

4.6 GREENHOUSE GAS EMISSIONS AND ENERGY

This section describes the science behind greenhouse gases (GHGs) and analyzes potential for GHG emissions and energy consumption during both construction and long-term operations. The section describes the regulatory framework for management of global climate change and energy on federal, state, and local levels. The following analysis is based in part on the Air Quality and Greenhouse Gas Emissions Assessment completed in June 2014 (Illingworth & Rodkin, 2014), included as **Appendix D**.

4.6.1 EXISTING CONDITIONS

Greenhouse Gas Emissions

Global temperatures are affected by both naturally occurring and anthropogenic (generated by human activity) atmospheric gases. When solar radiation enters the earth's atmosphere, a portion of the radiation is absorbed at the earth's surface and a portion is reemitted towards space in the form of infrared radiation¹. GHGs absorb infrared radiation (that would have otherwise escaped) and redirects some back to the earth's surface. As a result, GHGs trap heat into the atmosphere in a process called the greenhouse effect. A certain balance of GHGs in the atmosphere keeps the earth's climate temperate and habitable as a whole.

GHGs formed as a result of electricity production, motor vehicle use, agriculture, and other human activities, are elevating the concentrations of GHGs in the atmosphere. The accumulations of GHG concentrations are associated with the trend of unnatural warming of the earth's climate, known as global climate change. In general, global climate change can be described as the changing of the earth's climate caused by natural fluctuations and human activities which alter the composition of the global atmosphere.

Other than water vapor, the primary GHGs contributing to global climate change include the following gases:

¹ Infrared radiation is a type of electromagnetic radiation with longer wavelengths. Long infrared waves are thermal.

- **Carbon dioxide** is primary formed as a byproduct from the incomplete combustion of fuel.
- **Nitrous oxide** is also formed as a byproduct of fuel combustion, but is also associated with agricultural operations (i.e., fertilization of crops).
- **Methane** is commonly created by off-gassing from agricultural practices (e.g., livestock), wastewater treatment, and landfill operations.
- **Chlorofluorocarbons** were used as refrigerants, propellants, and cleaning solvents. An international treaty called the Montreal Protocol banned global production of CFCs.
- **Hydrofluorocarbons** are now widely used as a substitute for chlorofluorocarbons in refrigeration and cooling.
- **Perfluorocarbons** and **sulfur hexafluoride** emissions are commonly created by industries such as aluminum production and semiconductor manufacturing.
- **Ozone** is not directly emitted, but is formed from other gases in the troposphere, the lowest level of the earth's atmosphere. Ozone also contributes to the retention of heat.

These gases are measured by global warming potential (GWP), a term developed to compare the propensity of each GHG to trap heat in the atmosphere compared to another GHG. The GWP of each GHG varies considerably as GWP is based on several factors, including the relative effectiveness of a gas to absorb infrared radiation and the length of time the gas remains in the atmosphere. The GWP of each GHG is measured relative to carbon dioxide. Accordingly, GHG emissions are typically measured and reported in terms of carbon dioxide equivalent (CO₂e). For instance, sulfur hexafluoride is 22,800 times more intense GHG than carbon dioxide.

According to the California Air Resources Board (CARB) California Greenhouse Gas Emission Inventory (2014), California greenhouse gas emissions were 459 million metric tons of (MMTCO₂e). Transportation sector emissions were the largest source at 37 percent; industrial sector emissions were 22 percent; and in-state electricity generation sector emissions were 21 percent of total in-state emissions.

Energy

Pacific Gas & Electric (PG&E) provides electrical and natural gas services to the Bay Area within its service territory. PG&E obtains power generated from various sources, including fossil fuels, hydroelectric, nuclear, wind, and geothermal plants. Generated energy capacity supports the electrical grid system servicing Northern California, operated by the California Independent System Operator.

According to CARB (2014), GHG emissions produced by in-state electricity generation increased by 11.2 percent between 2000 and 2012.

