

Introduction

Under state law, it is the purview of each lead agency to determine what, if any, significance thresholds will be established to guide its review of projects under CEQA. While the state does provide guidelines for implementing CEQA, the guidelines have left the decision of whether to establish thresholds (and if so, at what level) to individual lead agencies. Frequently, lead agencies consult with resource-specific agencies (such as air districts) for assistance in determining what constitutes a significant impact on that specific resource.

With the passage of AB 32, the ARB has broad authority to regulate GHG emissions as necessary to meet the emission reduction goals of the statute. This may include authority to establish emission reduction requirements for new land use projects, and may also enable them to recommend statewide thresholds for GHG under CEQA.

In developing this white paper, CAPCOA recognizes that, as the GHG reduction program evolves over time, GHG thresholds and other policies and procedures for CEQA may undergo significant revision, and that uniform statewide thresholds and procedures may be established. This paper is intended to serve as a resource for public agencies until such time that statewide guidance is established, recognizing that decisions will need to be made about GHG emissions from projects before such guidance is available. This paper is not, however, uniform statewide guidance. As stated before, it outlines several possible approaches without endorsing any one over the others.

Some air districts may choose to use this paper to support their establishment of guidance for GHG under CEQA, including thresholds. This paper does not, nor should it be construed to require a district to implement any of the approaches evaluated here. Decisions about whether to provide formal local guidance on CEQA for projects with GHG emissions, including the question of thresholds, will be made by individual district boards.

Each of the 35 air districts operates independently and has its own set of regulations and programs to address the emissions from stationary, area and mobile sources, consistent with state and federal laws, regulations, and guidelines. The independence of the districts allows specific air quality problems to be addressed on a local level. In addition, districts have also established local CEQA thresholds of significance for criteria pollutants – also to address the specific air quality problems relative to that particular district.

The overall goal of air district thresholds is to achieve and maintain health based air quality standards within their respective air basins and to reduce transport of emissions to other air basins. In establishing recommended thresholds, air districts consider the existing emission inventory of criteria pollutants and the amount of emission reductions needed to attain and maintain ambient air quality standards.

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However, unlike criteria pollutants where individual districts are characterized by varying levels of pollutant concentrations and source types, greenhouse gases (GHG) and their attendant climate change ramifications are a global problem and, therefore, may suggest a uniform approach to solutions that ensure both progress and equity.

Under SB97, the Office of Planning and Research is directed to prepare, develop, and transmit to the Resources Agency guidelines for the feasible mitigation of GHG emissions or the effects of GHG emissions through CEQA by July 1, 2009. Those guidelines may recommend thresholds. As stated, this paper is intended to provide a common platform of information and tools to support local decision makers until such time that statewide guidance or requirements are promulgated.

Local Ability to Promulgate District-Specific GHG Thresholds

One of the primary reasons behind the creation of air districts in California is the recognition that some regions within the state face more critical air pollution problems than others and, as has often been pointed out – one size does not fit all. For example, a “Serious” federal nonattainment district would need greater emission reductions than a district already in attainment – and, therefore, the more “serious” district would set its criteria pollutant CEQA thresholds of significance much lower than the air district already in attainment.

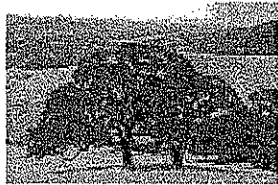
The action of GHGs is global in nature, rather than local or regional (or even statewide or national). Ultimately there may be a program that is global, or at least national in scope. That said, actions taken by a state, region, or local government can contribute to the solution of the global problem. Local governments are not barred from developing and implementing programs to address GHG. In the context of California and CEQA, lead agencies have the primary responsibility and authority to determine the significance of a project's impacts.

Further, air districts have primary authority under state law for "control of air pollution from all sources, other than emissions from motor vehicles." (H&SC §40000) The term air contaminant or "air pollutant" is defined extremely broadly, to mean "any discharge, release, or other propagation into the atmosphere" and includes, but is not limited to, soot, carbon, fumes, gases, particulate matter, etc. Greenhouse gases and other global warming pollutants such as black carbon would certainly be included in this definition, just as the U.S. Supreme Court held in *Massachusetts v. EPA* that greenhouse gases were air pollutants under the federal Clean Air Act. Therefore, air districts have the primary authority to regulate global warming pollutants from nonvehicular sources. AB 32 does not change this result. Although it gives wide responsibility to CARB to regulate greenhouse gases from all sources, including nonvehicular sources, it does not preempt the districts. AB 32 specifically states That "nothing in this division shall limit or expand the existing authority of any district..."(H&SC § 38594). Thus, districts and CARB retain concurrent authority over nonvehicular source greenhouse gas emissions.

