

## 3.7 Greenhouse Gas Emissions

This section describes the environmental and regulatory settings and draft significance criteria with respect to greenhouse gas emissions (GHG).

### 3.7.1 Environmental Setting

This subsection describes the environmental setting for GHGs. GHGs and climate change are a cumulative global issue. The California Air Resources Board (CARB) and the U.S. Environmental Protection Agency (EPA) regulate statewide and nationwide GHG emissions, respectively. CARB has divided California into regional air basins according to topographic drainage features. The proposed project is located within the San Diego air basin (SDAB), mostly in unincorporated areas of San Diego County. The topography of the SDAB is highly varied, being comprised of coastal plains and lagoons, flatlands and mesas, broad valleys, canyons, foothills, mountains, and deserts (SDAPCD 2018). The unincorporated areas of San Diego County include communities that vary from suburban locations neighboring incorporated cities to lower density rural communities surrounded by hillsides, deserts, and agricultural lands (County of San Diego 2017). Climate within the SDAB is classified as Mediterranean and described in Section 3.3 Air Quality. This section provides general definitions about GHGs, the reported GHG emission levels in California and the SDAB, and a brief description of the potential effects from climate change.

#### 3.7.1.1 Greenhouse Gases

GHGs are defined as gases that trap heat in the atmosphere and regulate the earth’s temperature. The GHG effect is responsible for maintaining a habitable climate. The most common GHGs are carbon dioxide (CO<sub>2</sub>) and water vapor. Other GHGs include methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF<sub>6</sub>). GHGs are released into the earth’s atmosphere through a variety of natural processes and human activities.

The potential of a GHG to trap heat in the atmosphere is known as global warming potential (GWP). Each GHG has its own potency and effect upon the earth’s energy balance, expressed in terms of its warming potential. The EPA defines GWP as “a measure of how much energy the emissions of 1 ton of a gas will absorb over a given period of time, relative to the emissions of 1 ton of carbon dioxide” (EPA 2018a). The time period usually used for GWPs is 100 years. The reference gas for GWP is CO<sub>2</sub> and is assigned a GWP value of one. In contrast, because it is orders of magnitude stronger in trapping heat in the atmosphere than CO<sub>2</sub>, SF<sub>6</sub> has a GWP value of 22,800. In GHG emissions inventories, the weight of each gas is multiplied by its GWP and is measured in units of equivalent CO<sub>2</sub> (CO<sub>2</sub>e). GWPs are updated periodically with improvements to scientific methods. Table 3.7-1 shows the 100-year GWPs for the six GHGs previously mentioned, as reported by the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (AR4).

Table 3.7-1 Greenhouse Gases and Associated Global Warming Potentials

Greenhouse Gas	Warming Potential <sup>(a)</sup>
Carbon Dioxide (CO <sub>2</sub> )	1
Methane (CH <sub>4</sub> )	25
Nitrous Oxide (N <sub>2</sub> O)	298
Perfluorocarbons (PFCs) <sup>(b)</sup>	7,390–12,200

**Table 3.7-1 Greenhouse Gases and Associated Global Warming Potentials**

Greenhouse Gas	Warming Potential <sup>(a)</sup>
Hydrofluorocarbons (HFCs) <sup>(b)</sup>	124–14,800
Sulfur Hexafluoride (SF <sub>6</sub> ) <sup>(b)</sup>	22,800

Source: CARB 2018a.

Notes:

- (a) Potential is expressed relative to that of carbon dioxide (CO<sub>2</sub>) over a period of 100 years.
- (b) High global warming potentials, which includes hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF<sub>6</sub>)

In 2016, the United States GHG emissions totaled 6,511 million metric tons of CO<sub>2</sub>e (MTCO<sub>2</sub>e) or 5,795 million MTCO<sub>2</sub>e after accounting for sequestration from the land sector (EPA 2018b). California statewide GHG emissions in 2016 were 429 million metric tons of carbon dioxide equivalent (CARB 2018b). The transportation sector (i.e., tailpipe of cars, trucks, off-road transportation sources, intrastate aviation, rail, and ship transportation) remains as the largest source of GHG emissions in the state, accounting for 39 percent of California’s inventory, followed by industry (21percent) and electricity (16 percent) sector contributions (CARB 2018b).