PG&E's energy portfolio is summarized as follows:²

- Natural Gas – 27%
- Nuclear – 21%
- Utility-scale Hydroelectric – 11%
- Other Renewable (Wind, Solar, etc.) – 19%
- Unspecified power – 21% (due to electricity that is not traceable)

4.6.2 REGULATORY SETTING

Federal Clean Air Act

As further described in **Section 4.2, Air Quality**, the U.S. Environmental Protection Agency (EPA) is the federal agency responsible for implementing the Clean Air Act (CAA). The U.S. Supreme Court ruled that the EPA has the authority to regulate carbon dioxide and other GHGs as air pollutants, as defined under the CAA. The EPA Administrator found that the current and projected concentrations of GHGs endanger the public health and welfare of current and future generations. Furthermore, the EPA has issued several other regulatory proposals to cut GHG emissions from power plants.³ Federal GHG programs focusing on large stationary sources and fuel efficiency standards for mobile sources are in place and evolving.

Corporate Average Fuel Economy

Corporate Average Fuel Economy (CAFE) requires vehicle manufacturers to comply with the gas mileage, or fuel economy, standards set by the Department of Transportation (DOT). CAFE values are obtained using the city and highway fuel economy test results and a weighted average of vehicle sales. The EPA administers the testing program that generates the fuel economy data. The National Highway Traffic and Safety Administration (NHTSA), part of DOT, is authorized to assess penalties based on the information EPA supplies and to modify the standards.

² Power mix includes all PG&E –owned generation plus PG&E power purchase procurements.

³ US EPA. 2014. Clean Power Plan Flexibility Approach. Accessed June 16, 2014 from <http://www2.epa.gov/carbon-pollution-standards/fact-sheet-clean-power-plan-flexibility>

The Corporate Average Fuel Economy (CAFE) requires vehicle manufacturers to comply with the gasoline mileage or fuel economy standards set by the Department of Transportation (DOT).

Energy Policy Act

The Energy Policy Act of 2005 introduced grant programs, demonstration and testing initiatives, and tax incentives to promote alternative fuels and the production/use of advanced vehicles. This Act also amended various regulations, including fuel economy testing procedures and Energy Policy Act of 1992 requirements for federal, state, and alternative fuel provider fleets.

California Global Warming Solutions Act (Assembly Bill 32)

Assembly Bill 32 (AB 32) requires that California cap its GHG emissions at 1990 levels by 2020. AB 32 requires CARB to design and implement emission limits, regulations, and other measures, such that feasible and cost-effective statewide GHG emissions are reduced to 1990 levels by 2020 (representing a 25 percent reduction in emissions).

Pursuant to AB 32, CARB adopted a Scoping Plan in December 2008 (updated in May 2014), outlining measures to meet the 2020 GHG reduction limits. In order to meet these goals, California must reduce its GHG emissions by 30 percent below projected 2020 business as usual emissions levels or about 10 percent from today's levels. As part of AB 32, California electricity suppliers must supply 33 percent of electricity from renewable energy sources. Furthermore, AB 32 established a greenhouse gas cap-and-trade program in 2013.

The AB 32 Scoping Plan anticipates that local government actions will result in reduced GHG emissions as successful implementation of the plan relies on local governments' land use planning and urban growth decisions. Local governments have primary authority to plan, zone, approve, and permit land development to accommodate population growth and the changing needs of their jurisdictions. CARB has identified a GHG reduction target of 15 percent from 2008 levels by 2020 for local governments.

California Renewable Energy Portfolio Standard Program (Senate Bills 107 and 1078)

The State of California established a Renewable Energy Portfolio Standard Program, which originally included a goal of increasing the percentage of renewable energy in the state's electricity mix to 20 percent by 2017. Subsequent legislation and an executive order raised California's renewable energy goal to 33 percent by 2020.⁴

Sunnyvale General Plan

According to the Sunnyvale General Plan, the city efforts to promote sustainability have resulted in a reduction of solid waste generation and expanded recycling programs.

