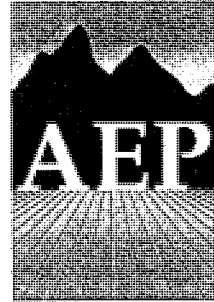


# Alternative Approaches to Analyzing Greenhouse Gas Emissions and Global Climate Change in CEQA Documents

Final - June 29, 2007

Association of Environmental Professionals



Principal Authors: Michael Hendrix and Cori Wilson, Michael Brandman Associates<sup>1</sup>

Contributing Authors: Curtis E. Alling, AICP, EDAW, Inc.  
Tony Held, Ph.D., P.E., Terry Rivasplata, AICP, Tim Rimpo, Richard  
Walter, and Kenneth M. Bogdan, Esq., Jones & Stokes

## Executive Summary

Global climate change (GCC) is a change in the average weather of the earth that can be measured by wind patterns, storms, precipitation, and temperature. This paper is not a scientific analysis of the existence or potential causes of GCC. Further, this paper does not address National Environmental Policy Act (NEPA) requirements. Instead, the intent of this paper is to provide practical, interim information to California Environmental Quality Act (CEQA) practitioners to help Lead Agencies determine how to address GCC in CEQA documents prior to the development and adoption of guidance by appropriate government agencies.

A typical individual project does not generate enough greenhouse gas emissions to influence GCC significantly on its own; the issue of GCC is by definition a cumulative environmental impact. Therefore, if the Lead Agency chooses to address GCC effects in a CEQA document, it should be discussed in the context of a cumulative impact. A complicating factor, however, is that there are currently no published CEQA thresholds or approved methods for determining whether a project's potential contribution to a cumulative GCC impact is considerable.

This paper provides a summary of background information on GCC, the current regulatory environment surrounding greenhouse gas (GHG) emissions, and the various approaches that a Lead Agency may select in a CEQA document to address the potential impacts of GCC and a project's cumulative contribution to GHG. There are many potentially valid approaches, some of which may not be addressed in this paper; for this reason, this document does not recommend a single approach, but rather describes several alternative methodologies and factors that a Lead Agency can consider in selecting the most appropriate methodology for a particular project.

---

<sup>1</sup> Preparation of this paper was partially funded by Michael Brandman Associates

## Introduction

The California Air Resources Board (CARB), the California Environmental Protection Agency (CalEPA), and other government agencies with jurisdiction over air quality have not developed guidelines about how to prepare a CEQA impact assessment for a project's GHG contribution to GCC. The State Legislature enacted and the Governor signed Assembly Bill (AB) 32, the Global Warming Solutions Act of 2006, which charged CARB to develop regulations on how the state would address reduction of GHG in response to GCC concerns.

This paper discusses the evaluation of climate change impacts in CEQA documents for typical development-related projects, such as private development (e.g., residential, commercial, and industrial) and planning programs (e.g., Specific Plans, General Plans, General Plan Updates). The authors represent the Association of Environmental Professionals (AEP). AEP is a statewide group of environmental professionals with over 1,600 members. AEP members are heavily involved in the preparation of CEQA documents, such as Negative Declarations and Environmental Impact Reports (EIR) and other matters related to CEQA compliance. One of the goals of AEP is to help educate its members and other professionals responsible for CEQA compliance in California. To that end, AEP has prepared this paper for consideration by the Governor's Office of Planning and Research, The Resources Agency, CARB, and its own membership. There is an urgent need for this information because many Lead Agencies have begun to assess a project's significance regarding GCC effects in CEQA documents and project opponents have challenged CEQA documents for omitting such an assessment. The State Attorney General's Office and some environmental groups have requested that large-scale projects (e.g., General Plan Updates, large land development proposals, regional transportation plans) analyze impacts on GCC and/or GHG emissions as part of the CEQA process (AG 2006 and AG 2007). While several CEQA court cases are pending, precedent-setting judicial guidance is not expected soon.

## Global Climate Change

### *General Overview*

Global climate change, which most scientists believe to be caused by GHG, is a widely discussed scientific, economic, and political issue in the United States. Briefly stated, GCC is a change in the average weather of the earth that may be measured by changes in wind patterns, storms, precipitation, and temperature. The baseline by which these changes are measured originates in historical records identifying temperature changes that have occurred in the past, such as during previous ice ages. Many of the recent concerns over GCC use this data to extrapolate a level of statistical significance specifically focusing on temperature records from the last 150 years (the Industrial Age) that differ from previous climate changes in rate and magnitude.

The United Nations Intergovernmental Panel on Climate Change (IPCC) constructed several emission trajectories of GHG needed to stabilize global temperatures and climate change impacts. The IPCC predicted that the range of global mean temperature change from 1990 to 2100, given six scenarios, could range from 1.1°C to 6.4°C (IPCC 2007). Regardless of analytical methodology, global average temperature and sea level are expected to rise under all scenarios (IPCC 2007).

### *Greenhouse Gases*

Gases that trap heat in the atmosphere are called greenhouse gases (GHG), analogous to the way a greenhouse retains heat. Common GHG include water vapor, carbon dioxide, methane, nitrous oxides, chlorofluorocarbons, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, ozone, and aerosols. Natural processes and human activities emit GHG. The accumulation of GHG in the

atmosphere regulates the earth's temperature. Without the natural heat trapping effect of GHG, the earth's surface would be about 34 degrees Centigrade (°C) cooler (CAT 2006). However, it is believed that emissions from human activities, such as electricity production and vehicle use, have elevated the concentration of these gases in the atmosphere beyond the level of naturally occurring concentrations.

Climate change is driven by forcings and feedbacks. A feedback is "an internal climate process that amplifies or dampens the climate response to a specific forcing" (NRC 2005). Radiative forcing is the difference between the incoming energy and outgoing energy in the climate system. The global warming potential (GWP) is the potential of a gas or aerosol to trap heat in the atmosphere; it is the "cumulative radiative forcing effects of a gas over a specified time horizon resulting from the emission of a unit mass of gas relative to a reference gas" (EPA 2006a).

Individual GHG species have varying GWP and atmospheric lifetimes. The carbon dioxide equivalent is a consistent methodology for comparing GHG emissions since it normalizes various GHG emissions to a consistent metric. The reference gas for GWP is carbon dioxide; carbon dioxide has a GWP of one. Compared to methane's GWP of 21, methane has a greater global warming effect than carbon dioxide on a molecule per molecule basis (EPA 2006b). One teragram (Tg) (equal to one million metric tons) of carbon dioxide equivalent (Tg CO<sub>2</sub> Eq.) is the mass emissions of an individual GHG multiplied by its GWP.

Of all greenhouse gases in the atmosphere, water vapor is the most abundant, important, and variable. It is not considered a pollutant; in the atmosphere, it maintains a climate necessary for life. The main source of water vapor is evaporation from the oceans (approximately 85 percent). Other sources include evaporation from other water bodies, sublimation (change from solid to gas) from ice and snow, and transpiration from plant leaves.

Ozone is a greenhouse gas; however, unlike other GHG, ozone in the troposphere is relatively short-lived and, therefore, is not global in nature. It is difficult to make an accurate determination of the contribution of ozone precursors (nitrogen oxides and volatile organic compounds) to GCC (CARB 2004b).

Aerosols are suspensions of particulate matter in a gas emitted into the air through burning biomass (plant material) and fossil fuels. Aerosols can warm the atmosphere by absorbing and emitting heat and can cool the atmosphere by reflecting light. Cloud formation can also be affected by aerosols. Sulfate aerosols are emitted when fuel containing sulfur is burned. Black carbon (or soot) is emitted during bio mass burning or incomplete combustion of fossil fuels. Particulate matter regulation has been lowering aerosol concentrations in the United States; however, global concentrations are likely increasing.

Carbon dioxide (CO<sub>2</sub>) is an odorless, colorless gas, which has both natural and anthropogenic sources. Natural sources include the following: decomposition of dead organic matter; respiration of bacteria, plants, animals, and fungus; evaporation from oceans; and volcanic outgassing. Anthropogenic sources of carbon dioxide are from burning coal, oil, natural gas, and wood. Concentrations of carbon dioxide were 379 parts per million (ppm) in 2005, which is an increase of 1.4 ppm per year since 1960 (IPCC 2007).

Methane is a flammable gas and is the main component of natural gas. When one molecule of methane is burned in the presence of oxygen, one molecule of carbon dioxide and two molecules of water are released. There are no ill health effects from methane. A natural source of methane is from the anaerobic decay of organic matter. Geological deposits, known as natural gas fields, also contain methane, which is extracted for fuel. Other sources are from landfills, fermentation of manure, and cattle.

Nitrous oxide (N<sub>2</sub>O), also known as laughing gas, is a colorless greenhouse gas. Higher concentrations can cause dizziness, euphoria, and sometimes slight hallucinations. Nitrous oxide is produced by microbial processes in soil and water, including those reactions that occur in fertilizer containing nitrogen. In addition to agricultural sources, some industrial processes (fossil fuel-fired power plants, nylon production, nitric acid production, and vehicle emissions) also contribute to its atmospheric load. It is used in rocket engines, racecars, and as an aerosol spray propellant.

