and the other for community-wide operations.<sup>81</sup> Both Climate Action Plans provided GHG emissions inventories, with the Municipal Climate Action Plan considering emissions related to the provision of water, wastewater, and solid waste services, as well as assessing emissions related to the City’s vehicle fleet, street lights within the City, City facilities, and employee commutes. Concurrently, the Community Climate Action Plan (CCAP) inventoried emissions related to residential energy consumption, industrial energy use, commercial energy use, solid waste, transportation and other mobile sources, solid waste generation, water consumption, and wastewater production. In compliance with AB 32, emissions reduction targets were established for both community and municipal emissions, and two different approaches were implemented to meet

<sup>80</sup> City of Antioch. 2003. City of Antioch General Plan. November 24. Website: [https://www.antiochca.gov/fc/community-development/planning/Antioch\\_Adopted\\_General\\_Plan.pdf](https://www.antiochca.gov/fc/community-development/planning/Antioch_Adopted_General_Plan.pdf). Accessed September 30, 2019.

<sup>81</sup> City of Antioch. 2011. Antioch Community Climate Action Plan. Website: <https://www.antiochca.gov/environmental-resources/climate-change/>. Accessed December 12, 2019.

the identified targets. The Municipal Climate Action Plan established measures and policies related to each emission source category, which would reduce existing and future emission from the identified sources. Simultaneously, the CCAP included GHG reduction strategies related to land use and transportation, green building and energy, and education and behavior change. The proposed project is community land-use development project and therefore only the community aspect of the CCAP would apply to the proposed project.

Although the CCAP does not include quantitative thresholds to assess a project's compliance with the CCAP, projects that are in compliance with AB 32 would be considered compliant with the CCAP. For instance, project's showing emissions reductions as required by AB 32, or projects incorporating reduction strategies from the CCAP are understood to be in compliance with the CCAP's GHG emissions reductions goals.

### ***Multi-Generational Plan and Traditional Plan Compliance with the Community Climate Action Plan***

The City's CCAP was established to ensure the City's compliance with the Statewide GHG reduction goals required by AB 32. The CCAP included emissions reduction targets for the City, as well as reduction strategies, but did not specify project-level emissions thresholds. Although the City's CCAP did not establish project-level thresholds to assess a project's compliance with AB 32, the BAAQMD adopted thresholds are designed to assess a project's compliance with AB 32 and Statewide reduction goals. Therefore, if GHG emissions relating to implementation of a project are below the BAAQMD's thresholds of significance, the project would be considered in compliance with AB 32 and the goals of the City's CCAP.

### **3.7.4 - Impacts and Mitigation Measures**

According to 2019 CEQA Guidelines Appendix G, to determine whether impacts related to GHG emissions are significant environmental effects, the following questions are analyzed and evaluated. Would the proposed project:

- a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?
- b) Conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases?
- c) Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?
- d) Conflict with or obstruct a State or local plan for renewable energy or energy efficiency?

The impacts associated with GHG emissions are inherently a cumulative impact given that climate change is an accumulation of global projects that collectively affect global climate. Therefore, the analysis below evaluates the GHG and cumulative impacts of the proposed project.

## Approach to Analysis

### ***GHG Emissions Generation Calculation Methodology***

The California Emissions Estimator Model (CalEEMod) version 2016.3.2 was used to estimate the proposed project's construction and operation-related GHG emissions. CalEEMod was developed in cooperation with air districts throughout the State and is designed as a uniform platform for government agencies, land use planners, and environmental professionals to quantify potential GHG emissions associated with construction and operation from a variety of land uses.

#### *Construction*

Construction emissions can vary substantially from day to day, depending on the level of activity, the specific type of operation, and prevailing weather conditions. Construction emissions result from on-site and off-site activities. On-site GHG emissions principally consist of exhaust emissions from heavy-duty construction equipment. Off-site GHG emissions would occur from motor vehicle exhaust from material delivery vehicles and construction worker traffic.

Construction activities would consist of demolition, mass grading, building construction, asphalt paving of roadways, and architectural coating of the inside and outside of the buildings. For each construction activity, the construction equipment operating hours and numbers represent the average equipment activity over the duration of the activity.

The duration of construction activity and associated equipment represent a reasonable approximation of the expected construction fleet as required by the CEQA Guidelines. Full construction emissions modeling parameters and assumptions are provided in Appendix C.

#### *Operation*

Operational GHG emissions are those GHG emissions that would occur during long-term operation of the project. Project operations were modeled for the year 2029 and the year 2030. The major sources for operational GHG emissions are summarized below.

#### **Motor Vehicles**

Motor vehicle emissions refer to exhaust and road dust emissions from the automobiles that would travel to and from the project site. The emissions were estimated using CalEEMod. The trip generation rates for operations associated with the proposed project were obtained from the transportation impact assessment (included in Appendix K).<sup>82</sup> As weekend trips were not explicitly stated in the transportation impact assessment, weekday trip generation rates were applied to both Saturday and Sunday trips. This presents a conservative analysis because the averaged weekend trip generation rates in the ITE Manual<sup>83</sup> for each of the land uses are lower than the weekday trip generation rate.

Pass-by trips are made as intermediate stops on the way from an origin to a primary trip destination without a route diversion. Pass-by trips are attracted from traffic passing the project on an adjacent

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<sup>82</sup> Fehr & Peers. 2019. The Ranch Final Transportation Impact Assessment. December.

<sup>83</sup> Institute of Transportation Engineers (ITE). 2017. Trip Generation Manual, 10<sup>th</sup> Edition.



street or roadway that offers direct access to the generator. Pass-by trips are not diverted from another roadway. The CalEEMod defaults pass-by trips were used for this analysis.

The CalEEMod default round trip lengths for an urban setting for Contra Costa County were used in this analysis. The vehicle fleet mix is defined as the mix of motor vehicle classes active during the operation of the proposed project. Emission factors are assigned to the expected vehicle mix as a function of vehicle class, speed, and fuel use (gasoline and diesel-powered vehicles). The CalEEMod default vehicle fleet mix for Contra Costa County was used for this analysis.

#### **Landscape Equipment**

The use of landscaping equipment (leaf blowers, chain saws, mowers) would generate GHG emissions as a result of fuel combustion based on assumptions in CalEEMod.

#### **Natural Gas**

These emissions refer to the GHG emissions that occur when natural gas is burned on the project site. Natural gas uses could include heating water, space heating, dryers, stoves, or other uses.

#### **Stationary Sources**

These emissions refer to emergency generators and fire pumps associated with the proposed fire station.

#### **Indirect GHG Emissions**

For GHG emissions, CalEEMod contains calculations to estimate indirect GHG emissions. Indirect emissions are emissions where the location of consumption or activity is different from where the actual emissions are generated. For example, electricity would be consumed at the proposed residential units; however, the emissions associated with producing that electricity are generated off-site at a power plant.

CalEEMod includes calculations for indirect GHG emissions for electricity consumption, water consumption, and solid waste disposal. For water consumption, CalEEMod calculates the embedded energy (e.g., treatment, conveyance, distribution) associated with providing each gallon of potable water to the proposed project. For solid waste disposal, CalEEMod calculates the GHG emissions generated as solid waste generated by the project decomposes in a landfill.