Introduction

The CEQA statutes do not require an air district or any lead agency to establish significance thresholds under CEQA for any pollutant. While there are considerations that support the establishment of thresholds (which are discussed in other sections of this document), there is no obligation to do so.

An air district or other lead agency may elect not to establish significance thresholds for a number of reasons. The agency may believe that the global nature of the climate change problem necessitates a statewide or national framework for consideration of environmental impacts. SB 97 directs OPR to develop “guidelines for the mitigation of greenhouse gas emissions or the effects of greenhouse gas emissions by July 1, 2009,” and directs the California Resources Agency to certify and adopt the guidelines by June 30, 2010.



An agency may also believe there is insufficient information to support selecting one specific threshold over another. As described earlier, air districts have historically set CEQA thresholds for air pollutants in the context of the local clean air plan, or (in the case of toxic air pollutants) within the framework of a rule or policy that manages risks and exposures due to toxic pollutants.

There is no current framework that would similarly manage impacts of greenhouse gas pollutants, although the CARB is directed to establish one by June 30, 2009, pursuant to AB 32. A local agency may decide to defer any consideration of thresholds until this framework is in place.

Finally, an agency may believe that the significance of a given project should be assessed on a case-by-case basis in the context of the project at the time it comes forward.

Implementing CEQA Without Significance Thresholds for GHG

The absence of a threshold does not in any way relieve agencies of their obligations to address GHG emissions from projects under CEQA. The implications of not having a threshold are different depending on the role the agency has under CEQA – whether it is acting in an advisory capacity, as a responsible agency, or as a lead agency.

Implications of No Thresholds for an Agency Acting in an Advisory Capacity

Air districts typically act in an advisory capacity to local governments in establishing the framework for environmental review of air pollution impacts under CEQA. This may include recommendations regarding significance thresholds, analytical tools to assess emissions and impacts, and mitigations for potentially significant impacts. Although districts will also address some of these issues on a project-specific basis as responsible agencies, they may provide general guidance to local governments on these issues that

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are program wide, and these are advisory (unless they have been established by regulation).

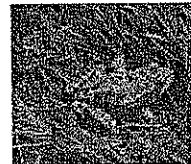
An air district that has not established significance thresholds for GHG will not provide guidance to local governments on this issue. This does not prevent the local government from establishing thresholds under its own authority. One possible result of this would be the establishment of different thresholds by cities and counties within the air district. Alternatively, the air district could advise local governments not to set thresholds and those jurisdictions may follow the air district's guidance.

It is important to note here (as has been clearly stated by the Attorney General in comments and filings) that lack of a threshold does *not* mean lack of significance. An agency may argue lack of significance for any project, but that argument would have to be carried forth on a case-by-case, project specific basis. By extension then, a decision not to establish thresholds for GHG is likely to result in a greater workload for responsible and lead agencies as they consider individual projects under CEQA.

Implications of No Thresholds for a Responsible Agency

If there are no established thresholds of significance, the significance of each project will have to be determined during the course of review. The responsible agency (e.g., the air district) will review each project referred by the lead agency. The review may be qualitative or quantitative in nature. A qualitative review would discuss the nature of GHG emissions expected and their potential effect on climate change as the district understands it. It could also include a discussion of the relative merits of alternative scenarios. A quantitative analysis would evaluate, to the extent possible, the expected and might include corresponding analysis of alternatives. The air district, as a responsible agency, may also identify mitigation measures for the project.

The lack of established thresholds will make the determination of significance more resource intensive for each project. The district may defer to the lead agency to make this determination, however the district may be obligated, as a responsible agency, to evaluate the analysis and determination.