Chlorofluorocarbons (CFCs) are gases formed synthetically by replacing all hydrogen atoms in methane or ethane with chlorine and/or fluorine atoms. CFCs are nontoxic, nonflammable, insoluble, and chemically unreactive in the troposphere (the level of air at the earth's surface). CFCs were first synthesized in 1928 for use as refrigerants, aerosol propellants, and cleaning solvents. They destroy stratospheric ozone; therefore, their production was stopped as required by the Montreal Protocol in 1987.

Hydrofluorocarbons (HFCs) are synthetic man-made chemicals that are used as a substitute for CFCs for automobile air conditioners and refrigerants.

Perfluorocarbons (PFCs) have stable molecular structures and do not break down through the chemical processes in the lower atmosphere. High-energy ultraviolet rays about 60 kilometers above the earth's surface are able to destroy the compounds. PFCs have very long lifetimes, between 10,000 and 50,000 years. Two common PFCs are tetrafluoromethane and hexafluoroethane. Concentrations of tetrafluoromethane in the atmosphere are over 70 parts per trillion (ppt) (EPA 2006d). The two main sources of PFCs are primary aluminum production and semiconductor manufacture.

Sulfur hexafluoride (SF<sub>6</sub>) is an inorganic, odorless, colorless, nontoxic, nonflammable gas. It has the highest GWP of any gas evaluated, 23,900. Concentrations in the 1990s were about 4 ppt (EPA 2006d). Sulfur hexafluoride is used for insulation in electric power transmission and distribution equipment, in the magnesium industry, in semiconductor manufacturing, and as a tracer gas for leak detection.

#### ***International and Federal Legislation***

International and Federal legislation has been enacted to deal with GCC issues. The Montreal Protocol was originally signed in 1987 and substantially amended in 1990 and 1992. The Montreal Protocol governs compounds that deplete ozone in the stratosphere—chlorofluorocarbons (CFCs), halons, carbon tetrachloride, and methyl chloroform. The Protocol provided that these compounds were to be phased out by 2000 (2005 for methyl chloroform).

In 1988, the United Nations and the World Meteorological Organization established the Intergovernmental Panel on Climate Change (IPCC) to assess "the scientific, technical and socio-economic information relevant to understanding the scientific basis of risk of human-induced climate change, its potential impacts, and options for adaptation and mitigation" (IPCC 2004).

On March 21, 1994, the United States joined a number of countries around the world in signing the United Nations Framework Convention on Climate Change (UNFCCC). Under the Convention, governments: gather and share information on greenhouse gas emissions, national policies, and best practices; launch national strategies for addressing greenhouse gas emissions and adapting to expected impacts, including the provision of financial and technological support to developing countries; and cooperate in preparing for adaptation to the impacts of climate change (UNFCCC 2007).

A particularly notable result of UNFCCC efforts was a treaty known as the Kyoto Protocol. Countries sign the treaty to demonstrate their commitment to reduce their emissions of GHG or engage in emissions trading. More than 160 countries—representing 55 percent of global emissions—are currently participating in the protocol. In 1998, U. S. Vice President, Al Gore, symbolically signed the Protocol; however, in order for the Protocol to be formally ratified, it must be adopted by the U. S. Congress. This was not done during the Clinton Administration, and the current U. S. President, George W. Bush, has indicated that he does not intend to submit the treaty for ratification.

In October 1993, President Clinton announced his Climate Change Action Plan, which had a goal to return greenhouse gas emissions to 1990 levels by the year 2000. This was to be accomplished through 50 initiatives that relied on innovative voluntary partnerships between the private sector and government aimed at producing cost-effective reductions in greenhouse gas emissions.

The United States Environmental Protection Agency (EPA) currently does not regulate GHG emissions from motor vehicles. *Massachusetts v. EPA* (Supreme Court Case 05-1120) was argued before the U. S. Supreme Court on November 29, 2006, in which it was petitioned that EPA regulate four GHG, including carbon dioxide, under §202(a)(1) of the Clean Air Act. A decision was made April 2, 2007, in which the Court held that petitioners have a standing to challenge the EPA and that the EPA has statutory authority to regulate emission of GHG from motor vehicles.

#### **California Legislation**

California Code of Regulations Title 24 Part 6: California's Energy Efficiency Standards for Residential and Nonresidential Buildings, were first established in 1978 in response to a legislative mandate to reduce California's energy consumption. The standards are updated periodically to allow consideration and possible incorporation of new energy efficiency technologies and methods. The latest amendments were made in October 2005 and currently require new homes to use half the energy they used only a decade ago. Energy efficient buildings require less electricity, and electricity production by fossil fuels results in greenhouse gas emissions. Therefore, increased energy efficiency results in decreased greenhouse gas emissions.

California Assembly Bill 1493 (Pavley) enacted on July 22, 2002, required CARB to develop and adopt regulations that reduce GHG emitted by passenger vehicles and light duty trucks. Regulations adopted by CARB will apply to 2009 and later model year vehicles. CARB estimates that the regulation will reduce climate change emissions from light duty passenger vehicle fleet by an estimated 18 percent in 2020 and by 27 percent in 2030 (CARB, 2004).

California Governor Arnold Schwarzenegger announced on June 1, 2005, through Executive Order S-3-05, the following GHG emission reduction targets: by 2010, reduce GHG emissions to 2000 levels; by 2020, reduce GHG emissions to 1990 levels; by 2050, reduce GHG emissions to 80 percent below 1990 levels (CA 2005). The California Climate Action Team's (CAT) Report to the

Governor contains recommendations and strategies to help ensure the targets in Executive Order S-3-05 are met (CAT 2006).

In 2006, the California State Legislature adopted AB 32, the California Global Warming Solutions Act of 2006 and the Governor signed it into law. AB 32 focuses on reducing GHG in California. GHG as defined under AB 32 include: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. AB 32 requires the California Air Resources Board (CARB), the State agency charged with regulating statewide air quality, to adopt rules and regulations that would achieve greenhouse gas emissions equivalent to statewide levels in 1990 by 2020. On or before June 30, 2007, CARB is required to publish a list of discrete early action GHG emission reduction measures that can be implemented by 2010.

AB 32 also requires that by January 1, 2008, the State Board determines what the statewide greenhouse gas emissions level was in 1990, and approve a statewide greenhouse gas emissions limit that is equivalent to that level, to be achieved by 2020. While the level of 1990 GHG emissions has not yet been approved, reported emissions vary from 425 to 468 Tg CO<sub>2</sub> Eq. (CEC 2006). In 2004, the emissions were estimated at 492 Tg CO<sub>2</sub> Eq. (CEC 2006).

CARB published its Proposed Early Actions to Mitigate Climate Change in California (CARB 2007b), which describes recommendations for discrete early action measures to reduce GHG emissions. The measures will become part of California's strategy for achieving GHG reductions under AB 32. One of the sources for the potential measures includes the CAT Report. Three new regulations are proposed to meet the definition of "discrete early action greenhouse gas reduction measures," which include the following: a low carbon fuel standard; reduction of HFC-134a emissions from non-professional servicing of motor vehicle air conditioning systems; and improved landfill methane capture (CARB 2007b). CARB estimates that by 2020, the reductions from those three measures would be approximately 13 to 26 million metric tons of carbon dioxide equivalent. Note that CARB defers General Plans and CEQA; early action is not recommended by CARB at this time.

Under AB 32, CARB has the primary responsibility for reducing GHG emissions. However, the CAT Report contains strategies that many other California agencies can take. The CAT published a public review draft of Proposed Early Actions to Mitigate Climate Change in California (CAT 2007). Most of the strategies were in the 2006 CAT Report or are similar to the 2006 CAT strategies.

Executive Order S-01-07 was approved by the Governor on January 18, 2007. The order mandates that a statewide goal shall be established to reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020. It also requires that a Low Carbon Fuel Standard for transportation fuels be established for California.

The Western Regional Climate Action Initiative was signed on February 26, 2007 by five states: Washington, Oregon, Arizona, New Mexico, and California. British Columbia, Canada joined on April 20, 2007. The Initiative plans on collaborating to identify, evaluate, and implement ways to reduce GHG emissions in the states collectively and to achieve related co-benefits. The Initiative plans to design a regional market-based multi-sector mechanism, such as a load-based cap and trade program by August 2008. In addition, a multi-state registry will track, manage, and credit entities that reduce GHG emissions.

California is also exploring the possibility of cap and trade systems for greenhouse gases. The Market Advisory Committee to CARB published draft recommendations for designing a greenhouse gas cap and trade system for California (MAC 2007).