For electricity-related emissions, CalEEMod contains default electricity intensity factors for various utilities throughout California. For the purposes of the proposed project, emission factors for PG&E were selected to quantify electricity emissions. The project is proposed to be operational in the year 2029. As such, the CO<sub>2</sub> emission factor was adjusted consistent to the SB-1078 RPS goal of achieving utility providers achieving 33 percent mix of renewable energy in their retail sales. The adjusted PG&E CalEEMod emission factors are shown below for the year 2029.

- **Carbon dioxide:** 491.65 pound per megawatt hour (lb/MWh)
- **Methane:** 0.022 lb/MWh
- **Nitrous oxide:** 0.005 lb/MWh

SB 350 requires an increase in the amount of electricity procured from renewable energy sources from 33 percent to 50 percent by 2030. Therefore, the adjusted PG&E CalEEMod emission factors are shown below for the year 2030.

- **Carbon dioxide:** 292.24 pound per megawatt hour (lb/MWh)
- **Methane:** 0.022 lb/MWh
- **Nitrous oxide:** 0.005 lb/MWh

#### Refrigerants

During operation, there may be leakage of refrigerants from air conditioners and the refrigeration system. HFCs are typically used for refrigerants, which are long-lived GHGs. Residential uses of refrigerants are minor; therefore, they were not estimated.

#### Life Cycle Emissions

An upstream GHG emissions source (also known as life cycle emissions) refers to emissions that are generated during the manufacturing and transportation of products that would be utilized for project construction. Upstream emission sources for construction of the proposed project include but are not limited to GHG emissions from the manufacturing of cement and steel as well as from the transportation of building materials to the seller of such products. The upstream emissions associated with construction of the proposed project has not been estimated as part of this impact analysis, because such upstream emissions are not within the control of the proposed project, the information is not readily available, and to characterize these emissions would be speculative. Additionally, the California Air Pollution Control Officers Association (CAPCOA) White Paper on CEQA and Climate Change supports this approach by stating, “The full life-cycle of GHG emissions from construction activities is not accounted for . . . and the information needed to characterize [life-cycle emissions] would be speculative at the CEQA analysis level.”<sup>84</sup> Therefore, pursuant to CEQA Guidelines Sections 15144 and 15145, upstream/life cycle emissions are speculative, and is not further discussed as part of this impact analysis.

#### Vegetation

There is currently carbon sequestration occurring on-site from existing vegetation. The project site currently includes several trees and open space vegetation that would help sequester carbon. The proposed project would preserve over 95 percent of existing trees and additionally plant trees and integrate landscaping into the project design, which would continue to provide carbon sequestration. However, data are insufficient to accurately determine the impact that existing plants have on carbon sequestration. For this analysis, it was conservatively assumed that the loss and addition of carbon sequestration that are due to the proposed project would be balanced; therefore, emissions due to carbon sequestration were not included.

#### **GHG Emissions Reduction Plan Consistency Determination Methodology**

In determining whether a project or plan conflicts with any applicable plan, policy, or regulation, the California Natural Resources Agency has stated that in order to be used for the purpose of

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<sup>84</sup> California Air Pollution Control Officers Association (CAPCOA). 2008. CEQA & Climate Change, Evaluating and Addressing Greenhouse Gas Emissions from Projects Subject to the California Environmental Quality Act. Available: <http://capcoa.org/wp-content/uploads/downloads/2010/05/CAPCOA-White-Paper.pdf>. Accessed: December 27, 2019.

determining significance, an applicable plan, policy, or regulation must contain specific requirements that result in reductions of GHG emissions to a less than significant level. The proposed project is assessed for its consistency with the City of Antioch's CCAP. This would be achieved with an assessment of the proposed project's compliance with applicable measures contained in the CCAP. The proposed project is also assessed for its consistency with the ARB's adopted AB 32 Scoping Plan and the ARB's adopted 2017 Climate Change Scoping Plan Update. The Scoping Plan Update includes the SB 32 goal of reducing Statewide GHG emissions to at least 40 percent below the Statewide GHG emissions limit by 2030.

### ***Energy Consumption Methodology***

For the purposes of this EIR, the approach to analysis for energy use is based on 2019 CEQA Guidelines Appendix F (Energy Conservation). CEQA Guidelines Appendix F is focused on the goal of conserving energy through the wise and efficient use of energy. The anticipated electricity and natural gas consumption associated with the proposed project were estimated using default CalEEMod assumptions. CalEEMod contains default energy intensity rates for the various land uses selected.

### ***Renewable Energy/Energy Efficiency Plan Consistency Determination Methodology***

The proposed project would be determined to conflict with or obstruct a State or local plan for renewable energy or energy efficiency if the proposed project would not adhere to the energy use reduction measures included in the California Green Building Code or required by the City of Antioch during construction or operational activities.

## **Specific Thresholds of Significance**

### ***GHG Emissions Generation***

The City of Antioch utilizes BAAQMD quantitative thresholds for evaluation of GHG emissions. BAAQMD provides multiple options in its 2017 BAAQMD CEQA Guidelines for operational GHG emissions generation significance thresholds. At the time of this analysis, BAAQMD has not yet provided a construction-related GHG emissions generation significance threshold, but it does recommend that construction-generated GHGs be quantified and disclosed.

BAAQMD's project-level significance threshold for operational GHG generation was deemed appropriate to use when determining the proposed project's potential GHG impacts. The thresholds suggested by BAAQMD are as follows:

- Compliance with a qualified GHG Reduction Strategy, or
- 1,100 MT CO<sub>2</sub>e per year, or
- 4.6 MT CO<sub>2</sub>e per service population (employees plus residents) per year (for 2020)

It should be noted that the BAAQMD's thresholds of significance were established based on meeting the 2020 GHG targets set forth in the AB 32 Scoping Plan. For developments that would occur beyond 2020, the service population threshold of significance (4.6 MT CO<sub>2</sub>e/service population/year) was adjusted to a "substantial progress" threshold that was calculated based on the GHG reduction goals of SB 32/Executive Order B-30-15 and the projected 2030 Statewide population and

employment levels.<sup>85</sup> The 2017 Scoping Plan provides an intermediate target that is intended to achieve reasonable progress towards goals for 2050 under Executive Order S-3-05. The efficiency threshold of 2.6 MT CO<sub>2</sub>e/service population/year is needed to meet the 2030 target. To determine significance for this criterion, the proposed project's GHG emissions are assessed against the 2.6 MT CO<sub>2</sub>e/service population/year threshold for the 2030 operational year. Although the BAAQMD does not have an adopted threshold for 2030, the BAAQMD is currently recommending evaluation of GHG significance based on 2030 GHG targets established in SB 32.

### ***GHG Emissions Reduction Plan Consistency***

The proposed project would be determined to conflict with any applicable GHG emissions reduction plan if it would not adhere to applicable GHG reduction measures included in:

- AB 32 (the ARB-adopted Scoping Plan); or
- SB 32 (the ARB-adopted 2017 Climate Change Scoping Plan Update).

### ***Energy***

The City of Antioch does not have quantitative thresholds for evaluation of energy; however, the following qualitative thresholds are used to evaluate the significance of energy impacts resulting from implementation of the proposed project if the project would:

- Result in a wasteful, inefficient, and unnecessary consumption of energy during construction and operational activities; or if
- Construction and operation of buildings and appliances would not adhere to the energy-use reduction measures included in the California Green Building Code and required by the City of Antioch.

