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CHAPTER 5: Analyzing Greenhouse Gas Emissions

Analyzing Greenhouse Gas Emissions

5.1. Greenhouse Gases (GHG)

Unlike criteria air pollutants, GHGs are global pollutants which are pollutants of regional and local concern. Whereas pollutants with localized air quality effects have relatively short atmospheric lifetimes (about 1 day), GHGs have long atmospheric lifetimes (1 year to several thousand years). GHGs persist in the atmosphere for long enough time periods to be dispersed around the globe. Similarly, impacts of GHGs are also borne globally. The quantity of GHGs that it takes to ultimately result in climate change is not precisely known; however, it is clear that the quantity is enormous, and no single project alone would measurably contribute to a noticeable incremental change in the global average temperature, or to global, local, or micro climate. Therefore, from the standpoint of CEQA, GHG impacts to global climate change are inherently cumulative.

Global Warming vs. Climate Change

Global Warming – An increase in GHG emissions leading to an increase in average global temperature.

Climate Change – A change in the statistical properties of the climate system when considered over long periods of time, regardless of cause.

Climate change is a global problem and could potentially impact the natural environment in California and the world in the following ways:

- ✓ Rising sea levels along the California coastline, particularly in San Francisco and the Sacramento–San Joaquin River Delta (Delta) due to ocean thermal expansion and melting of glacial ice, could cause flooding and saltwater intrusion in low-lying areas;
- ✓ Changing extreme-heat conditions, such as heat waves and very high temperatures, which could last longer and become more frequent;
- ✓ Increasing wildfire frequency and intensity;
- ✓ Increasing heat-related human deaths, infectious diseases, and increasing risk of respiratory problems caused by deteriorating air quality;
- ✓ Decreasing snow pack and stream flow in the Sierra Nevada Mountains, decreasing winter recreation opportunities and summer water supplies;
- ✓ Increasing severity of winter storms, causing higher peak stream flows and increased flooding;
- ✓ Changing growing season conditions that could affect California agriculture, causing variations in crop quality and yield; and
- ✓ Changing distribution of plant and wildlife species due to changes in temperature, competition from colonizing species, changes in hydrologic cycles, changes in sea levels, and other climate-related effects.

5.2. GHG & the Regulatory Environment

Lead agencies are required to prepare an EIR when they determine that a project will result in significant impacts. It is important that EIRs describe the existing ambient air quality in the project region, air quality standards which the project region should maintain, the rules and regulations that create those air quality standards, and the potential for the proposed project to contribute to violations of the applicable standards. The following list consists of the legislative actions which are applicable to land use projects pertaining to GHG emissions.

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Executive Order S-3-05

In 2005, Governor Arnold Schwarzenegger signed Executive Order S-3-05 which established greenhouse gas (GHG) emission reduction targets for California, and directs the CAEPA to coordinate the oversight of efforts to achieve them. The targets established by Governor Schwarzenegger call for a reduction of GHG emissions to 2000 levels by 2010; a reduction of GHG emissions to 1990 levels by 2020; and a reduction of GHG emissions to 80% below 1990 levels by 2050.

- ✓ For more information, go to: [Executive Order S-3-05](#).

Assembly Bill 32

In September 2006, Governor Arnold Schwarzenegger signed Assembly Bill (AB) 32, the California Global Warming Solutions Act of 2006. AB 32 establishes regulatory, reporting, and market mechanisms to achieve quantifiable reductions in GHG emissions and a cap on statewide GHG emissions. AB 32 requires that statewide GHG emissions be reduced to 1990 levels by 2020. AB 32 also includes guidance to institute emission reductions in an economically efficient manner and conditions to ensure that businesses and consumers are not unfairly affected by the reductions. AB 32 demonstrates California's commitment to reducing the rate of GHG emissions and the state's associated contribution to climate change, without intent to limit population or economic growth.