### **Inventory**

In 2004, total worldwide GHG emissions was estimated to be 20,135 Tg CO<sub>2</sub> Eq., excluding emissions/removals from land use, land use change, and forestry (UNFCCC 2006). (Note that sinks, or GHG removal processes, play an important role in the GHG inventory as forest and other land uses absorb carbon.) In 2004, GHG emissions in the U.S. were 7074.4 Tg CO<sub>2</sub> Eq. (EPA 2006a). In 2005, total U.S. GHG emissions were 7,260.4 Tg CO<sub>2</sub> Eq., a 16.3 increase from 1990 emissions, while U.S. gross domestic product has increased by 55 percent over the same period (EPA 2007a). Emissions rose from 2004 to 2005, increasing by 0.8 percent. The main causes of the increase: (1) strong economic growth in 2005, leading to increased demand for electricity and (2) an increase in the demand for electricity due to warmer summer conditions (EPA 2007a). However, a decrease in demand for fuels due to warmer winter conditions and higher fuel prices moderated the increase in emissions (EPA 2007a). California is a substantial contributor of GHG as it is the second largest contributor in the U.S. and the sixteenth largest in the world (CEC 2006). In 2004, California produced 492 Tg CO<sub>2</sub> Eq. (CEC 2006), which is approximately seven percent of U.S. emissions. The major source of GHG in California is transportation, contributing 41 percent of the State's total GHG emissions (CEC 2006). Electricity generation is the second largest source, contributing 22 percent of the State's GHG emissions.

### **California Environmental Quality Act**

In 1970, the state legislature passed the California Environmental Quality Act (CEQA). The basic purposes of CEQA are to inform governmental decision-makers and the public about the significant environmental effects of proposed activities, identify ways to avoid or significantly reduce environmental damage, use feasible alternatives or mitigation measures to avoid significant damage, and disclose to the public why a governmental agency approved a project if significant effects are involved (CEQA Guidelines §15002[a]). Under CEQA, the environment denotes the physical conditions affected by a project, including land, air, water, minerals, flora, fauna, noise, and objects of historical or aesthetic significance (CEQA §21060.5). Therefore, unlike other single-topic environmental laws, CEQA encourages the protection of many aspects of the physical environment by requiring state and local agencies to prepare multidisciplinary environmental impact analysis and to make decisions based on the analysis regarding the environmental effects of the proposed project (CEQA Guidelines §15002[a]).

### **CEQA Challenges**

Some project opponents, groups, or individuals have used CEQA's lawsuit provisions to attempt to block development projects they see as detrimental to the environment. Others insist upon additional mitigation to address environmental impacts of a project. CEQA challenges have been used to seek analysis of potential issues not contemplated by the Lead Agency. There are several pending lawsuits and recently published decisions by trial courts. However, these lawsuits cannot be characterized as imposing requirements. The cases will not result in published precedent, or a court decision on which Lead Agencies can rely, until Court of Appeal publishes a decision. As these cases are currently in trial courts, there is not likely to be a published legal precedent for well over a year, and more likely two or more years.

In a pending lawsuit, the Center for Biological Diversity filed a CEQA challenge to the Black Bench Specific Plan EIR for the failure to include an analysis of GHG emissions (*Center for Biological Diversity v. City of Banning*). As another example, the Attorney General filed a suit on April 13, 2007, against San Bernardino County for allegedly failing to adequately address climate change in its CEQA document evaluating the County's General Plan. The State Attorney General has also submitted letters to local Lead Agencies on some major projects requesting inclusion of an assessment of climate change impacts. One letter was submitted for a large refinery expansion project in the County of Contra Costa. The project addressed climate change in the Final EIR, but indicated that because there are no published thresholds, the Final EIR did not make a significance finding. The Attorney General indicates that the Lead Agency is obligated to determine significance. Further, the Lead Agency should ensure compliance with AB 32 to reduce GHG emissions to 1990 levels by estimating the GHG emissions and adopting feasible measures to avoid or reduce those emissions (AG 2007). Another letter was submitted on the Orange County Transportation Authority 2006 Long-Range Transportation Plan Draft EIR (AG 2006). The letter indicates that the Draft EIR should have quantified GHG emissions and mitigated for the impacts.

On April 27, 2007, the Sacramento trial court rejected the Natural Resource Defense Council's challenge against the Reclamation Board for its approval of a permit to allow the development of land in the San Joaquin River delta for failure to analyze climate change impacts associated with the development (*Natural Resource Defense Council v. Reclamation Board of the Resources Agency of the State of California*, Case No. 06 CS 01228). The Reclamation Board permit relied on an EIR prepared earlier by the City of Lathrop for the land development to be protected by the levee that was subject to the Board permit. The Court indicated that the requirements to trigger preparation of a new EIR were not met because the concept of climate change is not "new information" that had become available between the certification of the original Addendum to the SEIR and the approval of the permits, and therefore, the original EIR was adequate (Public Resources Code §21166). In other words, climate change issues were known when the original City of Lathrop EIR was prepared, but the absence of climate change impact analysis was not raised in any comments as a shortcoming of the EIR at the time. The tentative ruling also states that as the projected effects of climate change become clearer and can be related to specific sites, those effects will have to be factored into the analysis of many projects. On May 22, 2007, consistent with the above ruling, in *American Canyon Community United for Responsible Growth et al. v. City of American Canyon et al.* (Napa County Superior Court Case No. 26-27462), the Court rejected the petitioner's claim that the City was required to perform supplemental environmental review of the project's potential impacts on climate change in response to AB 32 (SM 2007).

On May 25, 2007, the U.S. District Court for the Eastern District of California upheld the challenge of the biological opinion issued by the U.S. Fish and Wildlife Service because the Service failed to address climate change (*Natural Resources Defense Council v. Kempthorne*, No. 05-1207). The biological opinion followed consultation under Section 7 of the Endangered Species Act for the Central Valley Project and State Water Project, which divert water from the Sacramento-San Joaquin Delta to central and southern California (NOSS 2007). Plaintiffs argued that the projects' impacts could be compounded by hydrological and temperature changes resulting from climate change, thus leaving unanalyzed potentially adverse impacts to the endangered delta smelt (NOSS 2007). The Court indicated that the biological opinion should also address "when and how climate change impacts will be addressed, whether existing take limits will remain, and the probable impacts on [project] operations" (NOSS 2007).



Prior to the passage of AB 32, the majority of CEQA documents did not evaluate GHG emissions or impacts on GCC. The primary focus of air pollutant analysis in CEQA documents was the emission of criteria pollutants, or those identified in the state and federal Clean Air Acts as pollutants of concern. The passage of AB 32 (Statutes of 2006) could be construed as evidence that an analysis of GHG emissions and effects of climate change should be presented in CEQA documents. Also known as the California Global Warming Solutions Act of 2006, AB 32 added Division 25.5 to the Health and Safety Code, commencing with §38500. In §38501(a), the findings of the act included the declaration by the Legislature that “global warming poses a serious threat to the economic well-being, public health, natural resources, and environment of California.” This legislative finding provides added state policy basis for addressing GCC in CEQA, in addition to the basic purpose of CEQA. §38501(a) of the act also states that “the potential effects 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.” Section 38598(b) of the California Global Warming Solutions Act directs that “nothing in this division shall relieve any state entity of its legal obligations to comply with existing law or regulation.” When the legislative findings about the threats to the environment and the absence of relief from other laws are considered together, the act creates compelling statutory basis for addressing significant adverse effects of GCC in CEQA compliance.

#### **CEQA Mandates for Analysis of Impacts**

CEQA requires that Lead Agencies inform decision-makers and the public regarding the following: potential significant environmental effects of proposed projects; feasible ways that environmental damage can be avoided or reduced through the use of feasible mitigation measures and/or project alternatives; and disclose the reasons why the Lead Agency approved a project if significant environmental effects are involved (CEQA Guidelines §15002). CEQA also requires Lead Agencies to evaluate potential environmental effects based to the fullest extent possible on scientific and factual data (CEQA Guidelines §15064[b]). Significance conclusions must be based on substantial evidence, which includes facts, reasonable assumptions predicated upon facts, and expert opinion supported by facts (CEQA Guidelines §15064f[5]). Scientific data in support of GCC, AB 32, and the requirements of CEQA could be used as support for a GCC analysis in CEQA documents.

Conversely, linking the GHG emissions to a project or plan to a direct influence on climate change could be considered overly speculative at this time. CEQA Guidelines §15151 states that, “...disagreement among experts does not make an EIR inadequate, but the EIR should summarize the main points of the disagreement among the experts. The courts have looked not for perfection but for adequacy, completeness, and a good faith effort at full disclosure.”

In addition, under the “rule of reason,” an EIR is required to evaluate impacts to the extent that is reasonably feasible ([CEQA Guideline §15151; *San Francisco Ecology Center v. City and County of San Francisco* (1975) 48 Cal.App.3<sup>rd</sup> 584]). While CEQA does require Lead Agencies to make a good faith effort to disclose what they reasonably can, CEQA does not demand what is not realistically possible ([*Residents at Hawks Stadium Committee v. Board of Trustees* (1979) 89 Cal.App.3<sup>rd</sup> 274, 286]). A Lead Agency, therefore, has discretion to design the CEQA document; it does not need to conduct every recommended test or perform all requested research or analysis ([CEQA Guideline §15204(a); *Laurel Heights Improvements Association v. Regents* (1988) 47 Cal.App.3<sup>rd</sup> 376, 410]).

