

5.7 Greenhouse Gas Emissions

GREENHOUSE GAS EMISSIONS

Would the project:

	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b. Conflict with any applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Significance criteria established by CEQA Guidelines, Appendix G.

5.7.1 Setting

Globally, temperature, precipitation, sea level, ocean currents, wind patterns, and storm activity are all affected by the presence of greenhouse gases (GHG) in the atmosphere. In contrast to air quality that is of regional or local concern, human-caused emissions of GHGs are linked to climate change on a global scale. GHGs allow ultraviolet radiation to enter the atmosphere and warm the Earth's surface and prevent some infrared radiation emitted by the Earth from escaping back into space. The largest anthropogenic source of GHGs is fossil fuel combustion, which results primarily in carbon dioxide (CO₂) emissions. Human activity contributes to emissions of six primary GHGs: CO₂, methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride (SF₆).

Carbon dioxide emissions occur largely from combustion of fossil fuels. Other GHG emissions tracked by State inventories occur in much smaller quantities. However, the global warming potential of CH₄ is about 21 times that of CO₂. The use of sulfur hexafluoride or SF₆ in power transformers and circuit breakers at power plants, switchyards, and substations also poses a concern, because this pollutant can slowly escape from the equipment, and it has an extremely high global warming potential (one pound of SF₆ is the equivalent warming potential of approximately 23,900 pounds of CO₂). When quantifying GHG emissions, the different global warming potentials of GHG pollutants are usually taken into account by normalizing their rates to an equivalent CO₂ emission rate (CO₂e).

California produced approximately 457 million metric tons of CO₂ equivalent (457 MMTCO₂e) in 2009, according to the most recent statewide inventory (CARB, 2011).³ This represents a decrease of 5.8 percent from 2008, during which approximately 485 MMTCO₂e were emitted, or about one percent of 49,000 MMTCO₂e emitted globally (IPCC, 2007a). The main sources of GHG emissions in California are the transportation and energy sectors.

How global climate change may affect California's public health, infrastructure, and natural resources is described in the 2009 Biennial Report of the California Climate Action Team (Cal EPA, 2010). The Climate Action Team found that:

Extreme events from heat waves, floods, droughts, wildfires and bad air quality are likely to become more frequent in the future and pose serious challenges to Californians. They pose growing demands on individuals, businesses and governments at the local, state, and federal levels to minimize vulnerabilities, prepare ahead of time, respond effectively, and recover and rebuild with a changing climate and environment in mind.

³ One metric ton (MT) equals 1.1 short tons or 2,204.6 pounds or 1,000 kilograms.

Recent findings from the California Climate Change Center⁴ assess the local and statewide vulnerabilities in a 2012 report, as follows:

Our Changing Climate 2012 *highlights important new insights and data, using probabilistic and detailed climate projections and refined topographic, demographic and land use information. The findings include:*

- *The state's electricity system is more vulnerable than was previously understood.*
- *The Sacramento–San Joaquin Delta is sinking, putting levees at growing risk.*
- *Wind and waves, in addition to faster rising seas, will worsen coastal flooding.*
- *Animals and plants need connected “migration corridors” to allow them to move to more suitable habitats to avoid serious impacts.*
- *Native freshwater fish are particularly threatened by climate change.*
- *Minority and low-income communities face the greatest risks from climate change.*
- *There are effective ways to prepare for and manage climate change risks, but local governments face many barriers to adapting to climate change; these can be addressed so that California can continue to prosper.*

Applicable Regulations

The Proposed Project would be in the Bay Area Air Quality Management District (BAAQMD). Emissions from project-related construction and operational activities would occur within the jurisdiction of the BAAQMD and the California Air Resources Board (CARB).

USEPA GHG Mandatory Reporting Program (40 CFR Part 98). This rule requires mandatory reporting of GHG emissions for industrial facilities and power plants that emit more than 25,000 MTCO_{2e} emissions per year. Currently, there are no federal regulations limiting GHG emissions from the Proposed Project.

