3.7 Greenhouse Gas Emissions

Issues (and Supporting Information Sources):	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
7. GREENHOUSE GAS EMISSIONS — Would the project:				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☒	☐
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☐	☒

3.7.1 Environmental Setting

Gases that trap heat in the atmosphere are called greenhouse gases (GHGs). GHGs allow sunlight to enter the atmosphere, but trap a portion of the outward-bound infrared radiation, which warms the air. The process is similar to the effect greenhouses have in raising the internal temperature, hence the name GHGs. Both natural processes and human activities emit GHGs. The accumulation of GHGs in the atmosphere regulates the Earth's temperature; however, emissions from human activities – such as fossil fuel-based electricity production and the use of motor vehicles – have elevated the concentration of GHGs in the atmosphere. This accumulation of GHGs has contributed to an increase in the temperature of the Earth's atmosphere and to global climate change. Global climate change is a change in the average weather on Earth that can be measured by wind patterns, storms, precipitation, and temperature. Although there is disagreement as to the rate of global climate change and the extent of the impacts attributable to human activities, most in the scientific community agree that there is a direct link between increased emissions of GHGs and long-term climate change.

The principal GHGs are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6), perfluorocarbons (PFCs), and hydrofluorocarbons (HFCs). CO_2 is the most common reference gas of GHGs. To account for the warming potential of GHGs, GHG emissions are often quantified and reported as CO_2 equivalents (CO_2e). For example, SF_6 is a GHG commonly used in the utility industry as an insulating gas in circuit breakers and other electronic equipment. SF_6, while comprising a small fraction of the total GHGs emitted annually world-wide, is a much more potent GHG with 23,900 times the global warming potential (GWP) as CO_2. Large emission sources are reported in million metric tons of CO_2e.[7]

Some of the potential effects of global warming in California may include decrease in snow pack, sea level rise, more extreme heat days per year, more high ozone days, more large forest fires, and more drought years (CARB, 2009). Globally, climate change has the potential to impact numerous environmental resources through potential, though uncertain, impacts related to future air temperatures and precipitation patterns. The projected effects of global warming on weather

[7] The term metric ton is commonly used in the U.S. to refer to the metric system unit, tonne, which is defined as a mass equal to 1,000 kilograms. A metric ton is approximately 1.1 short tons and approximately 2,204.6 pounds.

and climate are likely to vary regionally, but are expected to include the following direct effects (IPCC, 2007):

- Higher maximum temperatures and more hot days over nearly all land areas;
- Higher minimum temperatures, fewer cold days and frost days over nearly all land areas;
- Reduced diurnal temperature range over most land areas;
- Increase of heat index over land areas; and
- More intense precipitation events.

There are also many secondary effects that are projected to result from climate change, including global rise in sea level, impacts to agriculture, changes in disease vectors, and changes in habitat and biodiversity. While the possible outcomes and the feedback mechanisms involved are not fully understood and much research remains to be done, the potential for substantial environmental, social, and economic consequences over the long term is anticipated to be substantial.

Anthropogenic GHG emissions in the United States are derived mostly from the combustion of fossil fuels for transportation and power production. Energy-related CO_2 emissions resulting from fossil fuel exploration and use account for approximately three-quarters of the human-generated GHG emissions in the United States, primarily in the form of CO_2 emissions from burning fossil fuels. Approximately one-third of the GHG emissions come from electricity production, such as power plants; approximately one-third derive from transportation; and a majority of the remaining sources include industrial processes, agriculture, forestry, other land uses, and waste management (USEPA, 2014a).

Statewide emissions of GHG from relevant source categories for 2006 through 2012 are summarized in **Table 3.7-1**. In 2012, California produced 458.67 million metric tons of CO_2e emissions; Table 3.7-1 shows the percentages of GHG contributions by category for that year. The electric power sector was the source of approximately 21 percent of those GHG emissions (CARB, 2014a).

TABLE 3.7-1
CALIFORNIA GREENHOUSE GAS EMISSIONS (million metric tons CO_2e)

Emission Inventory Category	2006	2007	2008	2009	2010	2011	2012	
Transportation	189.18	189.27	178.02	171.47	170.46	168.13	167.38	36%
Electric Power	104.54	113.94	120.15	101.32	90.3	88.04	95.09	21%
Commercial and Residential	41.89	42.11	42.44	42.65	43.82	44.32	42.28	9%
Industrial	90.28	87.1	87.54	84.95	88.51	88.34	89.16	19%
Recycling and Waste	7.8	7.93	8.09	8.23	8.34	8.42	8.49	14%
High Global Warming Potential	11.08	11.78	12.87	13.99	15.89	17.35	18.41	
Agriculture	37.75	37.03	37.99	35.84	35.73	36.34	37.86	
Total Gross Emissions	**482.52**	**489.16**	**487.1**	**458.45**	**453.05**	**450.94**	**458.67**	**100%**

SOURCE: CARB, 2014a.