According to CARB, emissions from transportation sources were relatively constant between 2002 and 2007, declined through 2013, then increased by four percent from 2014 to 2016. This increase has been mainly driven by the increase in fuel use in on-road vehicles. However, California’s GHG overall emissions have followed a declining trend since 2007. During the 2000 to 2016 period, per capita GHG emissions in the state have decreased by 23 percent (CARB 2018b).

In 2014, GHG emissions in unincorporated San Diego County totaled 3.21 million MTCO<sub>2</sub>e. The on-road transportation sector (i.e., gasoline and diesel use) accounted for 45 percent (1.45 million MTCO<sub>2</sub>e) of the total emissions inventory, followed by the electricity and solid waste sectors (County of San Diego 2017). The County’s 2014 GHG emissions, not including subtraction of sequestration sectors, are presented in Table 3.7-2.

**Table 3.7-2 GHG Emissions in Unincorporated San Diego County by Sector (2014)**

Sector	GHG Emissions (MMTCO <sub>2</sub> e)
On-Road Transportation	1.46
Electricity	0.76
Solid Waste	0.34
Natural Gas	0.29
Agriculture	0.16
Water	0.13
Off-Road Transportation	0.04
Wastewater	0.02
Propane	0.01
<b>Total</b>	<b>3.21</b>

Source: County of San Diego 2017.

Key:

GHG = Greenhouse gas

MMTCO<sub>2</sub>e = Million metric tons of carbon dioxide equivalent

### 3.7.1.2 Potential Effects from Climate Change

Climate change, by its nature, is a cumulative effect resulting from global warming and innumerable GHG sources around the world. There is general scientific consensus that climate change is occurring and that human activity contributes substantially to that change. Scientific evidence has shown that global temperatures will continue to rise. The IPCC, which includes more than 1,300 scientists from the United States and other countries, forecasts a temperature rise of 2.5 to 10 degrees Fahrenheit over the next century (NASA 2018). According to the IPCC, the extent of climate change effects on individual regions will vary over time and with the ability of different societal and environmental systems to mitigate or adapt to change. “Taken as a whole,” the IPCC states, “the range of published evidence indicates that the net damage costs of climate change are likely to be significant and to increase over time.” (NASA 2018).

The California’s Fourth Climate Change Assessment finds that climate change is making extreme conditions more frequent and severe in California and, although changes vary between regions, every region is seeing, and will continue to see, effects from climate change (Bedsworth et al. 2018). Increasing temperatures and rising sea-levels will have direct impacts on public health and infrastructure. Drought, coastal and inland flooding, and wildfire will continue to affect people’s livelihoods and local economies. Changing weather patterns and more extreme conditions will impact tourism and rural economies, along with changes to agriculture and crops, which are a critical backbone of California’s economic success. There will also be negative impacts to California’s ecosystems, both on land and in the ocean, leading to local extinctions, migrations, and management challenges.

Climate change is already affecting San Diego region with more frequent and intense heat waves, decreased precipitation, and increased wildfire risk (Kalansky et al. 2018). Climate-related hazards that confront the San Diego region are projected to feature increasingly intense and possibly longer lasting heat waves and drought, along with floods, wildfire, debris flows, and coastal storms. Higher amounts of warming are expected in inland areas that do not benefit from the ventilation of marine air, which helps to shield the coastal zone. Overall changes in annual precipitation in San Diego County are uncertain, but most climate models agree that while there will be fewer wet days, the region will receive more intense precipitation when wet days do occur. The reduction in the number of wet days means that year-to-year precipitation will become more variable and lead to more frequent and intense drought (Kalansky et al. 2018).

### 3.7.2 Regulatory Setting

This subsection summarizes federal, state, and local laws; regulations; and standards that govern greenhouse gas emissions in the project area.

#### 3.7.2.1 Federal

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

In 2009, the EPA issued two separate findings regarding GHGs under Section 202(a) of the Clean Air Act:

- **Endangerment Finding:** states that the current and projected concentrations of the six key GHGs (CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, HFCs, PFCs, and SF<sub>6</sub>) in the atmosphere threaten public health and welfare of current and future generations.
- **Cause or Contribute Finding:** states that the combined emissions of GHGs from new motor vehicles and new motor vehicle engines contribute to GHG pollution that threatens public health and welfare.