The Sunnyvale General Plan includes goals and policies that strive to reduce Sunnyvale residents' exposure to air pollutants, as outlined in **Section 4.2, Air Quality**. The general plan includes specific policies related to "promote environmental sustainability and remediation in the planning and development of the city, in the design and operation of public buildings, in the transportation system, in the use of potable water, and in the recycling of waste." Such actions would support reductions in citywide greenhouse gas emissions.

Bay Area Air Quality Management District CEQA Thresholds

The Bay Area Air Quality Management District (BAAQMD) is primarily responsible for assuring that the national and state ambient air quality standards are attained and maintained in the Bay Area. BAAQMD is also responsible for adopting and enforcing rules and regulations concerning air pollutant sources, issuing permits for stationary sources of air pollutants, inspecting stationary sources of air pollutants, responding to citizen complaints, monitoring ambient air quality and meteorological conditions, awarding grants to reduce motor vehicle emissions, and conducting public education.

In June 2010, BAAQMD adopted thresholds of significance to assist in the review of projects under CEQA. These thresholds were designed to establish the level at which BAAQMD believed air pollution emissions would cause significant environmental impacts under CEQA and were posted on BAAQMD's website and included in the Air District's updated CEQA Guidelines (updated May 2011).

⁴ California Public Utilities Commission, RPS Program Overview. 2013
<http://www.cpuc.ca.gov/PUC/energy/Renewables/overview.htm>

In subsequent litigation, the BAAQMD CEQA Guidelines were determined to be a project under CEQA; BAAQMD was duly ordered to rescind these Guidelines pending completion of environmental review per CEQA. In August 2013, the Appellate Court struck down the lower court's order to set aside the thresholds. However, this litigation remains pending as the California Supreme Court recently accepted a portion of the petition to review the appellate court's decision to uphold BAAQMD's adoption of the thresholds. The preparers of the air quality report have reviewed the evidence used to formulate the BAAQMD CEQA Guidelines, including BAAQMD's May 2010 staff report recommending the adoption of the thresholds and its attachments. The preparers concluded that substantial evidence supports the use of BAAQMD's 2010 thresholds of significance as thresholds of significance for air quality. The significance threshold identified by BAAQMD for operational and construction GHG emissions is 1,000 metric tons or 4.6 metric tons per capita annually.

Bay Area Air Quality Management District Clean Air Plan

To achieve the CAAQS, BAAQMD develops air quality plans addressing the California CAA and updates them every several years. The 2010 CAP includes 55 measures for reducing pollution. In general, the 2010 CAP furthers the goals of the Bay Area 2005 Ozone Strategy, and includes the following actions:

- Update the current Bay Area 2005 Ozone Strategy in accordance with the requirements of the California CAA to implement "all feasible measures" to reduce ozone;
- Provide a control strategy to reduce ozone, particulate matter, TACs, and greenhouse gases in a single, integrated plan;
- Review progress in improving air quality in recent years; and
- Establish emission control measures to be adopted or implemented between the 2010 to 2012 timeframe.

BAAQMD adopts and enforces rules to reduce particulate matter emissions and develops public outreach programs to educate the public to reduce PM₁₀ and PM_{2.5} emissions. BAAQMD Regulation 6, Rule 3 restricts operation of any indoor or outdoor fireplace, fire pit, wood or pellet stove, masonry heater, or fireplace insert on specific days during the winter when air quality conditions are forecasted to exceed the NAAQS for PM_{2.5}. Rule 3 also limits excess visible emissions from wood burning devices and requires clean burning technology for wood burning devices sold (or resold) or installed in the Bay Area.