- ✓ For more information on AB 32, visit CARB at: <http://www.arb.ca.gov/cc/ab32/ab32.htm>

Senate Bill 97

In 2007, Senate Bill (SB) 97 was enacted to amend the CEQA statute in order to establish that GHG emissions and their effects are a prominent environmental issue that requires analysis under CEQA. This bill directs the Office of Planning and Research (OPR) to prepare, develop, and transmit to the California Natural Resources Agency guidelines for the feasible mitigation of GHG emissions or the effects of GHG emissions. The Natural Resources Agency was required to certify or adopt those guidelines by January 1, 2010.

On March 18, 2010, the amendments to the state CEQA Guidelines for addressing greenhouse gas emissions, as required by Senate Bill 97 (Chapter 185, 2007) were enacted in order to provide guidance to public agencies regarding the analysis and mitigation of the effects of greenhouse gas emissions in draft CEQA documents. The Natural Resources Agency has completed the formal rulemaking process and the Office of Administrative Law has adopted the amendments.

- ✓ For more information, visit the Natural Resources Agency [SB 97 Rulemaking](#) webpage.

Senate Bill 375

In 2008, Senate Bill (SB) 375, was enacted which aligns regional transportation planning efforts, regional GHG reduction targets, and land use and housing allocation. SB 375 requires Metropolitan Planning Organizations (MPOs) to adopt a Sustainable Communities Strategy (SCS) or Alternative Planning Strategy (APS), which will prescribe land use allocation in that MPO's Regional Transportation Plan (RTP).

- ✓ For more information, visit the CARB [Senate Bill \(SB\) 375](#) webpage.

Executive Order S-13-08

In November 2008, Governor Arnold Schwarzenegger issued Executive Order S-13-08 to enhance the state's management of climate impacts from sea level rise, increased

temperatures, shifting precipitation, and extreme weather events. The Executive Order directs the state agencies to request that the National Academy of Sciences convene an independent panel to complete the first California Sea Level Rise Assessment Report. The agencies involved in the project include the California Resources Agency; the Department of Water Resources; the California Coastal Commission; the California Ocean Protection Council; California State Parks; and the California Energy Commission (CEC). The Executive Order directs the California Office of Planning and Research (OPR) to provide state land-use planning guidance related to sea level rise and other climate change impacts. Therefore, the District recommends that lead agencies address the impacts of climate change on a proposed project and its ability to adapt to these changes in CEQA documents.

5.3. GHG Thresholds of Significance

The District currently has not established a Threshold of Significance for construction or operational related GHG emissions. However, the District does have a substantial amount of information to support a lead agency's effort in analyzing GHG impacts, and can suggest alternative thresholds that have been used in California. Some of these thresholds have been adopted or recommended by other lead agencies or air Districts, or recommended by other experts in the field. A lead agency could work with the District in determining which threshold would be best for a particular project. Alternatively, the lead agency could adopt its own thresholds, provided the decision is supported by substantial evidence. The lead agency should quantify and disclose GHG emissions that would occur during both stages (construction and operational phases of the project), and make a determination on the significance of the generated GHG emission impacts in relation to meeting AB 32 GHG reduction goals or other adopted GHG threshold of significance. CAPCOA's white paper: "CEQA and Climate Change" provides additional methods and concepts on the development of a threshold.

- ✓ [CAPCOA Guidance- "CEQA and Climate Change: Evaluating and Addressing Greenhouse Gas Emissions from Projects Subject to CEQA,"](#)  (pdf).

The District recommends that thresholds of significance for GHG emissions should be related to AB 32 GHG reduction goals. For example, a possible threshold of significance could be to determine whether a project's emissions would substantially hinder the State's ability to attain the goals identified in AB 32 (i.e., reduction of statewide GHG emissions to 1990 levels by 2020) from projected 2020 emissions). Another possible threshold option could include determining whether the project is consistent with the State's strategy to achieve the 2020 GHG emissions limit, as outlined in CARB's AB 32 Scoping Plan. The District also reminds CEQA practitioners that a lead agency's conclusions are to be supported by substantial evidence pursuant to Section 15384 of the CEQA Guidelines.