These findings were a foundation for the EPA’s regulation of vehicle GHG emissions. The EPA and the U.S. Department of Transportation’s National Highway Traffic and Safety Administration (NHTSA) have finalized GHG emission reduction regulations for light-duty vehicles and heavy-duty engines (EPA 2016).

### ***Final Rule on Mandatory Reporting of GHGs (40 Code of Federal Regulations Part 98)***

In 2009, the EPA established the Final Rule on Mandatory Reporting of Greenhouse Gases, which requires reporting of GHG emissions from large sources and suppliers in the United States. The rule intends to collect accurate and timely emissions data to inform future policy decisions. Facilities that emit 25,000 MTCO<sub>2e</sub> or more per year are required to submit annual reports to the EPA.

### ***Light-Duty Vehicle Standards***

In collaboration with the NHTSA, the EPA finalized the program to reduce GHG emissions and improve fuel economy for light-duty vehicles (model years [MY] 2012 to 2016) in May 2010. The program was extended in 2012 to set more stringent standards for MY 2017 to 2025 light-duty vehicles. The revised standards are projected to reduce GHGs by approximately 2 billion metric tons and save 4 billion barrels of oil over the lifetime of MY 2017 to 2025 vehicles. Standards include fuel economy targets and improvements in vehicle technologies, including improved vehicle aerodynamics, reduced vehicle weight, lower tire rolling resistance, and expanded production of electric and hybrid vehicles.

### ***Heavy-Duty Truck and Bus Standards***

In 2011, the EPA and NHTSA announced the first-year program to reduce GHG emissions and improve the fuel efficiency of heavy-duty trucks and buses. The final combined standards of the program will reduce CO<sub>2</sub> emissions by about 270 million metric tons and save about 530 million barrels of oil over the life of MY 2014 to 2018 heavy-duty vehicles. The heavy-duty sector addressed in the EPA and NHTSA rules (including the largest pickup trucks and vans, semi-trucks, and all types and sizes of work trucks and buses in between) accounts for nearly 6 percent of total GHG emissions in the United States and for 20 percent of transportation emissions. The program includes standards for fuel consumption and emissions for combination tractors and vocational vehicles; N<sub>2</sub>O and CH<sub>4</sub> emission standards applicable to all heavy-duty engines, pick-ups, and vans; and standards for leakage of HCF refrigerants from air conditioning systems.

## **3.7.2.2 State**

### ***Assembly Bill 32 and Scoping Plan***

In 2006, the Global Warming Solutions Act, Assembly Bill (AB) 32, was enacted, requiring a reduction of the state’s GHG emissions to 1990 levels by 2020, consistent with Executive Order (E.O.) S-3-05. AB-32 requires that CARB prepare and approve a Climate Change Scoping Plan (Scoping Plan) for achieving the maximum technologically feasible and cost-effective reductions in GHG emissions from sources or categories of sources of GHGs by 2020. The Scoping Plan includes a range of GHG emission reduction actions, including direct regulations; alternative compliance mechanisms; monetary and non-monetary incentives; voluntary actions; market-based mechanisms, such as a cap-and-trade system; and an AB-32 cost of implementation fee regulation to fund the program. The initial Scoping Plan was approved at the CARB hearing on December 12, 2008. CARB approved the First Update to the Scoping Plan in May 2014 (CARB 2014). On November 2017, CARB published the second update to the Scoping Plan to reflect the 2030 target of 40 percent emissions reductions below 1990 levels. Over time, measures in the Scoping Plan are being adopted as regulations (CARB 2017).

GHG reduction measures contained in the Scoping Plan that are applicable to the proposed project include the Low Carbon Fuel Standard, regional transportation-related GHG targets, light-duty vehicle GHG standards, medium/heavy-duty vehicle GHG standards, vehicle efficiency measures, goods movement, energy efficiency, high GWP gases, and recycling and waste. The California legislature has also passed legislation implementing most of the Scoping Plan measures. Legislation applicable to the proposed project is described below.