Implications of No Thresholds for a Lead Agency

The main impact of not having significance thresholds will be on the primary evaluation of projects by the lead agency. Without significance thresholds, the agency will have to conduct some level of analysis of every project to determine whether an environmental impact report is needed. There are three fundamental approaches to the case-by-case analysis of significance, including presumptions of significance or insignificance, or no presumption:

1. The agency can begin with a presumption of significance and the analysis would be used to support a case-specific finding of no significance. This is similar to establishing a threshold of zero, except that here, the “threshold” is rebuttable. This approach may result in a large number of projects proceeding to preparation of an environmental impact report. Because of the attendant costs, project proponents may challenge the determination of significance, although formal challenge is less likely than attempts to influence the determination.

2. The agency can begin with a presumption of insignificance, and the analysis would be used to support a case-specific finding of significance. A presumption of insignificance could be based on the perspective that it would be speculative to attempt to identify the significance of GHG emissions from a project relative to climate change on a global scale. This approach might reduce the number of projects proceeding to preparation of environmental impact reports. It is likely to have greater success with smaller projects than larger ones, and a presumption of *insignificance* may be more likely to be challenged by project opponents.

3. It is not necessary for the lead agency to have any presumption either way. The agency could approach each project from a *tabula rasa* perspective, and have the determination of significance more broadly tied to the specific context of the project; this approach is likely to be resource intensive, and creates the greatest uncertainty for project proponents. To the extent that it results in a lead agency approving similar projects based on different determinations of significance for GHG emissions, it may be more vulnerable to challenge from either proponents or opponents of the project. Alternatively, in the absence of either thresholds or presumptions, the lead agency could use each determination of significance to build its approach in the same way that subsequent judgments define the law.



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Relevant Citations

The full text of relevant citations is in Appendix A.

Public Resources Code – §21082.2, Significant Effect on Environment; Determination; Environmental Impact Report Preparation.

State CEQA Guidelines – §15064, Determining the Significance of the Environmental Effects Caused by a Project.



Chapter 6

CEQA with a GHG Threshold of Zero

Introduction

If an air district or lead agency determines that any degree of project-related increase in GHG emissions would contribute considerably to climate change and therefore would be a significant impact, it could adopt a zero-emission threshold to identify projects that would need to reduce their emissions. A lead agency may determine that a zero-emission threshold is justified even if other experts may disagree. A lead agency is not prevented from adopting any significance threshold it sees as appropriate, as long as it is based on substantial evidence.

If the zero threshold option is chosen, all projects subject to CEQA would be required to quantify and mitigate their GHG emissions, regardless of the size of the project or the availability of GHG reduction measures available to reduce the project's emissions. Projects that could not meet the zero-emission threshold would be required to prepare environmental impact reports to disclose the unmitigable significant impact, and develop the justification for a statement of overriding consideration to be adopted by the lead agency.



Implementing CEQA With a Zero Threshold for GHG

The scientific community overwhelmingly agrees that the earth's climate is becoming warmer, and that human activity is playing a role in climate change. Unlike other environmental impacts, climate change is a global phenomenon in that all GHG emissions generated throughout the earth contribute to it. Consequently, both large and small GHG generators cause the impact. While it may be true that many GHG sources are individually too small to make any noticeable difference to climate change, it is also true that the countless small sources around the globe combine to produce a very substantial portion of total GHG emissions.

A zero threshold approach is based on a belief that, 1) all GHG emissions contribute to global climate change and could be considered significant, and 2) not controlling emissions from smaller sources would be neglecting a major portion of the GHG inventory.

CEQA explicitly gives lead agencies the authority to choose thresholds of significance. CEQA defers to lead agency discretion when choosing thresholds. Consequently, a zero-emission threshold has merits.

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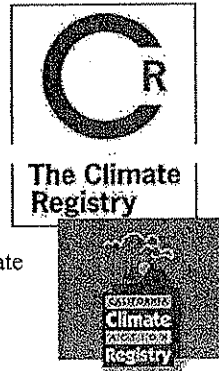
The CEQA review process for evaluating a project's impact on global climate change under the zero threshold option would involve several components. Air quality sections would be written by lead agencies to include discussions on climate change in CEQA documents, GHG emissions would be calculated, and a determination of significance would be made. The local air districts would review and comment on the climate change discussions in environmental documents. Lead agencies may then revise final EIRs to accommodate air district comments. More than likely, mitigation measures will be specified for the project, and a mitigation monitoring program will need to be put in place to ensure that these measures are being implemented.