- ✓ For more information, see [CEQA Guidelines Section 15384.](#)  (pdf)

5.4. GHGs & CEQA

The California Environmental Quality Act (CEQA) requires that lead agencies consider the reasonably foreseeable adverse environmental effects of projects they are considering for approval. GHG emissions have the potential to adversely affect the environment because they contribute, on a cumulative basis, to global climate change. For reasons stated above, global climate change has the potential to result in various impacts leading to adverse effects on air quality and other resources. Thus, GHG emissions require consideration in CEQA documents.

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Tiering & Streamlining

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The CEQA Guideline amendments pursuant to [CEQA Guidelines Section 15183.5](#) (pdf) include the provision for tiering and streamlining the analysis of GHG emissions in CEQA documents. Under these provisions, lead agencies may analyze and mitigate the effects of greenhouse gas emissions at a programmatic level, such as in a general plan, a long range development plan, or a separate plan such as a Climate Action Plan, developed by a local jurisdiction to reduce greenhouse gas emissions. After an environmental document for one of these plans has been certified, project-specific CEQA documents may tier and/or incorporate by reference the programmatic review discussed above if the proposed project is consistent with the plan. Also, pursuant to [CEQA Guideline Sections 15064\(h\)\(3\)](#) and [15130\(d\)](#), a lead agency may determine that a project's incremental contribution to a cumulative effect is not cumulatively considerable if the project complies with the requirements in a previously adopted plan or mitigation program under specified circumstances.

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State CEQA Guidelines

The evaluation of GHG emissions pertains to the [Amendments to the State CEQA Guidelines Addressing Analysis and Mitigation of Greenhouse Gas Emissions Pursuant to SB97](#) and modifications to the environmental checklist form (State CEQA Guidelines: Appendix G).

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CEQA Guidelines

- ✓ Would the project generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment?
- ✓ Would the project conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of GHGs?

10 Steps to Full Disclosure

In an effort to ensure full disclosure of GHG impacts as required by CEQA and other related Federal and State laws, the District recommends the following 10 steps when analyzing and discussing GHG emission impacts from land use projects in CEQA documents.