3.7.2 Regulatory Setting

Federal

On April 2, 2007, in *Massachusetts v. U.S. Environmental Protection Agency (USEPA)*, 549 US 497, the Supreme Court found that GHGs are air pollutants covered by the Clean Air Act (CAA). The Court held that the USEPA 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. In making these decisions, the USEPA is required to follow the language of Section 202(a) of the CAA.

On April 17, 2009, the USEPA Administrator signed proposed "endangerment" and "cause or contribute" findings for GHGs under Section 202(a) of the CAA. The USEPA held a 60-day public comment period, considered public comments, and issued final findings. The USEPA found that six GHGs taken in combination endanger both the public health and the public welfare of current and future generations. The USEPA also found that the combined emissions of these GHGs from new motor vehicles and new motor vehicle engines contribute to the greenhouse effect as air pollution that endangers public health and welfare under CAA Section 202(a) (USEPA, 2014b).

Specific GHG regulations that the USEPA has adopted to date are as follows:

> ***40 CFR Part 98. Mandatory Reporting of Greenhouse Gases Rule.*** This rule requires mandatory reporting of GHG emissions for facilities that emit more than 25,000 metric tons of CO_2e emissions per year (USEPA, 2013). The Project would not trigger GHG reporting as required by this regulation.
>
> ***40 CFR Part 52. Proposed Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule.*** USEPA has mandated that Prevention of Significant Deterioration (PSD) and Title V requirements applies to facilities whose stationary source CO_2e emissions exceed 100,000 tons per year (USEPA, 2014b). The Project would not trigger PSD or Title V permitting under this regulation.

State

There are currently no state regulations in California that establish ambient air quality standards for GHGs. However, California has passed laws directing the California Air Resources Board (CARB) to develop actions to reduce GHG emissions, and several state legislative actions related to climate change and GHG emissions have come into play in the past decade.

Executive Order S-3-05

In recognition of California's vulnerability to the effects of climate change, Executive Order S-3-05 was established by Governor Arnold Schwarzenegger in June 2006. It establishes statewide emission reduction targets through the year 2050 as follows:

1. By 2010, reduce GHG emissions to 2000 levels;
2. By 2020, reduce GHG emissions to 1990 levels; and
3. By 2050, reduce GHG emissions to 80 percent below 1990 levels.

This Executive Order does not include any specific requirements that pertain to the Project; however, future actions taken by the state to implement these goals may affect the Project, depending on the specific implementation measures that are developed.

Assembly Bill 32

California Assembly Bill (AB) 32, also known as the Global Warming Solutions Act of 2006, requires CARB to establish a statewide GHG emissions cap for 2020 based on 1990 emission levels. AB 32 required CARB to adopt regulations that identify and require selected sectors or categories of emitters of GHGs to report and verify their statewide GHG emissions, and CARB is authorized to enforce compliance with the program. Under AB 32, CARB also was required to adopt a statewide GHG emissions limit equivalent to the statewide GHG emissions levels in 1990, which must be achieved by 2020. CARB established this limit in December 2007 at 427 million metric tons of CO_2e. This is approximately 30 percent below forecasted "business-as-usual" emissions of 596 million metric tons of CO_2e in 2020, and about 10 percent below average annual GHG emissions during the period of 2002 through 2004 (CARB, 2009).

Toward achieving the maximum technologically feasible and cost-effective GHG emission reductions, AB 32 permits the use of market-based compliance mechanisms and requires CARB to monitor compliance with and enforce any rule, regulation, order, emission limitation, emissions reduction measure, or market-based compliance mechanism that it adopts.

Climate Change Scoping Plan

In December 2008, CARB approved the *AB 32 Scoping Plan* outlining the state's strategy to achieve the 2020 GHG emissions limit. The Scoping Plan estimates a reduction of 174 million metric tons CO_2e (about 191 million U.S. tons) from the transportation, energy, agriculture, forestry, and high climate-change-potential sectors, and proposes a comprehensive set of actions designed to reduce overall GHG emissions in California, improve the environment, reduce dependence on oil, diversify California's energy sources, save energy, create new jobs, and enhance public health. The Scoping Plan includes a list of 39 Recommended Actions contained in Appendices C and E of the Scoping Plan (CARB, 2009). Of these measures, only one is directly relevant to the Project. Measure H-6, High GWP Gases would reduce emissions of SF_6 within the electric utility sector and at particle accelerators by requiring the use of best achievable control technology for the detection and repair of leaks, and the recycling of SF_6.