California Global Warming Solutions Act (AB 32). The California Global Warming Solutions Act of 2006, Assembly Bill 32 (AB 32) requires that California's greenhouse gas (GHG) emissions be reduced to 1990 levels (427 MMTCO_{2e}) by 2020. The reduction will be accomplished through an enforceable statewide cap on global warming emissions to be phased in beginning 2012. AB 32 directs the CARB to develop regulations and a mandatory reporting system to track and monitor global warming emissions levels (AB 32, Chapter 488, Statutes of 2006). The CARB Climate Change Scoping Plan, approved December 2008, provides the framework for achieving California's goals.

In passing AB 32, the California Legislature found that:

Global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California. The potential adverse impacts of global warming include the exacerbation of air quality problems, a reduction in the quality and supply of water to the state from the Sierra snowpack, a rise in sea levels resulting in the displacement of thousands of coastal businesses and residences, damage to marine ecosystems and the natural environment, and an increase in the incidences of infectious diseases, asthma, and other human health-related problems.

⁴ The California Energy Commission's California Climate Change Center collaborates to prepare periodic science reports for the California Environmental Protection Agency (Cal/EPA). Guided by a Steering Committee of senior technical staff from State agencies and outside scientific experts, 26 research teams from the University of California system and other research groups produced more than 30 peer-reviewed papers. Available at: http://www.climatechange.ca.gov/adaptation/third_assessment/.

The regulations implementing AB 32 are being phased-in at this time. Implementation of the Climate Change Scoping Plan requires careful coordination on the State's energy policies, meaning that CPUC and CARB work together closely to implement the recommendations in the Scoping Plan, especially one key element of the plan, the Renewable Portfolio Standard (RPS). In April 2011, Senate Bill 2 of the 1st Extraordinary Session (SB X1-2) was signed into law. Regulations in the Public Utilities Code (§ 399.30) under SB X1-2 expressly apply the new 33 percent RPS by December 31, 2020 to all retail sellers of electricity and establish renewable energy standards for interim years prior to 2020. Additionally, the Intergovernmental Panel on Climate Change (IPCC), an international scientific body, has established that one of its Key Mitigation Technologies and Practices for Energy Supply is improved energy supply and distribution efficiency (IPCC, 2007b).

CPUC GHG Emissions Performance Standard. To guide the power procurement activities of the regulated California utilities, including PG&E, in 2007 the CPUC established a GHG limit under the Electricity Greenhouse Gas Emission Standards Act (SB 1368⁵), which requires that generation and contracts be subject to a GHG Environmental Performance Standard of 1,100 pounds (or 0.5 metric tons) of carbon dioxide (CO₂) per megawatt-hour (MWh) of electricity produced. The Emissions Performance Standard applies to base load power from new power plants, new investments in existing power plants, and new or renewed contracts with terms of five years or longer, including contracts with power plants located outside of California.⁶

Mandatory Reporting of Greenhouse Gas Emissions (17 CCR 95100). Mandatory reporting of GHG emissions applies to electric generating facilities with a nameplate capacity equal or greater than 1 MW capacity and GHG emissions exceeding 2,500 metric tons per year. As an Electric Power Entity under this rule, PG&E must report GHG emissions associated with providing electricity to end-use customers.

CARB SF₆ Regulations (17 CCR 95350). In 2010, CARB adopted a regulation for reducing SF₆ emissions from electric power system gas insulated switchgear. The regulation requires owners of such switchgear to: (1) annually report their SF₆ emissions; (2) determine the emission rate relative to the SF₆ capacity of the switchgear; (3) provide a complete inventory of all gas insulated switchgear and their SF₆ capacities; (4) produce a SF₆ gas container inventory; and (5) keep all information current for CARB enforcement staff inspection and verification.