### **Cumulative Versus Project-Specific Impacts**

If a Lead Agency chooses to address GCC in a document, it should be addressed in the context of a cumulative (versus project-specific) impact. The determination of whether a project creates significant direct impacts on the environment, as well as whether the project's contribution to areawide impacts is "cumulatively considerable," is the sole responsibility of the Lead Agency based on substantial evidence.

### **Thresholds of Significance**

There are currently no published thresholds of significance for measuring the impact of GCC on, or from, a project. To our knowledge to date, neither CARB nor any air districts have submitted a comment letter during a Notice of Preparation period recommending that an EIR address GHG emissions. CEQA Guidelines §15064.7 indicates only that, "each public agency is encouraged to develop and publish thresholds of significance that the agency uses in the determination of the significance of environmental effects."

It may further be asserted that because there are no published thresholds of significance, a Lead Agency is relieved of the threshold determination. This supports a Lead Agency in finding that a determination of significance for GCC impacts is speculative. In *Laurel Heights Improvements Association v. Regents* ([1993] 6 Cal.App.4<sup>th</sup> 1112, 1137), the Court upheld the conclusion in the EIR that potential cumulative impacts of toxic air emissions are too speculative based on the lack of accepted methodologies or standards and based on CEQA Guideline §15145.

The City of Rancho Cordova developed a threshold of 2 tons of CO<sub>2</sub> per person, which was estimated based on vehicle emission reductions needed to meet 1990 levels (RC 2006). An Air Quality and Emissions Reduction Plan was also prepared for the project, which contains vehicle trip reduction measures, which is estimated to be a 15 percent reduction in emissions (EH 2006). The project declared the emissions significant because they were over the 2 tons per person threshold. If a Lead Agency develops a threshold, the methodology should be clearly explained in the analysis.

## **Approaches**

In the absence of regulatory guidance, and prior to the resolution of CEQA challenges regarding GCC impact analysis, CEQA documents may choose to address GHG emissions on a case-by-case basis using methods tailored to the project's circumstances individual interpretation of existing CEQA guidance. The selection of an approach can be based on the location and characteristics of the project, or the level of information available about the site, the jurisdiction, or regional GHG emissions.

The following discussion explores the various approaches that could be used in CEQA documents to analyze GCC. Also included is the support for each approach and the items to consider when selecting the best approach. Each approach may have advantages and disadvantages, but it is the responsibility of the Lead Agency to select the most appropriate methodology based on the project's unique circumstances. There are many other kinds of actions and projects undertaken or approved by Lead Agencies that are not addressed in these proposed approaches, such as timber harvest plans, water quality management plans, highway improvement projects, and others that do not directly contribute to GHG emissions or have complicated interrelationships to the GHG balance in the atmosphere.

**Approach 1 No Analysis**

The No Analysis approach does not address or mention GHG emissions or GCC. The omission of any climate change discussion on a project could result in critical remarks during the comment period. During the comment period, this approach could be supported by explaining that regulatory guidance on how to address potential impacts of GCC currently does not exist.

GCC is a widely accepted concept and the debate is subsiding about whether anthropogenic sources have had a substantial influence on GCC. Nonetheless, uncertainty persists about the rate and ultimate extent of GCC. The National Research Council, a branch of the National Academies of Science, states, "...the mechanisms involved in land-atmosphere interactions are not well understood, let alone represented in climate models" (NRC 2005, page 125). Similar conclusions are presented in other reports (PI 2003 [page 5, 13] and IPCC 2003). Most recently, CARB deferred the topic of "GHGs in General Plans and CEQA" for further analysis, so there is no early action recommendation for evaluation of GHGs in CEQA documents at this time (CARB 2007b).

This approach may be useful for CEQA documents that were circulated prior to the adoption of AB 32; however, if evidence exists that GCC impacts may occur, this approach should be avoided, even if the CEQA document was circulated before adoption of AB 32. A Lead Agency may conclude that there is insufficient scientific evidence at present to allow a meaningful assessment of GHG and GCC impacts for a specific project, and therefore is considered overly speculative within the CEQA context. As with all alternative approaches, the Lead Agency should fully document the reasoning for selecting this approach in the CEQA document and/or the administrative record.

**Approach 2 Screening Analysis**

The Screening Analysis approach would exempt small or certain types of projects from doing a detailed analysis. CEQA Guidelines §15206 could help support using this approach, or the Lead Agency could select some other appropriate definition or threshold. Another method that could be used is reliance on a nexus between the project's significance for operational criteria pollutant emissions. Though the thresholds for significance for criteria pollutants are based on the attainment status of the pollutants, emissions for criteria pollutants tend to follow similar pattern as the emissions for GHG emissions (i.e., more vehicle miles traveled equals more GHG and criteria pollutants). For example, if a project has a less than significant impact for other air pollutant impacts, it could follow that the project would have a less than significant impact regarding to GHG emissions. Some projects do not involve any appreciable increase in GHG emissions; it should be appropriate for the Lead Agency to determine that this level of analysis would suffice. This approach would allow a Lead Agency to establish a process to screen projects and determine they would not make significant contributions to GHG emissions or GCC and therefore would not need to mitigate accordingly. As with all approaches, the Lead Agency should fully document the rationale for using the screening analysis, the thresholds for excluding certain kinds or sizes of projects, and support it with substantial evidence in the record.

**Approach 3 Qualitative Analysis without Significance Determination**

The Qualitative Analysis without Significance Determination approach involves a discussion of GCC and potential ways the project will contribute to the generation of GHG emissions, but does not provide any significance conclusions. This approach can be based on the fact that regulatory guidance relating to CEQA on how to address potential impacts of GCC does not currently exist. This approach discloses potential impacts but stops short of making a significance determination. Under this approach, the Lead Agency would have to determine that the analysis of GHG and GCC

within the CEQA process is overly speculative and there is no substantial evidence available at present to legitimately evaluate this issue in a CEQA document. This approach may be most appropriate for small projects or programmatic projects where very little information on GHG emissions is known. The courts have indicated that if an impact is too speculative, it need not be evaluated in detail, provided there is a reasoned explanation for the determination (such as in cases related to the issue of urban decay). After making a good faith effort to fully explore the potential for GCC effects of a project, if the conclusion is still too speculative to be meaningful, the discussion can be concluded without a significance determination, consistent with CEQA Guidelines §15145). The Lead Agency must provide a factual and reasoned basis for the determination that there is no accurate or appropriate methodology for determining significance of this potential impact ([*Alliance of Small Emitters/Metals Industry v. South Coast Air Quality Management District* (1997) 60 Cal.App.4<sup>th</sup> 55, 66; *Anderson First Coalition v. City of Anderson* (2005) 130 Cal.App.4<sup>th</sup> 1173]).

#### **Approach 4 Qualitative Analysis with Significance Determination**

The Qualitative Analysis with Significance Determination approach qualitatively discusses climate change impacts and concludes that the project impacts are significant. Similar to Approach 3, this approach concludes that regulatory guidance on how to address potential impacts of GCC currently does not exist, but then surpasses that alternative to make a significance finding. This approach should offer reasonable and feasible mitigation measures and/or design features that reduce GHG emissions.

#### **Approach 5 Quantitative Analysis without Significance Determination**

In the Quantitative Analysis without Significance Determination approach, GHG emissions from the project are quantified but are not compared to a quantitative threshold. This approach lacks a significance conclusion because regulatory guidance on how to address potential impacts of GCC currently does not exist. The Lead Agency may determine that it is too speculative to reach a significance conclusion regarding this issue (see Approach 3). This approach has been used by the City of San José (SJ 2007).

For projects with established development, such as cities, counties, or existing specific plans, it may be possible to prepare an emissions inventory of GHG. In such cases, the analysis can rely more heavily upon the quantitative analysis by estimating the existing GHG emissions inventory, the past GHG emissions inventory for Year 2000, Year 1990, and future year emissions inventory with the project. The challenge of this approach may be in the ability to find sufficient data to develop reliable estimates of past and proposed GHG emissions. If these past inventories can be credibly developed, this approach can then quantitatively show how the project will (or will not) meet the State GHG emissions targets. The types of projects that can rely upon the quantities of GHG emissions in determining significance is fairly limited, but lend themselves to regional projects such as General Plan Updates.

While this approach does provide a quantifiable methodology, an inventory of project-related GHG emissions may not be meaningful in certain contexts. There are no adopted thresholds for GHG emissions and the Year 1990 emissions target for Year 2020 has not yet been established. AB 32 gave CARB until 2008 to develop the 1990 emissions inventory because of the complexity of quantifying such emissions. In addition, a quantitative analysis contains many assumptions that could be challenged, especially at this interim stage lacking government guidance on how to calculate GHG emissions. While the analysis shows effort toward quantifying emissions, this approach lacks a significance finding.