## **Impact Evaluation**

### ***GHG Emissions Generation***

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**Impact GHG-1:      The project could generate direct and indirect greenhouse gas emissions that could result in a significant impact on the environment even with mitigation.**

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This GHG emissions generation analysis is restricted to emissions of the GHGs identified as those of California concern by AB 32 and SB 32, which include CO<sub>2</sub>, methane, nitrous oxide, HFC, PFC, and SF<sub>6</sub>. The proposed project would generate a variety of GHG emissions during construction and operation, including several defined by AB 32 and SB 32 such as CO<sub>2</sub>, methane, nitrous oxide, and HFCs. Certain GHGs defined by AB 32 and SB 32 would not be generated by the proposed project such as PFCs and SF<sub>6</sub>. As such, CO<sub>2</sub>e emissions discussed below are limited to a combination of emissions of CO<sub>2</sub>, methane, nitrous oxide, HFC, PFC, and SF<sub>6</sub>.

### ***Construction***

Construction of the proposed project would emit GHG emissions during construction from the off-road construction equipment, worker vehicles, and any hauling that may occur. Total GHG emissions

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<sup>85</sup> Personal communication with BAAQMD staff in January 2020.

generated during all construction activities were quantified and combined and are presented in Table 3.7-4. In order to assess the construction emissions, the total emissions generated during construction were amortized based on the life of the development (30 years) and added to the operational emissions. As shown in Table 3.7-4 construction of the proposed project would generate approximately 9,836 MT CO<sub>2</sub>e over the entire construction duration, which is approximately 328 MT CO<sub>2</sub>e per year when amortized over 30 years. The amortized emissions from construction were added to the operational emissions to determine the total emissions. These total emissions were analyzed against the 2020 BAAQMD emissions threshold of 4.6 MT CO<sub>2</sub>e/service population/year and the projected 2.6 MT CO<sub>2</sub>e/service population/year for the 2030 operational year.

**Table 3.7-4: Unmitigated Project Construction GHG Emissions**

Construction Activity	Total Emissions (MT CO <sub>2</sub> e/year)
Demolition—2021	18
Site Preparation—2021	35
Grading—2021	149
Building Construction—2021	353
Building Construction—2022	1,584
Building Construction—2023	1,246
Architectural Coating—2023	20
Paving—2023	39
Site Preparation—2024	37
Grading—2024	163
Building Construction—2024	610
Building Construction—2025	1,236
Building Construction—2026	934
Architectural Coating—2026	17
Paving—2026	42
Site Preparation—2027	40
Grading—2027	165
Building Construction—2027	652
Building Construction—2028	1,363
Building Construction—2029	1,068
Architectural Coating—2029	19
Paving—2029	44
<b>Total Construction Emissions</b>	<b>9,836</b>

**Table 3.7-4 (cont.): Unmitigated Project Construction  
GHG Emissions**

Construction Activity	Total Emissions (MT CO <sub>2</sub> e/year)
<b>Construction Emissions Amortized Over the Life of the Project (30 years)</b>	<b>328</b>
Note: Calculations use rounded numbers. Source: CalEEMod Output (see Appendix C).	

**Operation**

Operational or long-term emissions occur over the life of a project. The operational GHG emissions are combined with the amortized construction emissions and compared with the BAAQMD's per-service-population threshold to make a significance determination. Major sources for operational emissions are summarized below, and are described in more detail above under the Approach to Analysis section. Sources for operational emissions include:

- **Motor Vehicles:** These emissions refer to GHG emissions contained in the exhaust from the cars and trucks that would travel to and from the project site.
- **Natural Gas:** These emissions refer to the GHG emissions that occur when natural gas is burned within the project site. Natural gas uses could include heating water, space heating, dryers, stoves, or other uses.
- **Indirect Electricity:** These emissions refer to those generated by off-site power plants to supply electricity required for the proposed project.
- **Stationary Sources:** These emissions refer to emergency generators and fire pumps associated with the proposed fire station.
- **Water Transport:** These emissions refer to those generated by the electricity required to transport and treat the water to be used by the proposed project.
- **Waste:** These emissions refer to the GHG emissions produced by decomposing waste generated by the proposed project.

Operational GHG emissions by source are shown in Table 3.7-5. As previously indicated, the analysis includes construction emissions amortized over the life of the proposed project. The estimated total annual emissions that would be generated by the proposed project, including operational emissions and amortized construction emissions, were compared with the BAAQMD threshold 4.6 MT CO<sub>2</sub>e/service population/year to determine significance at buildout in the year 2029, and the BAAQMD threshold of 2.6 MT CO<sub>2</sub>e/service population/year to determine significance in the year 2030.

**Table 3.7-5: Unmitigated Project Operational GHG Emissions**

Emission Source	Year 2029 Total Emissions (MT CO <sub>2</sub> e per year)	Year 2030 Total Emissions (MT CO <sub>2</sub> e per year)
Area	49	49
Energy	3,975	3,036
Mobile	7,521	6,903
Stationary	1	1
Waste	837	745
Water	263	161
Amortized Construction Emissions	328	328
<i>Total Project Emissions</i>	<i>12,973</i>	<i>11,222</i>
Service Population (residents and employees)	3,858	3,858
<b>Project emission generation (MT CO<sub>2</sub>e/year/service population)</b>	<b>3.4</b>	<b>2.9</b>
<b>Applicable BAAQMD Threshold (MT CO<sub>2</sub>e/year/service population)</b>	<b>4.6</b>	<b>2.6</b>
<b>Does Project exceed threshold?</b>	<b>No</b>	<b>Yes</b>
Notes: MT CO <sub>2</sub> e = metric tons of carbon dioxide equivalent. Rounded results used to calculate totals. <sup>1</sup> Adjusted threshold to account for 2017 Scoping Plan Update 40 percent reduction goal by 2030 Source of Emissions: CalEEMod Output (Appendix C).		

As shown in Table 3.7-5, the proposed project would generate approximately 12,973 MT CO<sub>2</sub>e per year in 2029 and 11,222 MT CO<sub>2</sub>e per year in 2030 in terms of total (amortized construction plus operational) project GHG emissions. Therefore, the proposed project would not exceed the BAAQMD’s threshold of 4.6 MT CO<sub>2</sub>e/year/service population at project buildout, but the proposed project would exceed the threshold of 2.6 MT CO<sub>2</sub>e/year/service population for the 2030 GHG emissions. This represents a potentially significant impact, and mitigation would be required to reduce the proposed project’s estimated generation of GHG emissions.

The measures outlined in MM GHG-1 are recommended to reduce GHG emissions to less than significant levels. There are several options available to mitigate project emissions shown in Table 3.7-6. The project could achieve the equivalent of net zero electricity use through a combination of on-site generation or through the purchase of renewable electricity from the utility provider. PG&E currently offers the option to purchase 100 percent renewable energy through the “Solar Choice” program.

Table 3.7-6 shows the total project operational GHG emissions with the use of renewable electricity. As shown in Table 3.7-6, 1,191 MT CO<sub>2</sub>e of carbon credit offsets per year starting in year 2030 would be required to reduce annual operational GHG emissions during the year 2030.