City and County of San Francisco, Strategies to Address Greenhouse Gas Emissions. The City has developed a number of plans and programs to reduce the City's contribution to global climate change. Collectively known as the City's Greenhouse Gas Reduction Strategy, in 2010, the compilation of policies, programs and regulations adopted by the City was found to be consistent with and to achieve reductions exceeding the State's AB 32 goals (BAAQMD, 2010b). San Francisco's Greenhouse Gas Reduction Strategy documents the City's actions to pursue cleaner energy, energy conservation, alternative transportation and solid waste policies. As identified in the Greenhouse Gas Reduction Strategy, the City has implemented a number of mandatory requirements and incentives that have measurably reduced GHG emissions including, but not limited to, increasing the energy efficiency of new and existing buildings, installation of solar panels on building roofs, implementation of a green building strategy, adoption of a zero waste strategy, a construction and demolition debris recovery ordinance, a solar energy generation subsidy, incorporation of alternative fuel vehicles in the City's transportation fleet (including buses), and a mandatory recycling and composting ordinance.

⁵ Public Utilities Code § 8340 et seq.

⁶ See Rule at http://www.cpuc.ca.gov/PUBLISHED/FINAL_DECISION/64072.htm

Applicant Proposed Measures

PG&E proposes to implement measures during the design, construction, and operation of the Proposed Project to ensure it would occur with minimal environmental impacts in a manner consistent with applicable rules and regulations. Applicant Proposed Measures (APMs) are considered part of the Proposed Project in the evaluation of environmental impacts. CPUC approval would be based upon PG&E adhering to the Proposed Project as described in this document, including this project description and the APMs (see Table 5.7-1), as well as any adopted mitigation measures identified by this Initial Study.

Table 5.7-1. Applicant Proposed Measures (APMs) Related to Greenhouse Gas Emissions

APM Number	Issue Area
Greenhouse Gas Emissions	
APM GHG-1	<p>Minimize Construction Exhaust Emissions. The following measures will be implemented during construction to further minimize the less-than-significant construction GHG emissions:</p> <ul style="list-style-type: none"> ▪ Encourage construction workers to take public transportation to the project site where feasible. ▪ Minimize construction equipment exhaust by using low-emissions or electric construction equipment where feasible. ▪ Minimize unnecessary construction vehicle idling time. The ability to limit construction vehicle idling time is dependent upon the sequence of construction activities and when and where vehicles are needed or staged. Certain vehicles, such as large diesel-powered vehicles, have extended warm-up times following start-up that limit their availability for use following start-up. Where such diesel-powered vehicles are required for repetitive construction tasks, these vehicles may require more idling time. The project will apply a “common sense” approach to vehicle use, such that idling is reduced as far as possible below the maximum of five consecutive minutes required by California regulation (13 CCR 2485). If a vehicle is not required for use immediately or continuously for construction activities, its engine will be shut off. ▪ Minimize welding and cutting by using compression or mechanical applications where practical and within standards. ▪ Encourage use of natural gas or electric powered vehicles for passenger cars and light-duty trucks where feasible and available. ▪ Encourage the recycling of construction waste where feasible.
APM GHG-2	<p>Avoid and Minimize Potential SF6 Emissions. PG&E will include Potrero Switchyard in PG&E’s system-wide SF6 emission reduction program, which includes inventorying and monitoring system-wide SF6 leakage rates and employing X-ray technology to inspect internal circuit breaker components to eliminate dismantling of breakers and reduce accidental releases. New circuit breakers installed at Potrero Switchyard and Embarcadero Substation will have a manufacturer’s guaranteed SF6 leakage rate of 0.5 percent per year or less and will be maintained in accordance with PG&E’s maintenance guidelines.</p>
<p>In addition to these APMs, PG&E is implementing the following voluntary company-wide actions to further reduce GHG emissions:</p> <ul style="list-style-type: none"> ▪ PG&E is an active member of the SF6 Emission Reduction Partnership for Electric Power Systems, a voluntary program between the USEPA and electric power companies that focuses on reducing emissions of SF6 from transmission and distribution operations. Since 1998, PG&E has reduced its SF6 leakage rate by 89 percent and absolute SF6 emissions by 83 percent. ▪ PG&E supports Natural Gas STAR, a program promoting the reduction of CH4 from natural gas pipeline operations. Since 1998, PG&E has avoided the release of thousands of tons of CH4. ▪ On April 24th, 2012, PG&E submitted a proposal to state regulators for a new clean energy program that would give its electric customers an opportunity to support 100 percent renewable energy for an average of a few dollars a month. If approved, the “Green Option” would be totally voluntary, and customers could enroll in and/or leave the program as they wish. If approved, PG&E will buy renewable energy certificates to match the portion of each participating electric customer’s energy that is not already covered by PG&E’s eligible renewable energy deliveries. PG&E is asking the California Public Utilities Commission to approve the Green Option by early 2013. 	