Since CEQA requires mitigation to a less than significant level, it is conceivable that many projects subjected to a zero threshold could only be deemed less than significant with offsite reductions or the opportunity to purchase greenhouse gas emission reduction credits. GHG emission reduction credits are becoming more readily available however the quality of the credits varies considerably. High quality credits are generated by actions or projects that have clearly demonstrated emission reductions that are real, permanent, verifiable, enforceable, and not otherwise required by law or regulation. When the pre- or post-project emissions are not well quantified or cannot be independently confirmed, they are considered to be of lesser quality. Similarly, if the reductions are temporary in nature, they are also considered to be poor quality. Adoption of a zero threshold should consider the near-term availability and the quality of potential offsets.

There are also environmental justice concerns about the effects of using offsite mitigations or emission reduction credits to offset, or mitigate, the impacts of a new project. Although GHGs are global pollutants, some of them are emitted with pollutants that have significant near-source or regional impacts. Any time that increases in emissions at a specific site will be mitigated at a remote location or using emission reduction credits, the agency evaluating the project should ensure that it does not create disproportionate impacts.

Administrative Considerations

If electing to pursue a zero threshold, an air district or lead agency should consider the administrative costs and the environmental review system capacity. Some projects that previously would have qualified for an exemption could require further substantial analysis, including preparation of a Negative Declaration (ND), a Mitigated Negative Declaration (MND) or an EIR. Moreover, the trade-offs between the volume of projects requiring review and the quality of consideration given to reviews should be considered. It may also be useful to consider whether meaningful mitigation can be achieved from smaller projects.



Consideration of Exemptions from CEQA

A practical concern about identifying GHG emissions as a broad cumulative impact is whether the zero threshold option will preclude a lead agency from approving a large set of otherwise qualified projects utilizing a Categorical Exemption, ND, or MND. The results could be a substantial increase in the number of EIR's. This is a valid and challenging concern, particularly for any threshold approach that is based on a zero threshold for net GHG emission increases.

CEQA has specified exceptions to the use of a categorical exemption. Specifically, CEQA Guidelines §15300.2 includes the following exceptions:

"(b) Cumulative Impact. All exemptions for these classes are inapplicable when the cumulative impact of successive projects of the same type in the same place, over time is significant."

"(c) Significant Effect. A categorical exemption shall not be used for an activity where there is a reasonable possibility that the activity will have a significant effect on the environment due to unusual circumstances."

These CEQA Guidelines sections could be argued to mean that any net increase in GHG emissions would preclude the use of a categorical exemption. However, as described below, if the following can be shown, then the exceptions above could be argued not to apply:

- (1) Cumulative local, regional and/or state GHG emissions are being reduced or will be reduced by adopted, funded, and feasible measures in order to meet broader state targets.
- (2) Mandatory state or local GHG reduction measures would apply to the project's emissions such that broader GHG reduction goals would still be met and the project contributions would not be cumulatively considerable.
- (3) Project GHG emissions are below an adopted significance threshold designed to take into account the cumulative nature of GHG emissions.

A similar argument could be made relative to the use of a ND (provided no additional mitigation (beyond existing mandates) is required to control GHG emissions) and to the use of a MND instead of an EIR. However, due to the "fair argument" standard, which is discussed in Chapter 3, caution is recommended in use of a ND or MND unless all three elements above can be fully supported through substantial evidence and there is no substantial evidence to the contrary. Establishing a significance threshold of zero is likely to preclude the use of a categorical exemption.

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Relevant Citations

The full text of relevant citations is in Appendix A.

Public Resources Code – §21004, Mitigating or Avoiding a Significant Effect; Powers of Public Agency.

State CEQA Guidelines – §15064, Determining the Significance of the Environmental Effects Caused by a Project.

State CEQA Guidelines – §15130, Discussion of Cumulative Impacts.

State CEQA Guidelines – §15064.7, Thresholds of Significance.