Another limitation regarding to the quantitative analysis is that emissions models, such as EMFAC and URBEMIS, evaluate aggregate emissions and do not demonstrate, with respect to a global impact, how much of these emissions are "new" emissions specifically attributable to the proposed project in question. For most projects, the main contribution of GHG emissions is from motor vehicles, but the quantity of those emissions appropriately characterized as "new" is uncertain. New projects do not necessarily create new trips because drivers typically relocate from a different geographical area. Issues related to trip length, access to transit, and land use patterns can be examined to address whether new or longer trips are the result of a proposed project. Some mixed use and transportation-oriented projects can actually reduce the number of vehicle miles traveled that a person drives, which could also be disclosed in CEQA documents.

#### **Approach 6 Quantitative Analysis with Net Zero Threshold**

The Quantitative Analysis with Net Zero Threshold approach involves quantifying GHG emissions and using zero net carbon dioxide equivalent increase as the threshold. This approach would be useful where it can be demonstrated that a program or project results in zero GHG emissions, or otherwise does not contribute to climate change. This approach would make most projects significant with regard to their cumulative contribution to GHG emissions. Large programs or projects, for instance, might have difficulty reducing or documenting that they could reduce impacts to zero additional GHG emissions. This approach also has similar concerns associated with a quantitative analysis, as identified in Approach 5.

This approach may require the use of carbon offsets or offsite mitigation, which may be problematic due to limited details about the effectiveness of such programs or projects. To use carbon offsets or offsite mitigation, an adequate description of physical changes that would occur as a result of the offset program or offsite mitigation and the schedule for implementation would be needed in the CEQA document to demonstrate that the program reduces GHG emissions sufficiently to reduce a significant impact to a less-than-significant level.

This approach may also de-emphasize onsite design features that would lower GHG emissions through innovative energy conservation design and trip reduction measures because it is difficult to quantify the GHG reductions available through design features. Working with the traffic engineer to develop trip generation rates that account for trip reduction design features may help to encourage onsite design features that reduce GHG emissions. It is consistent with good environmental planning practice to reduce project emissions with design or operational changes before relying on carbon offset trading to provide for mitigation. Much like mitigation approaches for other impact issues, seeking to avoid and minimize the effect (in this case, the GHG emissions) is appropriate before trying to compensate for the impact (as the purchase of carbon offsets would do).

#### **Approach 7 Quantitative Analysis Relative to California GHG Emission Reduction Strategies**

The Quantitative Analysis Relative to California GHG Emission Reduction Strategies approach employs both quantitative and qualitative components. The quantitative analysis contains an inventory of project GHG emissions. The qualitative component involves project compliance with the emission reduction strategies contained in the California Climate Action Team's (CAT) Report to the Governor, which contains recommendations and strategies to help ensure the targets in Executive Order S-3-05 are met. Use of the strategies in the CAT report to determine project consistency are appropriate because the report "proposes a path to achieve the Governor's targets that will build on voluntary actions of California businesses, local government and community actions, and State

incentive and regulatory programs” (CAT 2006). While the CAT report does not specifically mention CEQA, it does include a list of the various measures that can be employed to achieve the GHG reduction targets (see Appendix A for a summary of the measures and methods whereby a project could demonstrate compliance). Also, some air quality management districts are developing GHG emission reduction strategies that may become useful for future CEQA reviews.

It may be possible to conclude that proposed projects that implement all feasible and applicable emissions reduction strategies would have a less than significant impact on GCC, particularly if research is developed by the State to support the GHG reduction effectiveness of those measures. This same type of approach could be used for projects within counties that have an adopted GHG reduction plan. In cases where quantifying emissions are not reasonable or possible, such as Specific Plans where the development is programmatic, an approach whereby reduction measures are adopted to conclude a project has less-than-significant effects could still be used, as long as substantial evidence is developed to support the GHG reduction effectiveness. It is up to the Lead Agency to identify feasible CAT strategies that the project could implement.

By combining both qualitative and quantitative approaches, the analysis can be tailored to the particular type and size of the project and still provide—to the fullest extent feasible—a comprehensive analysis of GCC impacts and appropriate feasible mitigation to reduce impacts. However, this approach has the same limitations associated with the quantification of GHG emissions as discussed in Approach 5.

The CAT strategies are preliminary and they do not represent an approved air quality management plan for GHG emissions. Once that plan is published, the Lead Agency may choose to rely on it; AB 32 requires that a list of emission reduction strategies be published to achieve its established goals. However, until those reduction strategies and/or an air quality management plan for GHG are published, emission reduction strategies to meet Executive Order S-3-05 is the only document published as of this date that can be used in this manner.

The emission reductions afforded by the CAT strategies are quantified statewide. However, evidence has not yet been developed to quantify the CAT’s strategies on a regional or project-by-project basis. As research and data evolve regarding the effectiveness of reduction measures, a CEQA document may calculate carbon reduction estimates compared to the project without the reduction strategies to the extent that credible methods to do so have been established. This quantified approach may be converted to a carbon-reduction efficiency estimate, where impact analysis can be oriented to achieving a certain reduced rate of GHG emissions per capita. If a per capita threshold can be developed to help achieve State reduction targets, this per capita approach may be useful in CEQA documents.

This approach requires more substantial analysis, which is not possible for all projects, especially smaller ones. In addition, some strategies are not feasible for all projects. In that situation, a feasibility analysis or further discussion may be needed. Some of the strategies listed in the CAT report are not applicable to land use projects. In addition, there are other design features that could be used to reduce a project’s potentially significant impact other than the CAT strategies.

#### **Approach 8 Use of Partial Exemption, “Within the Scope” of a Program EIR, or Tiering**

Streamlining approaches are available when a Lead Agency assesses a later project’s consistency with the cumulative climate change analysis in a broader EIR, such as a General Plan EIR. If a broader

EIR on a plan, program, or zoning action is certified and contains the cumulative GHG and GCC impact analysis and mitigation, a later project that is consistent with the actions, goals, and/or policies in that plan, program, or zoning action need not again evaluate the cumulative impact regarding GHG contribution and GCC. In this situation, the later project may use the "partial exemption" provision of CEQA §21083.3 and CEQA Guidelines §15183. This approach would be adequate provided that the cumulative effect had been adequately addressed in the broader EIR. In a similar approach, if the cumulative GHG and GCC impact analysis and mitigation are adequately addressed in a program EIR, and a later project is found to be "within the scope" of the earlier program and program EIR, the CEQA review for the later project can consider the issues already addressed in the earlier program EIR, consistent with CEQA Guidelines §15168. Tiering may also be used, consistent with CEQA §21093 and §21094, along with CEQA Guideline §15152, when the cumulative GHG and GCC issues are adequately addressed in a broader EIR and a later project-specific EIR is being prepared. The cumulative issue need not be re-addressed if done so adequately before and circumstances have not substantially changed. Counties and cities are in opportune positions to implement specific measures that would benefit their jurisdictions the most, if they include GHG and GCC policies and analysis in their General Plans and General Plan EIRs. Marin County prepared a Greenhouse Gas Reduction Plan (MC 2006), which sets a target of GHG reductions 15 to 20 percent below 1990 levels by 2020 for internal government and 15 percent countywide. The Plan contains measures such as reductions in building energy use, transportation, waste management, and land use.

#### **Mitigation and Project Design Features**

Design features can include strategies similar to those presented in the CAT's Report to the Governor in 2006, such as the following: increased recycling; community gardens and/or composting facilities; onsite tree planting; clustering development to preserve forest/woodland resources; increased water use efficiency by use of potable and non-potable water and low-flow appliances; increased building efficiency; Leadership in Energy and Environmental Design (LEED) Green Building Ratings; use of energy efficient appliances; smart land use concepts such as high-density and/or retail and residential mixed use; non-emission generating onsite electricity generation (photovoltaic cells, wind turbines, etc.); waste heat capture (for industrial projects to provide process and/or building heat); transit-oriented design; park and ride features; carpooling; and pedestrian friendly design features. The range of potential CAT strategies that Lead Agencies may use to develop specific project design features are contained in the Appendix of this report. Air quality management districts are also working on GHG emission reduction strategies. Still, it must be remembered that the application of any of these strategies is entirely up to the discretion of the Lead Agency based on such factors as the characteristics and size of the project and the need, if any, to include mitigation into the project for GHG emissions or GCC impacts.

The Lead Agency may also choose to contribute to offsite mitigation or a carbon-offset program, once established. For instance, a project could contribute to a program that invests in biomass, wind power, solar power, alternative vehicle fuels, or increased energy efficiency programs. Or a project could offset GHG emissions by making a monetary contribution to a tree-planting program that would provide for carbon sequestration over a reasonable period of time, compared to the planned life of the project and the nature of the mitigation or offset measure. Substantial evidence should be presented to explain the rationale supporting selection of the measure, its duration, details on the selection, and a quantification of the GHG reduction, if available.