Table 5.7-1. Applicant Proposed Measures (APMs) Related to Greenhouse Gas Emissions

APM AQ-2	<p>Minimize Construction Exhaust Emissions. The following measures will be implemented during construction to further minimize the less-than-significant construction exhaust emissions:</p> <ul style="list-style-type: none"> ▪ Encourage construction workers to take public transportation to the project site where feasible. ▪ Minimize construction equipment exhaust by using low-emissions or electric construction equipment where feasible. Develop a plan demonstrating that the off-road equipment (more than 50 horsepower) to be used would achieve a project-wide fleet-average 20 percent NO_x reduction and 45 percent PM reduction compared to the most recent CARB fleet average. Acceptable options for reducing emissions include the use of late model engines, low-emission diesel products, alternative fuels, engine retrofit technology, after-treatment products, add-on devices such as particulate filters, and/or other options as such become available. ▪ Minimize unnecessary construction vehicle idling time. The ability to limit construction vehicle idling time is dependent upon the sequence of construction activities and when and where vehicles are needed or staged. Certain vehicles, such as large diesel-powered vehicles, have extended warm-up times following start-up that limit their availability for use following start-up. Where such diesel-powered vehicles are required for repetitive construction tasks, these vehicles may require more idling time. The project will apply a “common sense” approach to vehicle use, such that idling is reduced as far as possible below the maximum of five consecutive minutes required by regulation (13 CCR 2485). If a vehicle is not required for use immediately or continuously for construction activities or other safety-related reasons, its engine will be shut off. ▪ Minimize welding and cutting by using compression or mechanical applications where practical and within standards. ▪ Encourage use of natural gas or electric powered vehicles for passenger cars and light-duty trucks where feasible and available.
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5.7.2 Environmental Impacts and Mitigation Measures

a. *Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?*

LESS THAN SIGNIFICANT – CONSTRUCTION. Construction of the proposed transmission line and other project facilities would result in emission of GHGs from construction equipment at the various work areas and off-site motor vehicle and marine vessel trips carrying workers and materials. Motor vehicles, marine vessels, and other construction equipment would directly emit CO₂, CH₄, and N₂O due to fuel use and combustion. Motor vehicle fuel combustion emissions in terms of CO₂e are approximately 95 percent CO₂, and CH₄ and N₂O emissions occur at rates of less than 1 percent of the mass of combustion CO₂ emissions. Other GHGs such as SF₆, hydrofluorocarbons, and perfluorocarbons were not included in the construction emission calculations because construction activities would not emit these GHG constituents.

Emissions for each phase and for each month of proposed activity are summarized in Appendix A as part of the detailed emission calculations based on the proposed quantities and types of equipment. The emission estimates rely on factors from the CARB EMFAC2011 model and the California Emissions Estimator Model (CalEEMod), and other resources. Based on the construction activity forecast, approximately 920 MTCO₂e would be emitted over the entire construction phase of the Proposed Project. The construction emissions would be reduced to approximately 775 MTCO₂e with implementation of the air quality-related APM AQ-2 (Minimize Construction Exhaust Emissions) and APM GHG-1, which aim to reduce short-term GHG emissions through an efficiently mobilized workforce, use of electric grid-powered equipment, and minimizing unnecessary idling or equipment use. Construction-related emissions would be spread over the development phase of roughly two years and would not recur over the life of the project, but these levels would be under the threshold level of 2,500 metric tons for annual mandatory reporting of GHG (17 CCR 95100) and well below the draft threshold level of 10,000 metric tons for annually recurring emissions from stationary sources (BAAQMD, 2010a). With total project construction emissions of approximately 775 MTCO₂e (Table 5.7-2), construction-related GHG emissions would not have a significant impact on the environment, and the impact would be less than significant.