The Scoping Plan must be updated every 5 years to evaluate the implementation of AB 32 policies to ensure that California is on track to achieve the 2020 GHG reduction goal. CARB released the Scoping Plan Update in May 2014 (CARB, 2014b). There are no recommended actions identified in the Scoping Plan Update that are directly applicable to the proposed Project.

Senate Bill 97

In 2007, the California State Legislature passed SB 97, which required amendment of the CEQA Guidelines to incorporate analysis of, and mitigation for, GHG emissions from projects subject to CEQA. The amendments took effect March 18, 2010. The amendments added Section 15064.4 to the CEQA Guidelines, specifically addressing the potential significance of GHG emissions.

Section 15064.4 calls for a "good faith effort" to "describe, calculate or estimate" GHG emissions and indicates that the analysis of the significance of any GHG impacts should include consideration of the extent to which the project would:

- Increase or reduce GHG emissions;
- Exceed a locally applicable threshold of significance; or
- Comply with "regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of greenhouse gas emissions."

The CEQA Guidelines also state that a project may be found to have a less-than-significant impact related to GHG emissions if it complies with an adopted plan that includes specific measures to sufficiently reduce GHG emissions (14 Cal. Code Regs. §15064(h)(3)). Importantly, however, the CEQA Guidelines do not require or recommend a specific analytical methodology or provide quantitative criteria for determining the significance of GHG emissions.

Regulation for Reducing SF_6 Emissions from Gas Insulated Switchgear

The purpose of this regulation (17 Cal. Code Regs. §95350 et seq.) is to achieve GHG emission reductions by reducing SF_6 emissions from gas-insulated switchgear. Owners of such switchgear must not exceed maximum allowable annual emissions rates, which are reduced each year until 2020, after which annual emissions must not exceed 1.0 percent. As defined by the regulation, the annual emissions rate means the gas-insulated switchgear owner's total annual SF_6 emissions from all active gas-insulated switchgear equipment divided by the average annual SF_6 nameplate capacity of all active gas-insulated switchgear equipment. Owners must regularly inventory gas-insulated switchgear equipment, measure quantities of SF_6, and maintain records of these for at least 3 years. Additionally, by June 1st each year, owners also must submit an annual report to CARB's Executive Officer for emissions that occurred during the previous calendar year (CARB, 2014c).

Local

El Dorado County

El Dorado County has no adopted policies or goals for reducing GHG emissions that would be directly applicable to the Project.

Sacramento County

Sacramento County adopted a Climate Action Plan on November 9, 2011; however, none of the identified actions developed to address climate change would directly apply to the Project (Sacramento County, 2011).

3.7.3 Applicant Proposed Measures

PG&E has proposed the following APMs to minimize GHG emissions from the Project. This analysis assumes that these APMs would be implemented as part of the Project.

APM GHG-1: Minimize GHG Emissions

- Maintain construction equipment in proper working conditions in accordance with PG&E standards.

- Minimize unnecessary construction vehicle idling time. The ability to limit construction vehicle idling time will depend on 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, so that idling is reduced as far as possible below the maximum of 5 consecutive minutes allowed by California law; if a vehicle is not required for use immediately or continuously for construction activities, its engine will be shut off. Construction foremen will include briefings to crews on vehicle use as part of pre-construction conferences. Those briefings will include discussion of a "common sense" approach to vehicle use.

- Minimize construction equipment exhaust by using low-emission or electric construction equipment where feasible. Portable diesel fueled construction equipment with engines 50 hp or larger and manufactured in 2000 or later will be registered under the CARB Statewide Portable Equipment Registration Program.

- Minimize welding and cutting by using compression of mechanical applications where practical and within standards.

- Encourage use of natural gas powered vehicles for passenger cars and light-duty trucks where feasible and available.