If a Lead Agency decides to include design features and/or mitigation that reduce GHG emissions, it would be prudent to also identify any secondary impacts resulting from implementation. Secondary impacts could include an increase or decrease in criteria pollutant levels, impacts to biological

resources, changes to aesthetics, etc. Design features that results in damage to other environmental components should be avoided. For typical projects, one of the main sources of GHG emissions is from vehicles. Designing projects that reduce vehicle trips will decrease GHG emissions.

### **Quantitative Analysis**

If the Lead Agency decides to conduct a quantitative analysis, an inventory of GHG emissions (carbon dioxide, methane, nitrous oxide, etc.) generated by the project could be estimated. The project inventory could be compared to the California inventory and/or the County inventory, when they become available. There are a number of sources for methods by which GHG emissions from a project can be estimated, as follows: the California Climate Action Registry protocol (CCAR 2007); URBEMIS2007; EPA factors (EPA 2004, EPA 2004b, EPA 1998, EPA 2004d); and the U.S. Energy Information Administration (EIA 2007).

### **CEQA Projects Affected by Climate Change Impacts**

The effects that GCC may have on a specific project also need to be considered in CEQA reviews. Care is needed to determine if there is a connection between a project's location or character and the potential for impacts on the project to occur that are caused by GCC. Mandating mitigation to lessen the environmental impacts of climate change on a project-level analysis without clear disclosure of the relationship between the project and the environmental impact would not comply with CEQA. Section 21002.1 of the California Public Resources Code states, "the purpose of an environmental impact report is to identify the significant effects on the environment of a project..." Without establishing what those effects are for residents in the State of California, and the relative degree of certainty of those effects, an adequate disclosure of GCC impacts on a project would not be realized.

The precise timing, nature, and magnitude of climate change impacts at specific locations is not certain, although projections with wide confidence limits have been developed for some parameters such as sea level rise and meteorology. However, effects of climate change specifically mentioned in AB 32, such as rising sea levels, modified meteorology and flood hydrographs, and changes in snowpack could be addressed in CEQA documents. How GCC may affect species ranges may also be considered. CEQA documents should address whether projected changes in sea level, meteorology, flooding, snow pack, and other identifiable consequences of GCC may create hazards for or otherwise adversely affect a project. The degree of uncertainty should also be addressed.

Potential health effects from GCC may arise from temperature increases, climate-sensitive diseases, extreme events, and air quality. There may be direct temperature effects through increases in average temperature leading to more extreme heat waves and less extreme cold spells. Those living in warmer climates are likely to experience more stress and heat-related problems (e.g., heat rash and heat stroke). In addition, climate sensitive diseases (such as malaria, dengue fever, yellow fever, and encephalitis) may increase, such as those spread by mosquitoes and other disease-carrying insects.

GCC-related meteorological changes and sea level rises are expected to lead to other adverse impacts. Extreme events, such as flooding and hurricanes, can displace people and damage property and agriculture. Drought in some areas may increase and snowpack may decrease, which would decrease water and food availability. Rising sea levels would increase stress on levees and exacerbate storm wave run-up and coastal erosion. GCC may also contribute to air quality problems from increased frequency of smog and particulate air pollution (EPA 2006c).



Some agencies have begun to assess potential risks from climate change in various regions of the State. The California Climate Change Center uses three IPCC climate change scenarios to assess risks from climate change to California (CCCC 2006). The report indicates GCC could result in the following changes in California: poor air quality; more severe heat; increased wildfires; shifting vegetation; declining forest productivity; decreased spring snowpack; water shortages; a potential reduction in hydropower; a loss in winter recreation; agricultural damages from heat, pests, pathogens, and weeds; and rising sea levels resulting in shrinking beaches and increased coastal floods (CCCC 2006).

The California Department of Water Resources published a report that describes the progress on incorporating climate change into existing water resources planning and management tools and methodologies (DWR 2006). While it does not focus on CEQA, the report does describe potential impacts of climate change on California's water resources. The California Coastal Commission published a Discussion Draft titled Global Warming and the California Coastal Commission (CCC 2006), which recommends that the Commission address GCC because the Coastal Act protects resources that are threatened by global warming.

It is hoped that a greater number of California agencies will assess climate change risks. Once information is made available by State government agencies, it could be used to determine more precisely to what extent a project is affected. Until then, environmental documents could make a good faith effort to assess the potential effects of GCC on projects. In some cases, such as coastal developments, an evaluation could be feasible, with recognized limitations related to uncertainties. In other locations, specific impact analysis may not be feasible.

## **Conclusion**

Lead Agencies in California are attempting to respond to increasing calls for evaluation of the potential impacts of greenhouse gas emissions and global climate change during CEQA reviews. There are a wide range of potential approaches for evaluating climate change and greenhouse gas emission impacts in CEQA documents. This paper has been prepared to help Lead Agencies select the most appropriate approach to analyze greenhouse gas emissions and global climate change until formal guidance or regulations are published by appropriate government agencies.

## **Document Process**

A comment draft dated March 5, 2007, was emailed to all California AEP members. Ten comment letters were received on the first draft. Permission was obtained by commenters to publish their comments on the AEP website. The updated second draft, dated April 10, 2007, was emailed to those that commented on the first draft. The April 10, 2007 version was published in the Environmental Monitor in the Spring 2007 edition. A Revised Draft dated April 27, 2007 was distributed at the 2007 AEP State Conference and posted on the AEP website in late April. Several additional comments were received and incorporated into this final version. The AEP thanks all commenters for their input provided during this process.

## References

- AG 2006 Attorney General, State of California, Bill Lockyer. Letter to Orange County Transportation Authority. Regarding Orange County Transportation Authority 2006 Long-Range Transportation Plan Draft Program Environmental Impact Report. March 30, 2006.
- AG 2007 Attorney General, State of California, Edmund G. Brown, Jr.. Letter to Contra Costa County Planning Commission. Comments on the ConocoPhillips Rodeo Refinery Expansion Project and Final Environmental Impact Report (File #LP052048), May 8, 2007.
- CA 2004 State of California, Executive Order S-20-04. July 27, 2004.  
<http://www.dot.ca.gov/hq/energy/ExecOrderS-20-04.htm>
- CA 2005 State of California, Executive Order S-3-05. June 1, 2005.  
<http://www.dot.ca.gov/hq/energy/ExecOrderS-3-05.htm>
- CARB 2004 California Air Resources Board. December 10, 2004. Fact Sheet, Climate Change Emission Control Regulations. [www.arb.ca.gov/cc/factsheets/cc\\_newfs.pdf](http://www.arb.ca.gov/cc/factsheets/cc_newfs.pdf)
- CARB 2004b California Environmental Protection Agency, Air Resources Board. July 21, 2004. Technical Support Document for Staff Proposal Regarding Reduction of Greenhouse Gas Emissions from Motor Vehicles Climate Change Overview.  
[http://www.arb.ca.gov/cc/factsheets/support\\_ccoverview.pdf](http://www.arb.ca.gov/cc/factsheets/support_ccoverview.pdf)
- CARB 2007b California Air Resources Board. Proposed Early Actions to Mitigate Climate Change in California. April 20, 2007. [www.climatechange.ca.gov/climate\\_action\\_team/reports/index.html](http://www.climatechange.ca.gov/climate_action_team/reports/index.html), Accessed April 23, 2007.
- CAT 2006 State of California, Environmental Protection Agency, Climate Action Team. March 2006. Climate Action Team Report to Governor Schwarzenegger and the California Legislature. [www.climatechange.ca.gov/climate\\_action\\_team/reports/index.html](http://www.climatechange.ca.gov/climate_action_team/reports/index.html)
- CAT 2007 State of California, Environmental Protection Agency, Climate Action Team. Climate Action Team Proposed Early Actions to Mitigate Climate Change in California. Draft for Public Review. April 20, 2007.
- CCAR 2007 California Climate Action Registry. General Reporting Protocol. Reporting Entity-Wide Greenhouse Gas Emissions. Version 2.2, March 2007.  
<http://www.climateregistry.org/docs/PROTOCOLS/GRP%20V2-March2007.pdf>
- CCC 2006 California Coastal Commission. December 12, 2006. Discussion Draft - Global Warming and the California Coastal Commission.  
<http://documents.coastal.ca.gov/reports/2006/12/Th3-12-2006.pdf>
- CCCC 2006 California Climate Change Center. Our Changing Climate, Assessing the Risks to California: A Summary Report from the California Climate Change Center. July 2006. CEC-500-2006-077.  
[www.climatechange.ca.gov/biennial\\_reports/2006report/index.html](http://www.climatechange.ca.gov/biennial_reports/2006report/index.html)