Chapter 7: CEQA with Non-Zero GHG Thresholds Climate Change

Chapter 7
CEQA with
Non-Zero GHG
Thresholds

Introduction

A non-zero threshold could minimize the resources spent reviewing environmental analyses that do not result in real GHG reductions or to prevent the environmental review system from being overwhelmed. The practical advantages of considering non-zero thresholds for GHG significance determinations can fit into the concept regarding whether the project’s GHG emissions represent a “considerable contribution to the cumulative impact” and therefore warrant analysis.

Specifying a non-zero threshold could be construed as setting a *de minimis* value for a cumulative impact. In effect, this would be indicating that there are certain GHG emission sources that are so small that they would not contribute substantially to the global GHG budget. This could be interpreted as allowing public agencies to approve certain projects without requiring any mitigation of their GHG. Any threshold framework should include a proper context to address the *de minimis* issue. However, the CEQA Guidelines recognize that there may be a point where a project’s contribution, although above zero, would not be a *considerable contribution* to the cumulative impact and, therefore, not trigger the need for a significance determination.

GHG emissions from all sources are under the purview of CARB and as such may eventually be “regulated” no matter how small. Virtually all projects will result in some direct or indirect release of GHG. However, a decision by CARB to regulate a class of sources does not necessarily mean that an individual source in that class would constitute a project with significant GHG impacts under CEQA. For example, CARB has established criteria pollutant emission standards for automobiles, but the purchase and use of a single new car is not considered a project with significant impacts under CEQA. At the same time, it is important to note that it is likely that all meaningful sources of emissions, no matter how small are likely to be considered for regulation under AB 32. It is expected that projects will have to achieve some level of GHG reduction to comply with CARB’s regulations meant to implement AB 32. As such all projects will have to play a part in reducing our GHG emissions budget and no project, however small, is truly being considered *de minimis* under CARB’s regulations.

This chapter evaluates a range of conceptual approaches toward developing GHG significance criteria. The air districts retained the services of J&S an environmental consulting, firm to assist with the development of a Statute and Executive Order-based threshold (Approach 1) and a tiered threshold (Approach 2) based on a prescribed list of tasks and deliverables. Time and financial constraints limited the scope and depth of this analysis, however, the work presented here may be useful in developing interim guidance while AB 32 is being implemented. J&S recognized that approaches other than those described here could be used.

As directed, J&S explored some overarching issues, such as:

- what constitutes “new” emissions?

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- how should “baseline emissions” be established?
- what is cumulatively “considerable” under CEQA?
- what is “business as usual” ? and
- should an analysis include “life-cycle” emissions?

The answers to these issues were key to evaluating each of the threshold concepts.

Approach 1 – Statute and Executive Order Approach

Thresholds could be grounded in existing mandates and their associated GHG emission reduction targets. A project would be required to meet the targets, or reduce GHG emissions to the targets, to be considered less than significant.

AB 32 and S-3-05 target the reduction of statewide emissions. It should be made clear that AB 32 and S-3-05 do not specify that the emissions reductions should be achieved through uniform reduction by geographic location or by emission source characteristics. For example, it is conceivable, although unlikely, that AB 32 goals could be achieved by new regulations that only apply to urban areas or that only apply to the transportation and/or energy sector. However, this approach to evaluating GHG under CEQA is based on the presumption that a new project must at least be consistent with AB 32 GHG emission reduction mandates.

The goal of AB 32 and S-3-05 is the significant reduction of future GHG emissions in a state that is expected to rapidly grow in both population and economic output. As such, there will have to be a significant reduction in the per capita GHG output for these goals to be met. CEQA is generally used to slow or zero the impact of new emissions, leaving the reduction of existing emission sources to be addressed by other regulatory means. With these concepts in mind, four options were identified for statute/executive order-based GHG significance thresholds and are described below.