**Table 3.7-6: Mitigated Project 2030 Operational GHG Emissions**

Emission Source	Year 2030 Total Emissions (MT CO <sub>2</sub> e per year)
Area	49
Energy	1,845
Mobile	6,903
Stationary	1
Waste	745
Water	161
Amortized Construction Emissions	328
<i>Total Project Emissions</i>	<i>10,031</i>
Service Population (residents and employees)	3,858
<b>Carbon Credit Offset Required to Meet Threshold (MT CO<sub>2</sub>e/year)</b>	<b>1,191</b>
<b>Project emission generation with the Purchase of Carbon Credit Offsets (MT CO<sub>2</sub>e/year/service population)</b>	<b>2.6</b>
<b>Applicable BAAQMD Threshold (MT CO<sub>2</sub>e/year/service population)</b>	<b>2.6</b>
<b>Does Project exceed threshold?</b>	<b>No</b>
Notes: MT CO <sub>2</sub> e = metric tons of carbon dioxide equivalent. Rounded results used to calculate totals. <sup>1</sup> Adjusted threshold to account for 2017 Scoping Plan Update 40 percent reduction goal by 2030 Source of Emissions: CalEEMod Output (Appendix C).	

As shown in Table 3.7-6, annual operational GHG emissions would not exceed the applicable thresholds with implementation of MM GHG-1. Therefore, the proposed project would not result in a significant generation of GHG emissions after incorporation of that mitigation. However, it is unknown whether carbon credits will be available and/or feasible to obtain. Further, the fate of PG&E and its renewable resources programs is uncertain. While the proposed project would be required to implement all feasible mitigation, given the uncertainty of credits and programs, the City cannot guarantee full and timely mitigation. As a result, this impact would conservatively be significant and unavoidable.

#### ***Level of Significance Before Mitigation***

Potentially Significant



### **Mitigation Measures**

The recommended mitigation measures listed below shall be implemented in addition to all project design features.

#### **MM GHG-1 Implement potentially feasible mitigation measures**

Prior to the issuance of the last certificate of occupancy (or as otherwise specifically stated), the project Applicant shall provide documentation to the City of Antioch that the proposed project has employed one or more of the following measures to reduce greenhouse gas (GHG) emissions (i.e., 1,191 metric tons of carbon dioxide equivalent per year (MT CO<sub>2</sub>e/year) to at or below 2.6 MT CO<sub>2</sub>e/year/service population by 2030:

- Purchased electricity from a utility offering 100 percent renewable power for some or all of the proposed project's power needs.
- Installed on-site solar panels to generate electricity for a portion or all of project electricity consumption.
- Installed on-site charging units for electric vehicles consistent with parking requirements in California Green Building Standards Code (CALGreen) Section 5.106.5.2.
- Implemented a ride sharing program for employees starting no later than 60 days after commercial operations begin.
- Purchased voluntary carbon credits from a verified GHG emissions credit broker in an amount sufficient to offset operational GHG emissions of approximately 34,531 MT CO<sub>2</sub>e over the lifetime of the proposed project (or a reduced amount estimated based on implementation of other measures listed above). Copies of the contract(s) shall be provided to the City Planning Department.

### **Level of Significance After Mitigation**

Significant and Unavoidable

### **GHG Emissions Reduction Plan Consistency**

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**Impact GHG-2: The project would not conflict with any applicable plan, policy, or regulation of an agency adopted to reduce the emissions of greenhouse gases.**

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The City of Antioch's CCAP was established to ensure the City's compliance with the Statewide GHG reduction goals required by AB 32.<sup>86</sup> The CCAP included emissions reduction targets for the City, as well as reduction strategies, but did not specify project-level emissions thresholds. Although the City's CCAP did not establish project-level thresholds to assess a project's compliance with AB 32, the BAAQMD adopted thresholds are designed to assess a project's compliance with AB 32 and Statewide reduction goals. Therefore, if GHG emissions relating to implementation of a project are

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<sup>86</sup> City of Antioch. 2011. Antioch Community Climate Action Plan. Website: <https://www.antiochca.gov/environmental-resources/climate-change/>. Accessed December 12, 2019.

below the BAAQMD's thresholds of significance, the proposed project would be considered in compliance with AB 32 and the goals of the City's CCAP.

The City's CCAP is focused on 2020 level reductions and does not include project-level emissions thresholds. Therefore, the proposed project is also assessed for its consistency with the ARB's adopted AB 32 Scoping Plan and the ARB adopted 2017 Climate Change Scoping Plan Update. This would be achieved with an assessment of the proposed project compliance with applicable Scoping Plan measures.

### **Construction**

Impacts related to a project's consistency with a GHG emissions reduction plan are primarily related to long-term operational activities. However, short-term construction activities would comply with and use equipment and fuel consistent with Statewide requirements set forth in the AB 32 Scoping Plan or the 2017 Scoping Plan Update. For example, fuel used during construction of the proposed project would be compliant with the California Low Carbon Fuel Standard. Because construction of the proposed project would not conflict with the AB 32 Scoping Plan or the 2017 Scoping Plan Update, the construction impact related to consistency with an applicable GHG emissions reduction plan would be less than significant.

### **Operation**

#### **City of Antioch CCAP Consistency**

The City of Antioch adopted its CCAP in 2011.<sup>87</sup> The proposed project would include several reduction strategies from the City's CCAP. The proposed project would include residential and commercial development along transit corridors (i.e., Deer Valley Road). Such mixed-use and transit friendly development would be consistent with Land Use Strategy L1 of the City's CCAP. The proposed project would include extensive bicycle lanes and pedestrian facilities, and the project site provides access to bus and rail services, thus encouraging alternative modes of transportation, in compliance with Transportation Strategy T7. The landscape design approach outlined in the Ranch Design Guidelines includes minimizing manicured landscapes and extensive lawns.<sup>88</sup> This low-maintenance landscaping design approach is consistent with the Land Use Strategy L5. Furthermore, since the adoption of CCAP the California Building Standards Commission (CBSC) has been updated twice, including updates to the CALGreen Code and the California Building Energy Efficiency Standards.<sup>89</sup> The updates to the CBSC require that new commercial and residential structures be built with energy and water efficiencies equal to or in excess of the efficiencies required by the CCAP's Green Building and Energy Strategies. Finally, the CBSC requires that certain new developments include electric vehicle charging infrastructure. The Ranch Design Guidelines anticipate a site-wide electrical system to accommodate increased loads associated with Level 2 Electric Vehicle (EV) charging in each residence, which would

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<sup>87</sup> City of Antioch. 2011. Antioch Community Climate Action Plan. Website: <https://www.antiochca.gov/environmental-resources/climate-change/>. Accessed December 12, 2019.

<sup>88</sup> Ascent Environmental. 2018. The Ranch at Antioch Development Standards & Design Guidelines. October.

<sup>89</sup> California Building Standards Commission (CBSC). 2016. Green Building Standards. Website: [https://www.ladbs.org/docs/default-source/publications/code-amendments/2016-calgreen\\_complete.pdf?sfvrsn=6](https://www.ladbs.org/docs/default-source/publications/code-amendments/2016-calgreen_complete.pdf?sfvrsn=6). Accessed December 27, 2019.

promote electric vehicle use in compliance with Transportation Strategies T8 and T9.<sup>90</sup> Therefore, the proposed project would be consistent with the City’s CCAP.