Table 5.7-2. Estimated Construction Emissions, GHG

Proposed Emissions Sources	Total CO ₂ e During Construction (MTCO ₂ e)
Construction Year 2014: Land Installation (Mobilization, Manholes, and Trenching); HDD Drilling (HDD Send Pit Excavation, HDD Bore, Casing Fuse, and Pull In Casing); Switchyard Construction (General Construction, Structure Foundation Excavation, Structure Delivery and Setup, and Cable Installation)	289.68
Construction Year 2015: Land Installation (Trenching and Cable Installation); HDD Drilling (HDD Send Pit Excavation, HDD Bore, Casing Fuse, Pull In Casing, and Restoration); Offshore Installation of the Submarine Route; Switchyard Construction (General Construction, Cable Installation, and Cleaning and Landscaping)	629.90
Total During Construction	919.58
Construction Year 2014 (with implementation of APM AQ-2 and GHG-1)	239.99
Construction Year 2015 (with implementation of APM AQ-2 and GHG-1)	535.46
Total During Construction with APMs	775.46

Source: See Appendix A (Table A-2 and Table A-3) for detailed calculations (PG&E, 2013).

LESS THAN SIGNIFICANT – OPERATION AND MAINTENANCE. Maintenance of the proposed transmission line and other project facilities would be incorporated into existing PG&E activities so GHG emissions from operation and maintenance activities would not notably increase as a result of this project.

The proposed installation of seven new circuit breakers at the Potrero Switchyard would introduce new gas insulated switchgear that would be a source of GHG due to the leakage of SF₆. These quantity of potential SF₆ emissions and the total rate in terms of CO₂e are presented in Table 5.7-3. The new circuit breakers would be required to comply with the CARB-adopted standards for SF₆ use in gas insulated circuit breakers. Based on SF₆ emission rates at the maximum leakage rate allowed by the manufacturer of 0.5 percent, the CARB requirements for control of SF₆ and recordkeeping, and the application of APM GHG-2, the actual GHG emissions would be minor at 66 MTCO₂e/yr (PG&E, 2012a). This level of GHG would not have a significant impact on the environment, and the impact associated with the GHG emissions would be less than significant.

Table 5.7-3. Estimated GHG Emissions from Gas-Insulated Switchgear

Emissions Sources	SF ₆ (lb/yr)	SF ₆ (metric ton/yr)	CO ₂ e (MTCO ₂ e/yr)
Circuit Breakers, 175 lb SF ₆ per breaker, at 0.5% annual leak rate	6.125	0.0028	66.4

Source: See Appendix A (Table A-13) for detailed calculations (PG&E, 2013).

b Conflict with any applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

LESS THAN SIGNIFICANT. The Climate Change Scoping Plan, approved by CARB in 2008 (CARB, 2008), provides an outline of actions to reduce California’s GHG emissions. The scoping plan requires CARB and other state agencies to adopt regulations and other initiatives to reduce GHGs.

The Proposed Project would improve the infrastructure used in distribution of California’s energy supply, and would not affect California’s ability to supply renewable energy. The Proposed Project would not affect PG&E’s ability to meet its RPS obligations. Similarly, the Proposed Project would not affect or conflict

with any goals or programs established by the City and County of San Francisco to achieve GHG reduction targets.

PG&E would comply with CARB SF₆ regulations to inventory, report, and minimize SF₆ leaks through the use of new technology. By complying with these requirements, the Proposed Project would not conflict with any applicable GHG management plan, policy, or regulation. Therefore, this impact would be less than significant.

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