- CEC 2005 California Energy Commission. 2005 Building Efficiency Standards. Non Residential Compliance Manual. Commission Certified Manual. CEC-400-2005-006-CMF, Revision 3. 4Q-05. Page 1-4.  
<http://www.energy.ca.gov/title24/2005standards/index.html>
- CEC 2006 California Energy Commission. December 2006. Inventory of California Greenhouse Gas Emissions and Sinks: 1990 to 2004. Staff Final Report. CEC-600-2006-013-SF. <http://www.energy.ca.gov/2006publications/CEC-600-2006-013/CEC-600-2006-013-SF.PDF>
- CTG 2007 CTG Energetics, Inc., Chris Pyke. Best Practices for Climate Change and the Sustainable Design and Operation of Neighborhoods and Communities. April 20, 2007.
- DWR 2006 California Department of Water Resources. July 2006. Progress on Incorporating Climate Change into Management of California's Water Resources.  
<http://baydeltaoffice.water.ca.gov/climatechange.cfm>, Accessed April 6, 2007.
- EH 2006 Elliott Homes, Inc. Air Quality and Emissions Reduction Plan, Rio del Oro, City of Rancho Cordova. November 2006.  
[http://www.cityofranhocordova.org/city\\_departments/planning\\_rio\\_del\\_oro.html](http://www.cityofranhocordova.org/city_departments/planning_rio_del_oro.html), Accessed June 14, 2007.
- EIA 2007 Energy Information Administration, Official Energy Statistics from the United States Government. <http://www.eia.doe.gov/environment.html>
- EPA 1998 U.S. Environmental Protection Agency. July 1998. AP-42 Emission Factor, Natural Gas Combustion. [www.epa.gov/ttn/chief/ap42/ch01/final/c01s04.pdf](http://www.epa.gov/ttn/chief/ap42/ch01/final/c01s04.pdf)
- EPA 2004 U.S. Environmental Protection Agency, prepared by ICF Consulting. November 2004. EPA420-P-04-016. Update of Methane and Nitrous Oxide Emission Factors for On-Highway Vehicles. <http://www.epa.gov/otaq/models/ngm/420p04016.pdf>
- EPA 2004b U.S. Environmental Protection Agency. Climate Leaders Greenhouse Gas Inventory Protocol. October 2004. Direct Emissions from Mobile Combustion Sources.  
<http://www.epa.gov/climateleaders/docs/mobilesourceguidance.pdf>
- EPA 2004c U.S. Environmental Protection Agency, Climate Leaders. October 2004. Direct HFC and PFC Emissions from Use of Refrigeration and Air Conditioning Equipment. EPA430-K-03-004.  
[www.epa.gov/climateleaders/docs/refrige\\_acequipuseguidance.pdf](http://www.epa.gov/climateleaders/docs/refrige_acequipuseguidance.pdf)
- EPA 2004d U.S. Environmental Protection Agency, Climate Leaders. October 2004. Direct Emissions from Stationary Combustion Sources.  
[www.epa.gov/climateleaders/docs/mobilesourceguidance.pdf](http://www.epa.gov/climateleaders/docs/mobilesourceguidance.pdf)
- EPA 2006a U.S. Environmental Protection Agency, Office of Atmospheric Programs. April 2006. The U.S. Inventory of Greenhouse Gas Emissions and Sinks: Fast Facts.  
<http://epa.gov/climatechange/emissions/downloads06/06FastFacts.pdf>

- EPA 2006b U.S. Environmental Protection Agency. 2006. Non CO2 Gases Economic Analysis and Inventory. Global Warming Potentials and Atmospheric Lifetimes. <http://www.epa.gov/nonco2/econ-inv/table.html>. Accessed December 20, 2006.
- EPA 2006c U.S. Environmental Protection Agency. 2006. Climate Change - Health and Environmental Effects. <http://www.epa.gov/climatechange/effects/health.html> Accessed December 20, 2006.
- EPA 2006d U.S. Environmental Protection Agency. 2006. High Global Warming Potential (GWP) Gases. Science. <http://www.epa.gov/highgwp/scientific.html>, Accessed December 2006.
- EPA 2007a U.S. Environmental Protection Agency. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2005. Executive Summary. April 2007. USEPA #430-R-07-002 <http://www.epa.gov/climatechange/emissions/usinventoryreport.html>
- IPCC 2001 Intergovernmental Panel on Climate Change. 2001. Climate Change 2001: The Scientific Basis. Contribution of Working Group I to the Third Assessment Report of the Intergovernmental Panel on Climate Change [Houghton, J.T., Y. Ding, D.J. Griggs, M. Noguer, P.J. van der Linden, X. Dai, K. Maskell, and C.A. Johnson (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 881pp. <http://www.ipcc.ch/pub/reports.htm>
- IPCC 2003 Intergovernmental Panel on Climate Change. July 2003. IPCC Meeting on Current Scientific Understanding of the Processes Affecting Terrestrial Carbon Stocks and Human Influences upon Them. Expert Meeting Report. <http://www.ipcc.ch/pub/carbon.pdf>
- IPCC 2004 Intergovernmental Panel on Climate Change. 2004. 16 Years of Scientific Assessment in Support of the Climate Convention. December 2004. <http://www.ipcc.ch/about/anniversarybrochure.pdf>
- IPCC 2007 Intergovernmental Panel on Climate Change. 2007. R.B. Alley, et al. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Summary for Policymakers. [www.ipcc.ch/WG1\\_SPM\\_17Apr07.pdf](http://www.ipcc.ch/WG1_SPM_17Apr07.pdf)
- JS 2007 Jones & Stokes. Tony Held, Ph.D., P.E.; Whitney Leeman, Ph.D., Tim Rimpo; Marina Pelosi; Richard Walter; Terry Rivasplata; Ken Bogdan, Esq.. 2007. Addressing Global Climate Change in Environmental Impact Statements (EIS) and Environmental Impact Reports (EIR) in the Post AB 32 Regulatory Environment.
- MAC 2007a Market Advisory Committee for the California Air Resources Board. Recommendations for Designing a Greenhouse Gas Cap-and-Trade System for California. [www.climatechange.ca.gov/events/2007-06-12\\_mac\\_meeting/2007-06-01\\_MAC\\_DRAFT\\_REPORT.PDF](http://www.climatechange.ca.gov/events/2007-06-12_mac_meeting/2007-06-01_MAC_DRAFT_REPORT.PDF), Accessed June 11, 2007.
- MC 2006 Marin County. October 2006. Marin County Greenhouse Gas Reduction Plan. <http://www.co.marin.ca.us/depts/CD/main/comdev/advance/Climate.cfm>.

- NOAA 2005 National Oceanic and Atmospheric Administration. 2005. Greenhouse Gases. Frequently Asked Questions. <http://lwf.ncdc.noaa.gov/oa/climate/gases.html> Accessed December 20, 2006.
- NOSS 2007 Nossaman Land Use Law, P.S. Weiland, S. Meyer, R.D. Thornton. Federal District Court Decides that Fish and Wildlife Service Violated Endangered Species Act by Failing to Address Climate Change during Section 7 Consultation. May 30, 2007. [http://www.envoynews.com/nossaman/e\\_article000827848.cfm?x=b11,0,w](http://www.envoynews.com/nossaman/e_article000827848.cfm?x=b11,0,w)
- NRC 2005 National Research Council of the National Academies, Climate Research Committee, Board on Atmospheric Sciences and Climate, Committee on Radiative Forcing Effects on Climate. Radiative Forcing of Climate Change: Expanding the Concept and Addressing Uncertainties. The National Academies Press, Washington, D.C.
- PI 2003 Pacific Institute. Climate Change and California Water Resources: A Survey and Summary of the Literature. Michael Kiparsky and Peter H. Gleick. July 2003. [http://www.pacinst.org/reports/climate\\_change\\_and\\_california\\_water\\_resources.pdf](http://www.pacinst.org/reports/climate_change_and_california_water_resources.pdf)
- RC 2006 City of Rancho Cordova. Rio del Oro Specific Plan Draft Environmental Impact Report. Prepared by EDAW. December 8, 2006. [http://www.cityofranhocordova.org/city\\_departments/planning\\_rio\\_del\\_oro.html](http://www.cityofranhocordova.org/city_departments/planning_rio_del_oro.html)
- SM 2007 Sheppard Mullin, Attorneys at Law, Arthur J. Friedman. Global Climate Change Legislation does not Require Supplemental Environmental Review under CEQA. May 23, 2007. [www.RealEstateandConstructionLawBlog.com](http://www.RealEstateandConstructionLawBlog.com)
- SJ 2007 City of San José. Coyote Valley Specific Plan Draft EIR. March 2007. [http://www.sanjoseca.gov/coyotevalley/publications\\_DEIR.htm](http://www.sanjoseca.gov/coyotevalley/publications_DEIR.htm)
- UNFCCC 2006 United Nations Framework Convention on Climate Change. 2006. Greenhouse Gas Emissions Data, Predefined Queries, Annex I Parties - GHG total without LULUCF (land use, land-use change, and forestry). [http://unfccc.int/ghg\\_emissions\\_data/predefined\\_queries/items/3841.php](http://unfccc.int/ghg_emissions_data/predefined_queries/items/3841.php)
- UNFCCC 2007 United Nations Framework Convention on Climate Change. Essential Background. [http://unfccc.int/essential\\_background/convention/items/2627.php](http://unfccc.int/essential_background/convention/items/2627.php), Accessed February 2007.
- WH 2007 The White House, President George W. Bush, Council on Environmental Quality. <http://www.whitehouse.gov/ceq/global-change.html>. Accessed January 23, 2007.