**AB 32 (ARB Adopted Scoping Plan) Consistency**

The California State Legislature adopted AB 32 in 2006. AB 32 focuses on reducing GHG emissions to 1990 levels by the year 2020. Pursuant to the requirements in AB 32, the ARB adopted the Climate Change Scoping Plan (Scoping Plan) in 2008, which outlines actions recommended to obtain that goal. The Scoping Plan calls for an “ambitious but achievable” reduction in California’s GHG emissions, cutting approximately 30 percent from BAU emission levels projected for 2020, or about 10 percent from 2008 levels. The Scoping Plan contains a variety of strategies to reduce the State’s emissions. As shown in Table 3.7-7, the proposed project is consistent with most of the strategies, while others are not applicable.

**Table 3.7-7: AB 32 (ARB-adopted 2008 Scoping Plan) Consistency Analysis**

Scoping Plan Reduction Measure	Consistency
<p>1. <b>California Cap-and-Trade Program Linked to Western Climate Initiative.</b> Implement a broad-based California Cap-and-Trade program to provide a firm limit on emissions. Link the California Cap-and-Trade Program with other Western Climate Initiative Partner programs to create a regional market system to achieve greater environmental and economic benefits for California. Ensure California’s program meets all applicable AB 32 requirements for market-based mechanisms.</p>	<p><b>Not applicable.</b> Although the cap-and-trade system has begun, the proposed project is not targeted by the cap-and-trade system regulations and therefore this measure does not apply to the proposed project.</p>
<p>2. <b>California Light-Duty Vehicle GHG Standards.</b> Implement adopted standards and planned second phase of the program. Align zero-emission vehicle, alternative and renewable fuel and vehicle technology programs with long-term climate change goals.</p>	<p><b>Not applicable.</b> This is a Statewide measure that cannot be implemented by a project Applicant or lead agency. California light-duty vehicle GHG standards, such as Pavley 2005 Regulations to Control GHG Emissions from Motor Vehicles and 2012 LEV III Amendments to the California GHG and Criteria Pollutant Exhaust and Evaporative Emission Standards, apply to new vehicles. The proposed project does not involve the manufacturing or sales of new vehicles; however, the standards would be applicable to the light-duty vehicles that access the project site.</p>
<p>3. <b>Energy Efficiency.</b> Maximize energy efficiency building and appliance standards; pursue additional efficiency including new technologies, policy, and implementation mechanisms. Pursue comparable investment in energy efficiency from all retail providers of electricity in California.</p>	<p><b>Consistent.</b> This is a measure for the State to increase its energy efficiency standards in new buildings. The proposed project is required to build to the new standards and would increase their energy efficiency through compliance with Title 24 and California Green Building Standards Code.</p>

<sup>90</sup> Ascent Environmental. 2018. The Ranch at Antioch Development Standards & Design Guidelines. October.

Table 3.7-7 (cont.): AB 32 (ARB-adopted 2008 Scoping Plan) Consistency Analysis

Scoping Plan Reduction Measure	Consistency
4. <b>Renewable Portfolio Standard.</b> Achieve 33 percent renewable energy mix Statewide. Renewable energy sources include (but are not limited to) wind, solar, geothermal, small hydroelectric, biomass, anaerobic digestion, and landfill gas.	<b>Not applicable.</b> This is a Statewide measure that cannot be implemented by a project Applicant or lead agency. PG&E is required to obtain 33 percent of its power supply from renewable sources to by the year 2020 pursuant to various regulations. PG&E is ahead of schedule in meeting the California Renewables Portfolio Standard of 33 percent by 2020 mandate. The proposed project would purchase power that comprises a greater amount of renewable sources and could install renewable solar power systems that could further assist the utility in achieving the mandate.
5. <b>Low Carbon Fuel Standard.</b> Develop and adopt the Low Carbon Fuel Standard.	<b>Not applicable.</b> This is a Statewide measure that applies to transportation fuels utilized by vehicles in California and cannot be implemented by a project Applicant or lead agency. All fuel consumption associated with construction and operational activities associated with the proposed project would use fuel that meets these standards.
6. <b>Regional Transportation-Related GHG Targets.</b> Develop regional GHG emissions reduction targets for passenger vehicles. This measure refers to SB 375.	<b>Not applicable.</b> The proposed project is not related to developing GHG emission reduction targets.
7. <b>Vehicle Efficiency Measures.</b> Implement light-duty vehicle efficiency measures.	<b>Not applicable.</b> The proposed project does not involve the manufacturing or sales of new vehicles; however, the standards would be applicable to the light-duty vehicles that access the project site.
8. <b>Goods Movement.</b> Implement adopted regulations for the use of shore power for ships at berth. Improve efficiency in goods movement activities.	<b>Not applicable.</b> The project proposes no changes to maritime, rail, or intermodal facilities or forms of transportation.
10. <b>Medium/Heavy-Duty Vehicles.</b> Adopt medium and heavy-duty vehicle efficiency measures.	<b>Not applicable.</b> This is a Statewide measure that cannot be implemented by a project Applicant or lead agency.
11. <b>Industrial Emissions.</b> Require assessment of large industrial sources to determine whether individual sources within a facility can cost-effectively reduce GHG emissions and provide other pollution reduction co-benefits. Reduce GHG emissions from fugitive emissions from oil and gas extraction and gas transmission. Adopt and implement regulations to control fugitive CH <sub>4</sub> emissions and reduce flaring at refineries.	<b>Not applicable.</b> This measure would apply to the direct GHG emissions at major industrial facilities emitting more than 500,000 MT CO <sub>2</sub> e per year. The proposed project would generate less than 13,000 MT CO <sub>2</sub> e per year (see Table 3.7-5).
12. <b>High Speed Rail.</b> Support implementation of a high-speed rail system.	<b>Not applicable.</b> This is a Statewide measure that cannot be implemented by a project Applicant or lead agency. Implementation of the proposed project would not preclude the implementation of this strategy.