#### ***Executive Order B-30-15 and Senate Bill 32***

In April 2015, Governor Brown signed E.O. B-20-15 establishing a new interim statewide GHG emission reduction target of 40 percent below 1990 levels by 2030. The interim reduction target was established to ensure that California meets its goal of reducing GHG emissions to 80 percent below 1990 levels by 2050. E.O. B-30-15 requires state agencies to consider climate change in their planning and investment decisions, giving priority to actions that reduce GHG emissions. In 2016, the legislature passed Senate Bill (SB 32), which codifies a 2030 GHG emission reduction target of 40 percent below 1990 levels.

#### ***Senate Bill 375 – Sustainable Communities Strategy***

In 2008, SB 375 was adopted to achieve the GHG reduction targets established in the Scoping Plan for the transportation sector through local land use decisions that affect travel behavior. In a relevant part, SB 375 requires CARB to set regional targets for GHG emission reductions from passenger vehicles and light-duty trucks. On November 11, 2011, CARB accepted the San Diego Association of Governments (SANDAG)—which includes San Diego County—determination that its adopted Sustainable Communities Strategy would meet or exceed the regional GHG emissions reduction goals of 7 percent by 2020 and 13 percent by 2035 (CARB 2011).

#### ***Assembly Bill 1493 – Pavley***

In 2002, the California legislature adopted regulations to reduce GHG emissions in the transportation sector, the state’s largest source of GHG emissions. In September 2004, pursuant to AB 1493, CARB approved regulations to reduce GHG emissions from new motor vehicles beginning with the 2009 MY. In September 2009, CARB adopted amendments to the Pavley regulations to reduce GHG from 2009 to 2016. CARB, EPA, and NHTSA have coordinated efforts to develop fuel economy and GHG standards for model 2017-2025 vehicles. The GHG standards are incorporated into the “Low Emission Vehicle” Regulations.

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

In January 2007, the governor set a new standard for transportation fuels sold in California, which sets a reduction of 2.5 percent in the carbon intensity of transportation fuels by 2015 and a reduction of at least 10 percent by 2020.

#### ***Other Mobile Source Reduction Requirements***

Several other State provisions address the GHG emissions reduction targets set by CARB for mobile sources. Measures applicable to the proposed projects include the following:

- **Advanced Clean Cars Program:** a set of regulations that would apply to new vehicles with MYs between 2017 and 2025, with a goal of GHG emission reduction of 34 percent in 2025.
- **Heavy-Duty Truck GHG Regulations:** regulations that apply to new heavy-duty tractors and trailers to reduce GHG emissions.
- **On-Road Heavy-Duty Diesel Vehicle Regulations:** requires diesel trucks and buses to be upgraded to reduce GHG emissions under a phased implementation that would have almost all buses and trucks with 2010 engines by January 1, 2023.

### ***California Green Building Standards***

California Code of Regulations Title 24, Part 11, establishes the requirements to improve health, safety, and general welfare by enhancing the planning, design, operation, construction, use, and occupancy of every newly constructed building or structure throughout the state of California. Section 5.408 of this code establishes mandatory requirements for construction waste reduction, disposal, and recycling for nonresidential building structures. In particular, Section 5.408.1 requires recycling and/or salvaging for reuse a minimum of 50 percent of the nonhazardous construction and demolition waste. In addition, Section 5.408 requires preparation of a construction waste management plan, selection of a waste management company that can provide verifiable documentation, alternatives for waste stream reduction, and requirements for managing excavated soils and land clearing debris.

### **3.7.2.3 Regional and Local**

#### ***San Diego Association of Governments' 2014 Regional Energy Strategy***

The 2014 Regional Energy Strategy is an energy policy guide used to support decision-making by the SANDAG and its member agencies through 2050, with the goal of assisting the San Diego region in meeting the energy needs of a growing population, housing stock, and workforce, while maintaining and enhancing regional quality of life and economic stability. To accomplish these objectives, among other things, the Regional Energy Strategy calls for increased use of natural gas for certain transportation applications and the continued efficient use of electricity generation (SANDAG 2014).

#### ***County of San Diego Climate Action Plan***

The County of San Diego adopted its Climate Action Plan (CAP) in February 2018. The CAP addresses the issues of managing growth and climate change, safeguarding the environment for residents and visitors, and reducing county GHG emissions consistent with state legislative requirements. Emissions reduction measures outlined in the CAP include increasing transit use, walking and biking, and ridesharing (County of San Diego 2018). The CAP includes strategies and measures to reduce GHG emissions from “county operations,” i.e., GHG emissions generated by facilities and operational activities throughout the county, including facilities and operations located within incorporated cities. In addition to strategies and measures to reduce GHG emissions, the CAP also includes a threshold of significance for GHG emissions and revised Guidelines for Determining Significance for Climate Change (County of San Diego 2018).