## **APPENDIX A**

# **California Climate Action Team's Strategies**

**California Climate Action Team's Strategies**

Several of the approaches outlined in this report refer to GHG emission reduction strategies contained in the CAT's Report to the Governor (CAT 2006), which outlines strategies for meeting the Governor's emission reduction targets contained in Executive Order S-3-05. To assess project compliance with the CAT strategies, the strategies would be described and project consistency would be determined. Note that many of the California Climate Action Team's (CAT) strategies are applicable only to state agencies such as CARB. In addition, not all strategies will be feasible to every project. The Lead Agency must make the determination of the feasibility of the project to implement the emission reduction strategies. Some of the CAT strategies are listed in Table A-1 along with project design features or mitigation to comply with each strategy.

**Table A-1: California Climate Action Team Strategies**

Strategy	Possible Project Design/Mitigation to Comply with Strategy
<p><b>Vehicle Climate Change Standards:</b> AB 1493 (Pavley) required the state to develop and adopt regulations that achieve the maximum feasible and cost-effective reduction of climate change emissions emitted by passenger vehicles and light duty trucks. Regulations were adopted by the ARB in September 2004.</p>	<p>These are CARB enforced standards; vehicles that access the project that are required to comply with the standards will comply with these strategies.</p>
<p><b>Other Light Duty Vehicle Technology:</b> New standards would be adopted to phase in beginning in the 2017 model.</p>	
<p><b>Heavy-Duty Vehicle Emission Reduction Measures:</b> Increased efficiency in the design of heavy-duty vehicles and an education program for the heavy-duty vehicle sector.</p>	
<p><b>Diesel Anti-Idling:</b> In July 2004, the CARB adopted a measure to limit diesel-fueled commercial motor vehicle idling.</p>	<p>Signs posted that restrict idling; education for truck drivers regarding diesel health impacts.</p>
<p><b>Hydrofluorocarbon Reduction:</b> 1) Ban retail sale of HFC in small cans; 2) Require that only low GWP refrigerants be used in new vehicular systems; 3) Adopt specifications for new commercial refrigeration; 4) Add refrigerant leak-tightness to the pass criteria for vehicular Inspection and Maintenance programs; 5) Enforce federal ban on releasing HFCs.</p>	<p>This measure applies to consumer products. When CARB adopts regulations for these reduction measures, any products that the regulations apply to will comply with the measures.</p>
<p><b>Transportation Refrigeration Units (TRU), Off-Road Electrification, Port Electrification:</b> Strategies to reduce emissions from TRUs, increase off-road electrification, and increase use of shore-side/port electrification.</p>	<p>In projects where TRUs access the site, implement measures to reduce emissions; install electrification in applicable projects (i.e., truck stops, warehouses, etc.)</p>

Strategy	Possible Project Design/Mitigation to Comply with Strategy
<b>Manure Management:</b> The proposed San Joaquin Valley Rule 4570 will reduce volatile organic compounds from confined animal facilities through implementation of control options.	San Joaquin Valley: In projects that address confined animal facilities, project design as recommended in proposed Rule 4570 would reduce GHG emissions.
<b>Alternative Fuels - Biodiesel Blends:</b> CARB would develop regulations to require the use of 1 to 4 percent biodiesel displacement of California diesel fuel.	Applicable to some industrial and agricultural projects.
<b>Alternative Fuels - Ethanol:</b> Increased use of ethanol fuel.	Applicable to some industrial and agricultural projects.
<b>Achieve 50 percent Statewide Recycling Goal:</b> Achieving the State's 50 percent waste diversion mandate as established by the Integrated Waste Management Act of 1989, (AB 939, Shér, Chapter 1095, Statutes of 1989), will reduce climate change emissions associated with energy intensive material extraction and production as well as methane emission from landfills. A diversion rate of 48 percent has been achieved on a statewide basis. Therefore, a 2 percent additional reduction is needed.	1) Design locations for separate waste and recycling receptacles. 2) Utilize recycled components in the building design.
<b>Zero Waste - High Recycling:</b> Additional recycling beyond the State's 50 percent recycling goal.	
<b>Landfill Methane Capture:</b> Install direct gas use or electricity projects at landfills to capture and use emitted methane.	Methane capture would be applicable to projects involving landfills.
<b>Urban Forestry:</b> A new statewide goal of planting 5 million trees in urban areas by 2020 would be achieved through the expansion of local urban forestry programs.	Trees near structures act as insulators from weather thereby decreasing energy requirements. Trees also store carbon.
<b>Afforestation/Reforestation Projects:</b> Reforestation projects focus on restoring native tree cover on lands that were previously forested and are now covered with other vegetative types.	Clustering residential development to preserve forest/woodland resources; increasing density; and preserving and restoring open space.
<b>Water Use Efficiency:</b> Approximately 19 percent of all electricity, 30 percent of all natural gas, and 88 million gallons of diesel are used to convey, treat, distribute and use water and wastewater. Increasing the efficiency of water transport and reducing water use would reduce greenhouse gas emissions.	Use of both potable and non-potable water to the maximum extent practicable; low flow appliances (i.e., toilets, dishwashers, shower heads, washing machines, etc.); automatic shut off valves for sinks in restrooms; drought resistant landscaping; "Save Water" signs near water faucets.
<b>Building Energy Efficiency Standards in Place and in Progress:</b> Public Resources Code 25402 authorizes the CEC to adopt and periodically update its building energy efficiency standards (that apply to newly constructed buildings and additions to and alterations to existing	If feasible, a project could achieve a greater reduction in combined space heating, cooling and water heating energy compared to the current Title 24 Standards.



Strategy	Possible Project Design/Mitigation to Comply with Strategy
buildings).	
<p><b>Appliance Energy Efficiency Standards in Place and in Progress:</b> Public Resources Code 25402 authorizes the Energy Commission to adopt and periodically update its appliance energy efficiency standards (that apply to devices and equipment using energy that are sold or offered for sale in California).</p>	<p>Use of energy efficient appliances (i.e., washer/dryers, refrigerators, stoves, etc.)</p>
<p><b>Cement Manufacturing:</b> Cost-effective reductions to reduce energy consumption and to lower carbon dioxide emissions in the cement industry.</p>	<p>Features to reduce emissions would be applicable to projects involving cement manufacturing.</p>
<p><b>Smart Land Use and Intelligent Transportation Systems (ITS):</b> Smart land use strategies encourage jobs/housing proximity, promote transit-oriented development, and encourage high-density residential/commercial development along transit corridors.</p> <p>ITS is the application of advanced technology systems and management strategies to improve operational efficiency of transportation systems and movement of people, goods and services.</p> <p>Governor Schwarzenegger is finalizing a comprehensive 10-year strategic growth plan with the intent of developing ways to promote, through state investments, incentives and technical assistance, land use, and technology strategies that provide for a prosperous economy, social equity, and a quality environment.</p>	<p>Smart land use, demand management, ITS, and value pricing are critical elements for improving mobility and transportation efficiency. Specific strategies include: promoting jobs/housing proximity and transit-oriented development; encouraging high density residential/commercial development along transit/rail corridor; valuing and congestion pricing; implementing intelligent transportation systems, traveler information/traffic control, incident management; accelerating the development of broadband infrastructure; and comprehensive, integrated, multimodal/intermodal transportation planning.</p>
<p><b>Enteric Fermentation:</b> Cattle emit methane from digestion processes. Changes in diet could result in a reduction in emissions.</p>	<p>In agricultural/cattle related projects, design features that reduce emissions could be implemented.</p>
<p><b>Green Buildings Initiative:</b> Green Building Executive Order, S-20-04 (CA 2004), sets a goal of reducing energy use in public and private buildings by 20 percent by the year 2015, as compared with 2003 levels.</p>	<p>A project could increase its energy efficiency percent beyond Title 24 requirements. In addition, the project could implement other green building design (i.e., natural daylighting and on-site renewable, electricity generation).</p>
<p><b>California Solar Initiative:</b> Installation of 1 million solar roofs or an equivalent 3,000 MW by 2017 on homes and businesses; increased use of solar thermal systems to offset the increasing demand for natural gas; use of advanced metering in solar applications; and creation of a funding source that can provide rebates over 10 years through a declining incentive schedule.</p>	<p>If feasible, the project could install photovoltaic cells or other solar options.</p>
<p>Source: State of California, Environmental Protection Agency, Climate Action Team, 2006.</p>	