**Table 3.7-7 (cont.): AB 32 (ARB-adopted 2008 Scoping Plan) Consistency Analysis**

Scoping Plan Reduction Measure	Consistency
<p>13. <b>Green Building Strategy.</b> Expand the use of green building practices to reduce the carbon footprint of California’s new and existing inventory of buildings.</p>	<p><b>Consistent.</b> The proposed project would comply with the California Energy Code and, thus, incorporate applicable energy efficiency features designed to reduce energy consumption associated with operation of the proposed project.</p>
<p>14. <b>High Global Warming Potential Gases.</b> Adopt measures to reduce high global warming potential gases.</p>	<p><b>Consistent.</b> This measure is applicable to the high global warming potential gases that would be used by sources with large equipment (such as in air conditioning and commercial refrigerators). The proposed project includes development of up to 1,177 single-family residential units, a 5-acre commercial, office, and retail space, and a fire station. As such, it is not anticipated that the proposed project would include refrigeration subject to refrigerant management regulations adopted by the ARB. However, specific uses of the commercial center are not known at this time. If the proposed project was to install large air conditioning equipment subject to the refrigerant management regulations adopted by the ARB, they would be required to comply with all ARB requirements for the Stationary Equipment Refrigerant Management Program.</p>
<p>15. <b>Recycling and Waste.</b> Reduce CH<sub>4</sub> emissions at landfills. Increase waste diversion, composting, and commercial recycling. Move toward zero waste.</p>	<p><b>Consistent.</b> Implementation of the proposed project would not conflict with implementation of this measure. The proposed project is required to achieve the recycling mandates via compliance with the CALGreen Code. As noted in Section 2.3.5 of Chapter 2, Project Description, Republic Services would provide solid waste collection, disposal, recycling, and yard waste services to the project site.</p>
<p>16. <b>Sustainable Forests.</b> Preserve forest sequestration and encourage the use of forest biomass for sustainable energy generation.</p>	<p><b>Not applicable.</b> As noted in Chapter 3.4, Biological Resources, the majority of the proposed project site consists of annual brome grassland. The project site contains approximately 255 trees, and the proposed project does not currently plan to remove any protected trees. As explained in Chapter 3.2, Agricultural Resources and Forestry Resources, the project site does not contain any forest land. Therefore, no on-site preservation is possible.</p>

**Table 3.7-7 (cont.): AB 32 (ARB-adopted 2008 Scoping Plan) Consistency Analysis**

Scoping Plan Reduction Measure	Consistency
17. <b>Water.</b> Continue efficiency programs and use cleaner energy sources to move and treat water.	<b>Consistent.</b> The proposed project would comply with the California Energy Code and the California Updated Model Landscape Ordinance. Furthermore, the City's CCAP includes an emissions reduction strategy, L4. Adopt a Water Conservation Ordinance, that aims to reduce household water use by 20 percent by the year 2020.
18. <b>Agriculture.</b> In the near-term, encourage investment in manure digesters and at the 5-year Scoping Plan update determine if the program should be made mandatory by 2020.	<b>Not applicable.</b> The project site currently includes a cattle-grazing operation, however, no grazing, feedlot, or other agricultural activities that generate manure are proposed to be implemented by the proposed project.

Source of ARB Scoping Plan Reduction Measures: California Air Resources Board (ARB). 2008 (includes edits made in 2009). Climate Change Scoping Plan, a framework for change. Website: [https://ww3.arb.ca.gov/cc/scopingplan/document/adopted\\_scoping\\_plan.pdf](https://ww3.arb.ca.gov/cc/scopingplan/document/adopted_scoping_plan.pdf). Accessed December 27, 2019.

As shown in Table 3.7-7, the proposed project is consistent with the applicable strategies and would not conflict with the recommendations of AB 32 in achieving a Statewide reduction in GHG emissions. Therefore, the proposed project would not significantly hinder or delay the State's ability to meet the reduction targets contained in AB 32 or conflict with implementation of the Scoping Plan.

#### ARB 2017 Climate Change Scoping Plan Update Consistency

The 2017 Climate Change Scoping Plan Update addressing the SB 32 targets was adopted on December 14, 2017. Table 3.7-8 provides an analysis of the proposed project's consistency with the 2017 Scoping Plan Update measures. As shown in Table 3.7-8, many of the measures are not applicable to the proposed project. The proposed project is consistent with all strategies that are applicable.

**Table 3.7-8: SB 32 (ARB-adopted 2017 Climate Change Scoping Plan Update) Consistency Analysis**

2017 Scoping Plan Update Reduction Measure	Project Consistency
<b>SB 350 50. Percent Renewable Mandate.</b> Utilities subject to the legislation will be required to increase their renewable energy mix from 33 percent in 2020 to 50 percent in 2030.	<b>Not applicable.</b> This measure would apply to utilities and not to individual development projects. The proposed project would purchase electricity from PG&E, which would be subject to the SB 350 Renewable Mandate.
<b>SB 350. Double Building Energy Efficiency by 2030.</b> This is equivalent to a 20 percent reduction from 2014 building energy usage compared to current projected 2030 levels.	<b>Not applicable.</b> This measure applies to existing buildings. New structures are required to comply with Title 24 Energy Efficiency Standards that are expected to increase in stringency over time. The proposed project would comply with the applicable Title 24 Energy Efficiency Standards in effect at the time building permits are received.

**Table 3.7-8 (cont.): SB 32 (ARB-adopted 2017 Climate Change Scoping Plan Update)  
Consistency Analysis**

2017 Scoping Plan Update Reduction Measure	Project Consistency
<p><b>Low Carbon Fuel Standard.</b> This measure requires fuel providers to meet an 18 percent reduction in carbon content by 2030.</p>	<p><b>Not applicable.</b> This is a Statewide measure that cannot be implemented by a project Applicant or lead agency. However, vehicles accessing the project site would benefit from the standards.</p>
<p><b>Mobile Source Strategy (Cleaner Technology and Fuels Scenario).</b> Vehicle manufacturers will be required to meet existing regulations mandated by the LEV III and Heavy-Duty Vehicle programs. The strategy includes a goal of having 4.2 million ZEVs on the road by 2030 and increasing numbers of ZEV trucks and buses.</p>	<p><b>Not applicable.</b> This measure is not applicable to the proposed project; however, vehicles accessing the project site would benefit from the increased availability of cleaner technology and fuels. Future residents, visitors, and employees can be expected to purchase increasing numbers of more fuel efficient and zero emission cars and trucks each year. Furthermore, delivery trucks and buses that would serve future residents, visitors, and employees would be made by increasing numbers of ZEV delivery trucks.</p>
<p><b>Sustainable Freight Action Plan</b> The plan’s target is to improve freight system efficiency 25 percent by increasing the value of goods and services produced from the freight sector, relative to the amount of carbon that it produces by 2030. This would be achieved by deploying over 100,000 freight vehicles and equipment capable of zero emission operation and maximize near-zero emission freight vehicles and equipment powered by renewable energy by 2030.</p>	<p><b>Not applicable.</b> This measure applies to owners and operators of trucks and freight operations. The proposed project includes a mix of uses that would support truck and freight operations. It is expected that deliveries throughout the State would be made with an increasing number of ZEV delivery trucks, including deliveries that would be made to future residents of the proposed project.</p>
<p><b>Short-Lived Climate Pollutant Reduction Strategy.</b> The strategy requires the reduction of SLCPs by 40 percent from 2013 levels by 2030 and the reduction of black carbon by 50 percent from 2013 levels by 2030.</p>	<p><b>Consistent.</b> No wood-burning devices are proposed as part of the project. Natural gas hearths produce very little black carbon compared to wood-burning fireplace; therefore, the proposed project would not include major sources of black carbon.</p>
<p><b>SB 375. Sustainable Communities Strategies.</b> Requires Regional Transportation Plans to include a Sustainable Communities Strategy for reduction of per capita vehicle miles traveled.</p>	<p><b>Not applicable.</b> The proposed project does not include the development of a Regional Transportation Plan.</p>
<p><b>Post-2020 Cap-and-Trade Program.</b> The Post 2020 Cap-and-Trade Program continues the existing program for another 10 years. The Cap-and-Trade Program applies to large industrial sources such as power plants, refineries, and cement manufacturers.</p>	<p><b>Not applicable.</b> The proposed project is not targeted by the cap-and-trade system regulations, and, therefore, this measure does not apply. However, the post-2020 Cap-and-Trade Program indirectly affects people and entities who use the products and services produced by the regulated industrial sources when increased cost of products or services (such as electricity and fuel) are transferred to the consumers.</p>