APM GHG-2: Minimize SF_6 Emissions

- Incorporate the new breakers at Gold Hill Substation into PG&E's system-wide SF_6 emission reduction program. CARB has adopted the Regulation for Reducing Sulfur Hexafluoride Emissions from Gas Insulated Switchgear sections 95350 to 95359, title 17, California Code of Regulations, which requires that company-wide SF_6 emission rate not exceed 1 percent by 2020. Since 1998, PG&E has implemented a programmatic plan to inventory, track, and recycle SF_6 inputs, and inventory and monitor system-wide SF_6 leakage rates to facilitate timely replacement of leaking breakers. PG&E has improved its leak detection procedures and increased awareness of SF_6 issues within the company. X-ray technology is now used to inspect internal circuit breaker components to eliminate dismantling of breakers, reducing SF_6 handling and accidental releases. As an active member of USEPA's SF_6 Emission Reduction Partnership for Electrical Power Systems, PG&E has focused on reducing SF_6 emissions from its transmission and distribution operations and has reduced the SF_6 leak rate by 89 percent and absolute SF_6 emissions by 83 percent.

- Require that breakers to be replaced at Gold Hill Substation have a manufacturer's guaranteed maximum leakage rate of 0.5 percent per year or less for SF_6.

- Maintain substation breakers in accordance with PG&E's maintenance standards.

- Comply with CARB Early Action Measures as these policies become effective.

3.7.4 Environmental Impacts and Mitigation Measures

a) Whether the Project would generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment: *LESS THAN SIGNIFICANT*.

The Project would result in GHG emissions from both short-term construction and long-term operations. CEQA allows for significance criteria established by the applicable air pollution control district(s) to be used to assess the impact of a project related to GHG emissions, at the discretion of the CEQA Lead Agency. The EDCAQMD and SMAQMD have not adopted CEQA significance thresholds for GHG emissions; however, in April 2013, SMAQMD released a GHG Emissions chapter as part of its updated CEQA Guide with recommendations for analysis of GHG emissions (SMAQMD, 2013). The SMAQMD recommends that thresholds of significance for GHG emissions be related to AB 32's GHG reduction goals. For example, if a project's emissions would substantially hinder the State's ability to attain the goals identified in AB 32, it would be considered to result in a cumulatively considerable significant impact.

Other California air districts, such as Monterey Bay Unified, San Luis Obispo County, Ventura County, South Coast, and San Diego County, have adopted, or have recommended for adoption, a significance threshold of 10,000 metric tons CO_2e per year for stationary source projects (MBUAPCD, 2013). This threshold was derived from emissions data from the four largest air districts in California and is based on the Executive Order S-3-05 GHG emissions reductions goal of 80 percent below 1990 levels by 2050, which is roughly equivalent to 90 percent below current levels by 2050. This emissions reduction goal goes beyond the AB 32 emissions reduction goal established for 2020. The emissions data suggests that approximately 1 percent of all stationary sources emit greater than 10,000 metric tons CO_2e per year and are responsible for 90 percent of GHG emissions. This significance threshold represents a capture rate of 90 percent of all new and modified stationary source-related projects. A 90 percent emissions capture rate means 90 percent of the total emissions from all new or modified stationary source projects would be subject to analysis in an environmental impact report prepared pursuant to CEQA, including analysis of feasible alternatives and imposition of feasible mitigation measures (SCAQMD, 2008). The CPUC has determined that the GHG significance threshold of 10,000 metric tons per year for stationary source projects is based on substantial evidence and, therefore, has determined that it is appropriate for use in this analysis.

As noted above, this GHG significance threshold is intended for long-term operational GHG emissions associated with stationary sources; none of the air districts mentioned above have adopted or have recommended GHG significance thresholds for construction emissions. Therefore, the CPUC has elected to use an approach to the determination of significance of GHG construction emissions based on guidance developed by the South Coast Air Quality Management District (SCAQMD). For construction related GHGs, SCAQMD recommends that total emissions from construction be amortized over 30 years and added to operational emissions and then compared to the operation-based significance threshold (SCAQMD, 2008). Similar to the SCAQMD's recommended approach for construction emissions, this analysis amortizes the construction emissions over a 30-year project lifetime then compares those emissions to the significance threshold of 10,000 metric tons CO_2e per year.

Construction Emissions

Construction of the Project would generate GHG emissions over the 20-month construction period. Construction-related emissions would result from off-road construction equipment and machinery, helicopter activity, and from vehicular traffic generated by commuting workers and material hauling. As part of the CPUC's permit application process, PG&E provided construction emissions estimates for the construction activities that would be associated with the Project (PG&E, 2014; see Appendix B). These emission estimates were independently reviewed by the CPUC's consultant, Environmental Science Associates (ESA), and are summarized below.