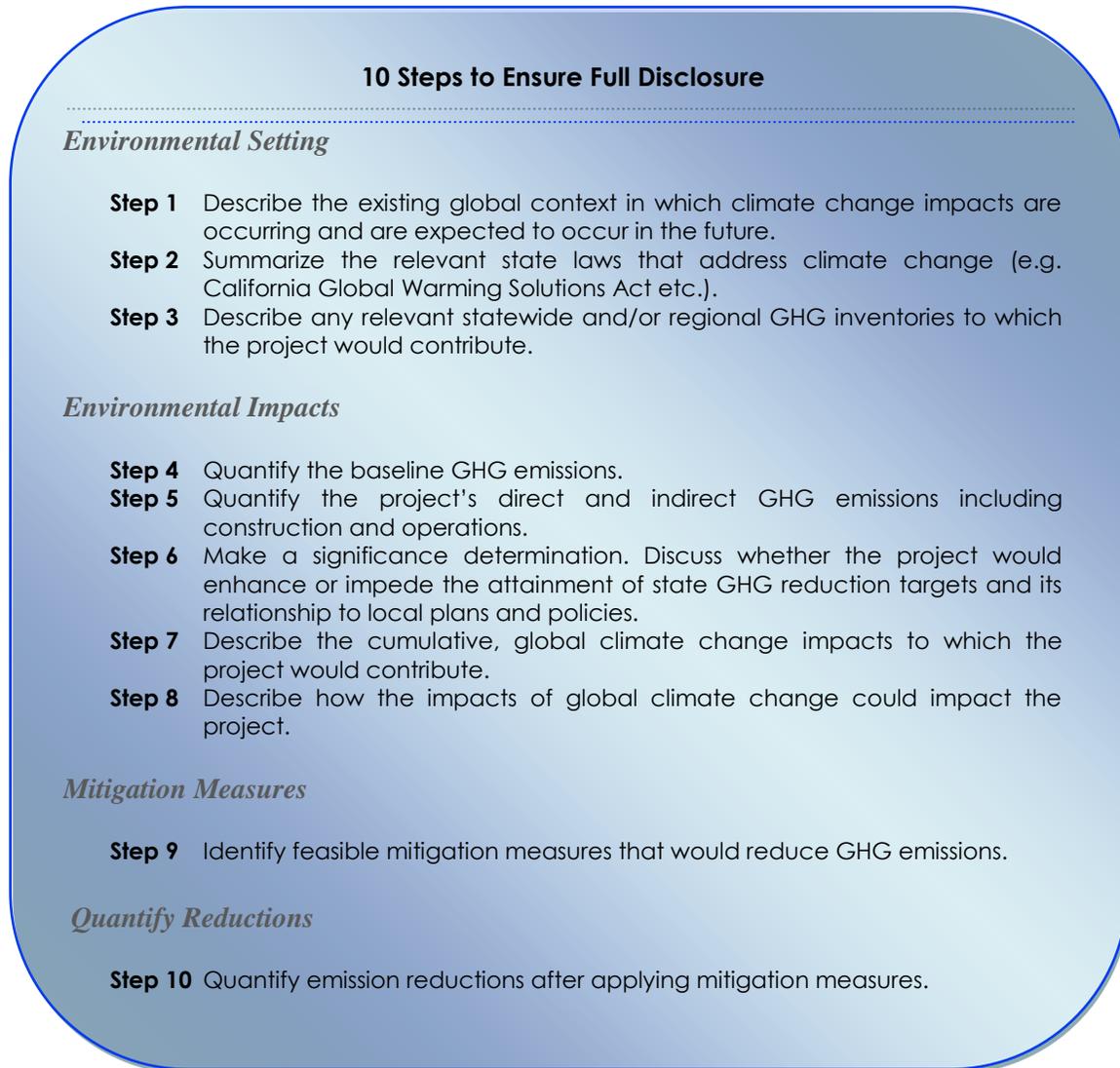


Figure 5-1: 10 Steps to Ensure Full Disclosure

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Emissions Quantification

In accordance with federal, state and local regulations, the District recommends that air quality modeling analyses quantify all GHG emissions anticipated to be generated by the project, including the project's direct and indirect emissions of GHGs from construction and operations. Direct emissions include onsite combustion of energy, such as natural gas used in furnaces and boilers, emissions from industrial processes, and fuel combustion from mobile sources. Indirect emissions include off-site energy production and water consumption (energy for conveyance, treatment, distribution, and wastewater treatment), should also be quantified and disclosed in the environmental document.

GHG emissions from industrial sources should be calculated separately from the project's operational emissions. Permitted stationary sources may be subject to a different threshold than land use developments.

If the project includes existing emission sources, the District recommends subtracting these emissions from the new emissions generated by the proposed land use. This net calculation is permissible only if the existing emission sources were operational at the time that the Notice of Preparation (NOP) for the CEQA project was circulated (or in the absence of an NOP when environmental analysis begins), and would continue if the proposed redevelopment project is not approved. This net calculation is not suggested for emission sources that ceased to operate, or the land uses were vacated and/or demolished, prior to circulation of the NOP or the commencement of environmental analysis. This approach is consistent with the definition of baseline conditions pursuant to CEQA.

Emissions of greenhouse gases are typically expressed in a common metric, so that their impacts can be directly compared, as some gases are more potent (have a higher global warming potential or GWP) than others. The CEQA document should report the project's total GHG emissions in units of metric tons Carbon Dioxide Equivalent (CO_{2e}). The finite amount of a project's construction-related GHG emissions and the operational GHG emissions generated per year over the lifetime of the project should be disclosed separately. The District recommends using CalEEMod to estimate direct CO₂ emissions from area and mobile sources.