**Table 3.7-8 (cont.): SB 32 (ARB-adopted 2017 Climate Change Scoping Plan Update)  
Consistency Analysis**

2017 Scoping Plan Update Reduction Measure	Project Consistency
<p><b>Natural and Working Lands Action Plan.</b> ARB is working in coordination with several other agencies at the federal, State, and local levels, stakeholders, and with the public, to develop measures as outlined in the Scoping Plan Update and the governor’s Executive Order B-30-15 to reduce GHG emissions and to cultivate net carbon sequestration potential for California’s natural and working land.</p>	<p><b>Not applicable.</b> The proposed project site is a residential and commercial master planned area and would not be considered natural working land.</p>
<p>Source of ARB Scoping Plan Reduction Measures: California Air Resources Board (ARB). 2017. California’s 2017 Climate Change Scoping Plan, the strategy for achieving California’s 2030 GHG target. Website: <a href="https://www.arb.ca.gov/cc/scopingplan/scopingplan.htm">https://www.arb.ca.gov/cc/scopingplan/scopingplan.htm</a>. Accessed March 1, 2019.</p>	

As shown in Table 3.7-7 the proposed project is consistent with the applicable strategies and would not conflict with the recommendations of SB 32 in achieving a Statewide reduction in GHG emissions. Therefore, the proposed project would not significantly hinder or delay the State’s ability to meet the reduction targets contained in SB 32 or conflict with implementation of the Scoping Plan Update.

### **Overall**

In general, the Statewide AB 32 Scoping Plan and the SB 32 Scoping Plan Update rely on increased building energy efficiency as a method to address one of the largest Statewide GHG sectors (i.e., Energy Use). The proposed project would be compliant with all applicable energy efficiency standards such as Title 24 and CALGreen. Compliance with regulations would result in higher energy efficiency operations than the existing buildings. As presented in Table 3.7-7, the proposed project is consistent with the applicable strategies and would not conflict with the recommendations of AB 32 in achieving a Statewide reduction in GHG emissions. Therefore, the proposed project would not significantly hinder or delay the State’s ability to meet the reduction targets contained in AB 32 or conflict with implementation of the Scoping Plan. Furthermore, as shown in Table 3.7-8, implementation of the proposed project would not conflict with the reduction measures outlined in the 2017 Scoping Plan Update addressing the SB 32 targets. Therefore, the proposed project would not conflict with any applicable plan, policy or regulation of an agency adopted to reduce the emissions of GHGs. The impact would be less than significant.

### **Level of Significance**

Less Than Significant



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## Energy Use

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**Impact GHG-3: The project would not result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation.**

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### **Construction**

During construction, the proposed project would result in energy consumption through the combustion of fossil fuels in construction vehicles, worker commute vehicles, and construction equipment, and the use of electricity for temporary buildings, lighting, and other sources. No natural gas would be utilized as part of construction. Fossil fuels used for construction vehicles and other energy-consuming equipment would be used during site demolition, site preparation, grading, paving, and building construction. The types of equipment could include gasoline- and diesel-powered construction and transportation equipment, including trucks, bulldozers, frontend loaders, forklifts, and cranes. Other equipment could include construction lighting, field services (office trailers), and electrically driven equipment such as pumps and other tools.

Based on CalEEMod estimations within the modeling output files used to estimate GHG emissions associated with the proposed project, on-site construction equipment usage would consume an estimated 288,268 gallons of diesel and gasoline combined during the construction phase (Appendix C). Construction assumptions used to estimate energy consumption for the proposed project were estimated consistent with the CalEEMod modeling output files used to estimate GHG emissions and are included in Appendix C.

Limitations on idling of vehicles and equipment and requirements that equipment be properly maintained would result in fuel savings. California regulations (CCR Title 13, §§ 2449(d)(3) and 2485) limit idling from both on-road and off-road diesel-powered equipment and are enforced by the ARB. In addition, given the cost of fuel, contractors and owners have a strong financial incentive to avoid wasteful, inefficient, and unnecessary consumption of energy during construction.

Fuel use associated with construction-related vehicle trips generated by the proposed project was also estimated; trips include construction worker trips, haul trucks trips for material transport, and vendor trips for construction material deliveries. Fuel use from these vehicles traveling to the project site was based on (1) the projected number of trips the proposed project would generate during construction, (2) average trip distances by trip type, and (3) fuel efficiencies estimated in the ARB Emissions Factors model (EMFAC) mobile source emission model. The specific parameters used to estimate fuel usage are included in Appendix C. In total, the proposed project is estimated to generate approximately 12.8 million vehicle miles traveled and consume a combined 633,892 gallons of gasoline and diesel for vehicle travel during construction.

Other equipment could include construction lighting, field services (office trailers), and electrically driven equipment such as pumps and other tools. The City of Antioch Code of Ordinance limits construction activities to the hours between 7:00 a.m. and 6:00 p.m., or between 8:00 a.m. and 5:00 p.m. if within 300 feet of occupied dwellings, on weekdays, and between 9:00 a.m. and 5:00 p.m. on weekends and holidays, irrespective of the distance from occupied dwellings.<sup>91</sup> As on-site construction

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<sup>91</sup> City of Antioch. 2019. City of Antioch Code of Ordinances. Website:

activities would be restricted between these hours, it is anticipated that the use of construction lighting would be minimal. Singlewide mobile office trailers, which are commonly used in construction staging areas, generally range in size from 160 square feet to 720 square feet. A typical 720-square-foot office trailer would consume approximately 108,891 kWh during the 8.5-year construction project (Appendix C).

Due to the temporary nature of construction and the financial incentives for developers and contractors to use energy-consuming resources in an efficient manner, the construction phase of the proposed project would not result in wasteful, inefficient, and unnecessary consumption of energy. Therefore, the construction-related impact related to fuel and electricity consumption would be less than significant.

### **Operation**

#### *Electricity and Natural Gas*

Building operations for the proposed project would involve energy consumption for multiple purposes including, but not limited to, building heating and cooling, refrigeration, lighting, and electronics as well as outdoor lighting. Based on CalEEMod estimations within the modeling output files used to estimate GHG emissions associated with the proposed project, operations would consume approximately 9,878,492 kWh of electricity per year and an estimated 32,836,120 kilo-BTU per year of natural gas. Complete CalEEMod output files and additional energy calculations are included in Appendix C. The proposed project would be designed and constructed in accordance with the City's latest adopted energy efficiency standards, which are based on the State's Title 24 energy efficiency standards. These standards are widely regarded as the most advanced energy efficiency standards and compliance would ensure that operational energy consumption would not result in the use of energy in a wasteful manner or inefficient manner. Therefore, the operational impact related to building electricity and natural gas consumption would be less than significant.