Project construction emissions that would be associated with the use of off-road construction equipment, such as graders, backhoes, loaders, and cranes, were estimated for the Project using the California Emission Estimator Model (CalEEMod version 2011.1.1). Construction-related helicopter emissions were estimated using specific fuel use factors developed by the Switzerland Federal Office of Civil Aviation and emission factors published by U.S. Energy Information Administration. It should be noted that PG&E's emission estimates for El Dorado County were supplemented to include 5 hours of helicopter operations to account for travel to and from the Project area (ESA, 2014; see Appendix B). To estimate off-site construction-related vehicle emissions that would be associated with construction of the Project, emission factors for on-road trucks and worker vehicles were derived using CARB's EMFAC2011 Model with anticipated trip characteristics, such as daily round trips, phase duration, and trip lengths.

Table 3.7-2 presents the total estimated GHG construction emissions that would be generated by the Project. As described in the table, approximately 807 metric tons of CO_2e would be generated during the Project's 20-month construction phase. It should be noted that PG&E's total GHG construction emissions estimated to be generated within Sacramento County do not account for the substation-related work that would occur at Gold Hill Substation. Therefore, for a conservative analysis, the emissions estimates presented in Table 3.7-2 reflect the assumption that the same amount of substation-related construction activities would occur in Sacramento County as would occur in El Dorado County, thereby generating the same amount of GHG emissions.

Operation and Maintenance Emissions

The Project would require no change to PG&E's existing operation and maintenance activities, and would result in no net change in long-term vehicle or equipment exhaust emissions. However, GHG emissions associated with operation of the Project would result from the proposed replacement of two existing oil-insulated breakers with two SF_6-insulated breakers at the Gold Hill Substation. SF_6 could be released if a leak would occur in one of the joints in the circuit breaker tank, or if a crack occurs in the breaker. In the event of a release, the loss of gas pressure/density would cause an alarm to be sent directly to the PG&E's control center, which would enable PG&E operators to minimize loss of SF_6 through automatic detection and immediate actions to fix the leak(s) immediately (PG&E, 2013). Pursuant to the requirements of APM GHG-2, the new SF_6 circuit breakers would have an annual guaranteed maximum leakage rate of 0.5 percent for the two 115 kV circuit breakers, containing approximately 80 pounds of SF_6 each. Therefore, the maximum emissions that could be released from the new SF_6-insulated circuit breakers would be approximately 9 metric tons of CO_2e annually (PG&E, 2013).

TABLE 3.7-2
TOTAL GHG CONSTRUCTION EMISSIONS

Construction Phase	CO_2e metric tons
El Dorado County	
Tubular Steel Pole	36.99
Reconductoring	105.35
Wood Poles	191.5
Substation	23.68
Grading	233.91
Interset Poles	18.96
Wood Poles at Substations	12.1
Distribution Underground	14.94
Distribution Grading	17.38
Micropiles	26.19
Helicopter Landings and Takeoffs	1.26
Helicopter Operations	1.85
Subtotal	***684.11***
Sacramento County	
Reconductoring	25.44
Steel Lattice Towers	59.77
Helicopter Operations	11.10
Grading	3.36
Substation	23.68
Subtotal	***123.35***
Total	**807.46**

SOURCE: PG&E, 2014 and ESA, 2014.

Impact Statement

As indicated in Table 3.7-2, total GHG construction emissions in the form of CO_2e would be approximately 807 metric tons. These emissions amortized over a 30-year period equal approximately 27 metric tons per year. Adding 27 metric tons of CO_2e to the operational emissions of 9 metric tons CO_2e per year equals a total Project annual GHG emissions rate of approximately 36 metric tons CO_2e per year, which would be substantially less than the significance threshold of 10,000 metric tons CO_2e per year. Therefore, the GHG emissions that would be generated by the Project would not be cumulatively considerable and would not significantly contribute to global climate change. The impact would be less than significant.

b) Whether the Project would conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases: NO IMPACT.

Construction and operation of the Project would result in increased GHG emissions; however, it would not conflict with GHG reduction goals set forth in Executive Order S-3-05 or AB 32, including the 39 Recommended Actions identified by CARB in its Climate Change Scoping Plan.

Operation of the Project would be consistent with the intent of Scoping Plan Measure H-6: High Global Warming Potential Gas Reductions from Stationary Sources – SF_6 Leak Reduction and Recycling in Electrical Applications pursuant to implementation of APM GHG-2, which would minimize emissions of SF_6 by requiring the use of best achievable control technology for the detection and repair of leaks and the recycling of SF_6. Because the Project would be consistent (and would not conflict) with these plans, policies, and regulations, it would cause no impact related to this significance criterion.

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