Global Warming Potentials (100 Year Time Horizon)

Gas	*GWP
Carbon Dioxide (CO ₂)	1
Methane (CH ₄)	25
Nitrous Oxide (N ₂ O)	298
Hydro fluorocarbon (HFC)	124-14,800
Per fluorocarbons (PFC)	7,390-12,200
Sulfur hexafluoride (SF ₆)	22,800

*Expressed as parts per million

Figure 5-2: Equivalent CO₂ (CO_{2e})²²

In addition to the above estimations, the following are activities which need to be analyzed and quantified within the environmental document:

Construction Emissions

- Construction activities resulting in exhaust emissions of GHGs from fuel combustion for mobile heavy-duty diesel and gasoline-powered equipment, portable auxiliary equipment, material delivery trucks, and worker commuter trips;

Operational Emissions

- As shown in Figure 5-3, the transportation sector is the largest contributor of the State's total GHG emissions. This includes motor vehicle trips generated by the particular land use (i.e., vehicles arriving and leaving the project site), as well as those by residents, shoppers, workers, and vendors;
- Onsite fuel combustion for space and water heating, landscape maintenance equipment, and fireplaces/stoves; and
- Offsite emissions at utility providers associated with the project's electricity and water consumption and transport of waste.
- Other sources that may emit GHGs such as refrigerants leaking from cooling systems associated with commercial, industrial, and institutional land uses.

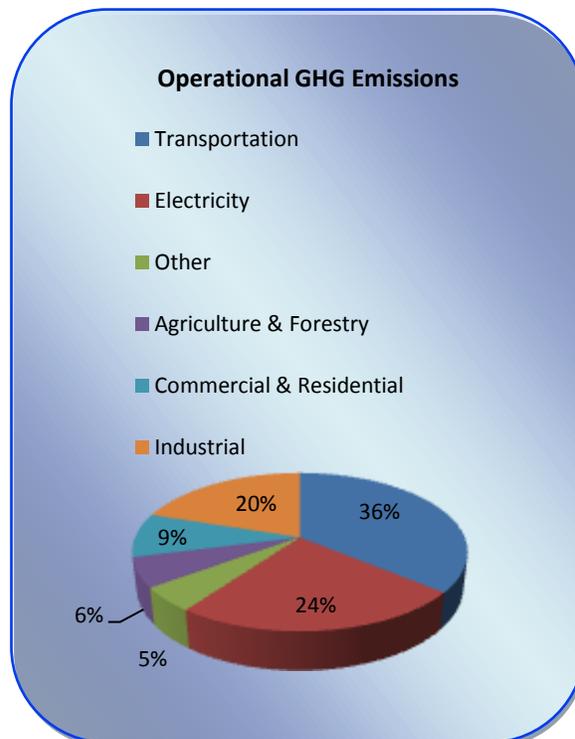


Figure 5-3: Greenhouse Gas Inventory²³

5.5. GHG Analysis & Quantification Tools for Land Use Projects

Generally, the District believes that GHG emissions are best analyzed and mitigated at the program level; however, until more program level GHG analyses have been performed in Placer County, the District offers the recommendations contained in this chapter for addressing the GHG emissions associated with individual development projects.

The following resources are Greenhouse Gas analysis and modeling tools which are being provided to applicants for proposed land use and construction projects. Note that these tools may or may not be appropriate for the type or scope of certain project. The applicant should contact the District for any questions regarding the use of these resources.

Modeling Analysis Tools

- [CalEEMod](#) – Calculates emissions for land use and construction projects
- [EMFAC2011](#) –Calculates emission factors from motor vehicles
- [OFFROAD2007](#) –Calculates emission factors from off-road vehicles
- [Roadway Construction Emissions Model](#) (SMAQMD) –Calculates construction emissions from roadway projects.