In addition, BAAQMD enforces regulations regarding offensive odors. BAAQMD Regulation 7 places general limitations on odorous substances, and specific emission limitations on certain odorous compounds. The regulation applies when and if the BAAQMD receives validated odor complaints from 10 or more complainants in a 90-day period.

Bay Area Air Quality Management District Climate Protection Program

BAAQMD established a climate protection program to reduce pollutants that contribute to global climate change and affect air quality. The climate protection program includes measures that promote energy efficiency, reduce vehicle miles traveled, and develop alternative sources of energy, all of which assist in reducing emissions of GHGs and in reducing air pollutants that affect the health of residents. BAAQMD also seeks to support current climate protection programs in the region and to stimulate additional efforts through public education and outreach, technical assistance to local governments and other interested parties, and promotion of collaborative efforts.

Project Consistency

The proposed project would conform to the above policies and subject to any new requirements under rule making or policies developed at the state and local level regarding GHG emissions. As a result, the proposed project would be consistent with the applicable plans, policies, and regulations discussed above.

4.6.3 IMPACTS AND MITIGATION MEASURES

Consistent with the foregoing policies and guidelines, this section documents the results of an evaluation of the project's potential to result in substantial GHG emissions or significant new energy demand.

Significance Criteria

Appendix G of the CEQA Guidelines identifies environmental issues to be considered when determining whether a project could have significant effects on the environment. The project would have a significant impact if it would:

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

- Result in wasteful, inefficient and unnecessary use of energy.
- Result in a significant demand on regional energy supply or requirements of substantial additional capacity.

Discussion of No Impacts

Would the project conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

The project would not interfere with any plan or regulation intended to reduce GHG emissions as the project would not increase the number of or otherwise expand automobile lanes and would thus not generate new automobile trips. However, the proposed project would remain subject to any new requirements under rule making or policies developed at the state and local level regarding GHG emissions. As a result, the proposed project would not conflict with applicable plans, policies, or regulations and no mitigation would be required.

Discussion of Less-than-Significant Impacts

Would the project generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

Construction and operation GHG emission estimates were calculated and modeled using anticipated construction equipment over the various project construction phases. **Appendix D** includes GHG emission model input and output worksheets for further reference. GHG emissions for project demolition, construction, and hauling activities would require 263 MT of CO₂e over the course of the entire construction period. Neither the City of Sunnyvale, BAAQMD, nor Caltrans have quantified thresholds for construction activities. However, the emissions would be below the lowest threshold considered by BAAQMD.

As a bridge rehabilitation project, the proposed project would not widen the automobile lanes of traffic and thus would not generate new automobile trips. As a result, operational GHG emissions would not result in a significant impact.

Would the project result in a wasteful, inefficient and unnecessary use of energy?

and

Would the project result in a significant demand on regional energy supply or requirements of substantial additional capacity?

Implementation of proposed project would result in rehabilitation of an existing overhead bridge. Energy would be consumed throughout the construction period, expected to last approximately 16 months. Construction of the proposed project would require indirect consumption of fossil fuels, labor, and construction materials. Construction includes energy/fuel sources to power construction equipment, manufacture the equipment, and transport supplies to the worksite. Such equipment would involve use of excavators, tractors, backhoes, cranes, drill rigs, forklifts, welders, cement mixers, rollers, etc. Energy expenditures of this equipment would be, for the most part, irrecoverable; however, they are not in short supply, and their use would not have a significant impact upon continued availability of these resources.

Once in operation, the proposed project would have the same number of lanes as existing and thus would not generate new automobile trips. Furthermore, the proposed project would replace existing streetlight infrastructure with more energy efficient lighting. As a result, the proposed project would not result in any wasteful or inefficient use of energy and would not constitute any significant regional energy demand.

4.6.4 REFERENCES

California Air Resources Board (CARB). California Greenhouse Gas Emission Inventory (2014), Accessed June 16, 2014 from http://www.arb.ca.gov/cc/inventory/pubs/reports/ghg_inventory_00-12_report.pdf

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