The proposed project crosses the communities of Rainbow, Fallbrook, Bonsall, and Valley Center, as well as the North County Metropolitan Subregional Plan area in unincorporated San Diego County. Goals or policies specifically related to GHGs or climate change are covered under the County of San Diego CAP.

#### ***City of San Diego Climate Action Plan***

The City of San Diego adopted its CAP in December 2015 to proactively address environmental concerns, such as achieving GHG reduction targets in line with E.O. S-3-05. The CAP was amended by City Council on July 2016. This CAP includes a municipal operations and community-wide GHG emissions baseline calculation from 2010, and sets a target of achieving a 15 percent reduction from the baseline by 2020 and an 80 percent reduction by 2050. Measures to achieve these targets include strategies centered on energy and water efficient buildings, clean and renewable energy, transit and land use, zero waste, and climate resiliency (City of San Diego 2016).

### 3.7.3 Draft Significance Criteria

Had an impact analysis been completed for the proposed project, significance criteria would likely have been based on California Environmental Quality Act Guidelines Appendix G. An impact might have been considered significant if the project would:

- a) Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment; or
- b) Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs.

### 3.7.4 References

Bedsworth, Louise, Dan Cayan, Guido Franco, Leah Fisher, Sonya Ziaja. (California Governor’s Office of Planning and Research, Scripps Institution of Oceanography, California Energy Commission, California Public Utilities Commission). 2018. Statewide Summary Report. California’s Fourth Climate Change Assessment. Publication number: SUMCCCA4-2018-013.

CARB (California Air Resources Board). 2011. Executive Order G-11-114. ARB Acceptance of GHG Quantification Determination. November.

\_\_\_\_\_. 2014. First update to the AB-32 Scoping Plan. May 2014.

\_\_\_\_\_. 2017. California’s 2017 Climate Change Scoping Plan. November 2017.

\_\_\_\_\_. 2018a. Global Warming Potentials. Accessed October 16, 2018.  
<https://www.arb.ca.gov/cc/inventory/background/gwp.htm>

\_\_\_\_\_. 2018b. California Greenhouse Gas Emissions for 2000 to 2016. Trends of Emissions and Other Indicators. July 2018.

City of San Diego. 2016. Climate Action Plan. Amended July 12, 2016.

County of San Diego. 2017. 2014 Greenhouse Gas Emissions Inventory and Projections. Prepared by the Energy Policy Initiatives Center and Ascent Environmental, Inc. December 2017.

\_\_\_\_\_. 2018. County of San Diego Climate Action Plan. Adopted February 14, 2018.

EPA (United States Environmental Protection Agency). EPA and NHTSA Adopt Standards to Reduce Greenhouse Gas Emissions and Improve Fuel Efficiency of Medium- and Heavy-Duty Vehicles for Model Year 2018 and Beyond. EPA-420-F-16-044. August 2016.

\_\_\_\_\_. 2018a. Understanding Global Warming Potentials. Accessed: October 16, 2018.  
<https://www.epa.gov/ghgemissions/understanding-global-warming-potentials>

\_\_\_\_\_. 2018b. Inventory of U.S. Greenhouse Gas Emissions and Sinks. Accessed October 16, 2018. <https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks>

Kalansky, Julie, Dan Cayan, Kate Barba, Laura Walsh, Kimberly Brouwer, Dani Boudreau. (University of California, San Diego). 2018. San Diego Summary Report. California’s Fourth Climate Change Assessment. Publication number: SUM-CCCA4-2018-009.

NASA (National Aeronautics and Space Administration). 2018. How Climate Is Changing. <https://climate.nasa.gov/effects/>. Last updated: October 15, 2018.

SANDAG (San Diego Association of Governments). 2014. Regional Energy Strategy Goals Summary for the San Diego Region. June 2014.

SDAPCD (San Diego Air Pollution Control District). 2018. Annual Air Quality Monitoring Network Plan 2017. April 2018.