Protocols

- California Climate Action Registry General Reporting Protocol, Version 3.1
- CARB/ICLEI/CCAR/Climate Registry Local Government Operations Protocol
- U.S. EPA Methodology from Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2009

- IPCC Guidance for national Greenhouse Gas Inventories

The following documents are available to assist with the various aspects of quantifying emissions and mitigation measure reductions.

- ✓ [CAPCOA -Quantifying Greenhouse Gas Mitigation Measures](#) (pdf);
- ✓ [CAPCOA Guidance- "CEQA and Climate Change: Evaluating and Addressing Greenhouse Gas Emissions from Projects Subject to CEQA,"](#) (pdf);
- ✓ [CAPCOA –Model Policies for Greenhouse Gases in General Plans;](#) (pdf);
- ✓ [California Natural Resources Agency Guidance -GHG emissions and CEQA;](#) and
- ✓ [California Air Resources Board's \(CARB\) Climate Change Scoping Plan;](#)

5.6. GHG Mitigation Measures & Reduction Strategies

Where operational related emissions exceed an applicable Threshold of Significance, lead agencies are responsible for implementing all feasible mitigation measures to reduce the project's construction and operational related GHG emissions. The air quality analysis should quantify the reduction of emissions associated with any proposed mitigation measures and include this information in the environmental document.



The recent amendments to the [CEQA Guidelines Section 15126.4\(c\)](#) require lead agencies to consider feasible means of mitigating greenhouse gas emissions that may include, but not be limited to:

- *Measures in an existing plan or mitigation program, for the reduction of emissions that are required as part of the lead agency's decision, which provides specific requirements that will avoid or substantially lessen the potential impacts of the project;*
- *Reductions in emissions resulting from construction and operation of a project through implementation of project features, project design, or other measures, such as those described in CEQA Guidelines [Appendix F: Energy Conservation](#), also available in (pdf);*
- *Off-site measures, including offsets, that are not otherwise required, to mitigate a project's emissions;*
- *Measures that sequester greenhouse gases [i.e., such as carbon credits]; and*
- *In the case of the adoption of a plan, such as a general plan, long range development plan, or plans for the reduction of GHG emissions, mitigation may include the identification of specific measures that may be implemented on a project-by-project basis. Mitigation may also include the incorporation of specific measures or policies found in an adopted ordinance or regulation that reduces the cumulative effect of emissions.*

CEQA does not require mitigation measures that are infeasible for specific legal, economic, technological, or other reasons. A lead agency is not responsible for wholly eliminating all GHG emissions from a project. The CEQA Guidelines state that lead agencies should try to mitigate to a level that is "less than significant" or, in the case of cumulative impacts, less than cumulatively considerable.

The District recommends the proposed mitigation measures to reduce GHG emissions should be as detailed as possible and should clearly identify who is responsible for implementation, funding, monitoring, enforcement, and any required maintenance activities. In cases where GHG emission reduction measures relate directly or indirectly to policies within a local jurisdiction's General or Community Plan, the District encourages discussion in the environmental document of the relationship between the General Plan or Community Plan policy and proposed reduction measures.

As part of the Attorney General's efforts to work with agencies as they confront the challenge of addressing global warming, documentation has been prepared providing various mitigation measures that local agencies may consider to offset or reduce global warming impacts. Some of this information is included in the links below:

- ✓ CAPCOA Guidance: [Quantifying Greenhouse Gas Mitigation Measures](#) (pdf);
- ✓ California Attorney General's Office: Addressing Climate Change at the Project Level. [Mitigation Measures](#) (pdf);
- ✓ Governor's Office of Planning and Research (OPR): [CEQA and Climate Change](#); and
- ✓ CAPCOA Guidance: ["CEQA and Climate Change: Evaluating and Addressing Greenhouse Gas Emissions from Projects Subject to CEQA."](#)

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