#### *Fuel*

Operational energy would also be consumed during vehicle trips. Fuel consumption would be primarily related to vehicle use by residents, visitors, and employees. Based on the estimates contained in the CalEEMod output files, vehicle trips associated with the proposed project would result in approximately 23.8 million vehicle miles traveled, and consume an estimated 734,731 gallons of gasoline and diesel combined on an annual basis.<sup>92</sup> Complete CalEEMod output files are included in Appendix C. The project site is located less than 2 miles west of California State Route 4 (SR-4). As such, it would be in proximity to a regional route of travel. The project site is also located approximately 3 miles from the Antioch BART Station, which is served by the yellow line. Tri-Delta Transit provides bus services in eastern Contra Costa County. Local Routes 379, 388, and 392 would provide bus services to the project site, and the nearest bus stop to the project site for the aforementioned routes is located approximately 230 feet east of the project site across Deer Valley Road. The existing transportation facilities in the area would provide future residents, visitors, and

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[http://library.amlegal.com/nxt/gateway.dll/California/antioch/cityofantiochcaliforniacodeofordinances?f=templates\\$fn=default.htm\\$3.0\\$vid=amlegal:antioch\\_ca](http://library.amlegal.com/nxt/gateway.dll/California/antioch/cityofantiochcaliforniacodeofordinances?f=templates$fn=default.htm$3.0$vid=amlegal:antioch_ca). Accessed December 12, 2019.

<sup>92</sup> Based on the 23,800,931 annual VMT consistent with CalEEMod output (Appendix C) and an average fuel consumption determined using EMFAC2014 factors for Contra Costa County in the 2029 calendar. Website: <https://www.arb.ca.gov/emfac/2014/>. Accessed December 16, 2019.

employees with access to public transportation, thus further reducing fuel consumption demand. Additionally, the proposed project would include sidewalks on local streets and bicycle lanes, which would connect to existing bicycle lanes, thus encouraging walking and bicycling within the project site and to off-site destinations. For these reasons, transportation fuel consumption would not result in a significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during long-term operations. Therefore, the operational impact related to vehicle fuel consumption would be less than significant.

### **Level of Significance**

Less Than Significant

### **Energy Efficiency and Renewable Energy Standards Consistency**

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**Impact GHG-4:      The project would not conflict with or obstruct a state or local plan for renewable energy or energy efficiency.**

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The City of Antioch’s CCAP focuses on reducing energy from new and existing development as a mechanism to reduce GHG emissions, which is addressed under Impact GHG-2. A significant impact would occur if the proposed project would conflict with or obstruct a State or local plan for renewable energy or energy efficiency.

### **Construction**

The proposed project would result in energy consumption through the combustion of fossil fuels in construction vehicles, worker commute vehicles, and construction equipment, and the use of electricity for temporary buildings, lighting, and other sources. Fossil fuels used for construction vehicles and other energy-consuming equipment would be used during site clearing, grading, paving, and building construction. The types of equipment could include gasoline- and diesel-powered construction and transportation equipment, including trucks, bulldozers, frontend loaders, forklifts, and cranes. Other equipment could include construction lighting, field services (office trailers), and electrically driven equipment such as pumps and other tools. Limitations on idling of vehicles and equipment and requirements that equipment be properly maintained would result in fuel savings. California Code of Regulations, Title 13, Sections 2449(d)(3) and 2485 limit idling from both on-road and off-road diesel-powered equipment and are enforced by the ARB. The proposed project would be required to comply with these regulations. There are no renewable energy standards that would apply to construction of the proposed project. Therefore, construction would not conflict with or obstruct any regulations adopted for the purposes of increasing the use of renewable energy. Therefore, it is anticipated that construction of the proposed project would not conflict with any applicable plan, policy, or regulation adopted for the purpose of reducing energy use or increasing the use of renewable energy. Therefore, construction-related energy efficiency and renewable energy standards consistency impacts would be less than significant.

### **Operation**

As noted in Section 2.3.5 of the Project Description, the proposed project would be served with electricity provided by PG&E. Over 85 percent of the electricity that PG&E delivered in 2018 came

from a combination of renewable and GHG-emissions-free resources.<sup>93,94</sup> The 2017 power mix included 27 percent non-emitting nuclear generation, 18 percent large hydroelectric facilities, 33 percent eligible renewable resources, such as wind, geothermal, biomass, solar, and small hydro, 20 percent natural gas/other, and 2 percent unspecified power.<sup>95</sup> PG&E also offers a Solar Choice program, which allows the purchase of up to 100 percent solar energy generated within California.<sup>96</sup> PG&E is ahead of schedule in meeting the California Renewables Portfolio Standard of 33 percent by 2020 mandate, having delivered 39 percent of its energy from qualified renewable energy resources in 2018.<sup>97</sup> As such, the proposed project would purchase power comprised of a greater amount of renewable sources compared to what is required by regulations in effect. In addition, the City's CCAP includes green building and energy efficiency policies that promote planting trees to shade buildings, installing energy efficient appliances, reducing household water use, and expanding bicycle use and public transportation. The proposed project would include extensive bicycle lanes and sidewalks, and would provide access to Tri-Delta Transit bus services. Proposed buildings would be designed and constructed in accordance with the State's Title 24 energy efficiency standards. The project's approach to landscape design aims to minimize manicured landscapes and extensive lawns, and to maximize tree preservation.<sup>98</sup> The proposed project would not conflict with any applicable plan, policy, or regulation adopted for the purpose of reducing energy use or increasing the use of renewable energy. Therefore, operational energy efficiency and renewable energy standards consistency impacts would be less than significant.

### **Level of Significance**

Less Than Significant

### **3.7.5 - Cumulative Impacts**

As discussed above, GHG emissions are inherently a cumulative impact. Therefore, the analysis presented above addresses the cumulative GHG impacts of the proposed project.

### **Level of Cumulative Significance Before Mitigation**

Potentially Significant

### **Mitigation Measures**

MM GHG-1.

### **Level of Cumulative Significance After Mitigation**

Less Than Significant

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<sup>93</sup> Pacific Gas & Electric (PG&E). 2019. Exploring Clean Energy Solutions. Website: [https://www.pge.com/en\\_US/about-pge/environment/what-we-are-doing/clean-energy-solutions/clean-energy-solutions.page](https://www.pge.com/en_US/about-pge/environment/what-we-are-doing/clean-energy-solutions/clean-energy-solutions.page). Accessed December 5, 2019.

<sup>94</sup> Renewable sources included solar, wind, geothermal, biomass, and small hydroelectric sources. GHG-emissions-free sources of energy included nuclear and large hydro.

<sup>95</sup> California Energy Commission (CEC). 2019. Annual Power Content Label for 2017. Website: [https://www2.energy.ca.gov/pcl/labels/2017\\_index.html](https://www2.energy.ca.gov/pcl/labels/2017_index.html). Accessed December 5, 2019.

<sup>96</sup> Pacific Gas & Electric (PG&E). 2019. Exploring Clean Energy Solutions. Website: [https://www.pge.com/en\\_US/about-pge/environment/what-we-are-doing/clean-energy-solutions/clean-energy-solutions.page](https://www.pge.com/en_US/about-pge/environment/what-we-are-doing/clean-energy-solutions/clean-energy-solutions.page). Accessed December 5, 2019.

<sup>97</sup> Ibid.

<sup>98</sup> Ascent Environmental. 2018. The Ranch at Antioch Development Standards & Design Guidelines. October.