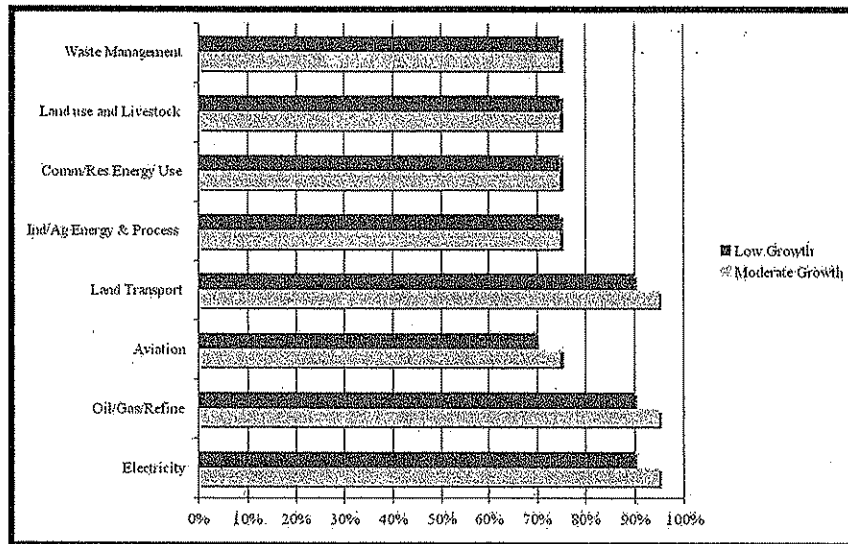
Threshold 1.1: AB 32/S-3-05 Derived Uniform Percentage-Based Reduction. AB 32 requires the state to reduce California-wide GHG emissions to 1990 levels by 2020. Reducing greenhouse gas emission levels from 2020 to 1990 levels could require a 28 to 33 percent reduction of business-as-usual GHG emissions depending on the methodology used to determine the future emission inventories. The exact percent reduction may change slightly once CARB finalizes its 1990 and 2020 inventory estimates. In this context, business-as-usual means the emissions that would have occurred in the absence of the mandated reductions. The details of the business-as-usual scenario are established by CARB in the assumptions it uses to project what the state’s GHG emissions would have been in 2020, and the difference between that level and the level that existed in 1990 constitutes the reductions that must be achieved if the mandated goals are to be met.



Chapter 7

CEQA with
Non-Zero GHG
Thresholds
 > Approach 1: Statute
and Executive Order
 > 1.1: AB32/S-3-05
Derived Uniform
Percentage-Based
Reduction

This threshold approach would require a project to meet a percent reduction target based on the average reductions needed from the business-as-usual emission from all GHG sources. Using the 2020 target, this approach would require all discretionary projects to achieve a 33 percent reduction from projected business-as-usual emissions in order to be considered less than significant. A more restrictive approach would use the 2050 targets. S-3-05 seeks to reduce GHG emissions to 80 percent below 1990 levels by 2050. To reach the 2050 milestone would require an estimated 90 percent reduction (effective immediately) of business-as-usual emissions. Using this goal as the basis for a significance threshold may be more appropriate to address the long-term adverse impacts associated with global climate change. Note that AB 32 and S-3-05 set emission inventory goals at milestone years; it is unclear how California will progress to these goals in non-milestone years.



SOURCE: ARB 2007

Threshold 1.2: Uniform Percentage-Based (e.g.50%) Reduction for New Development.
 This threshold is based on a presumption that new development should contribute a greater percent reduction from business-as-usual because greater reductions can be achieved at lower cost from new projects than can be achieved from existing sources. This approach would establish that new development emit 50 percent less GHG emissions than business-as-usual development. This reduction rate is greater than the recommended reduction rate for meeting the Threshold 1.1 2020 target (33 percent) but is significantly less restrictive than the Threshold 1.1 2050 target reduction rate (90 percent). If a 50 percent GHG reduction were achieved from new development, existing emissions would have to be reduced by 25 to 30 percent in order to meet the 2020 emissions goal depending on the year used to determine the baseline inventory. Although this reduction goal is reasonable for achieving the 2020 goal, it would not be possible to

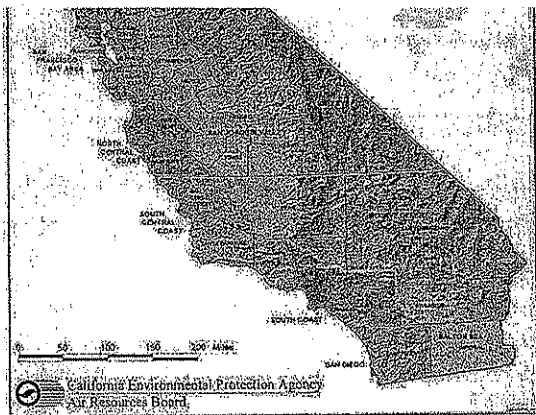
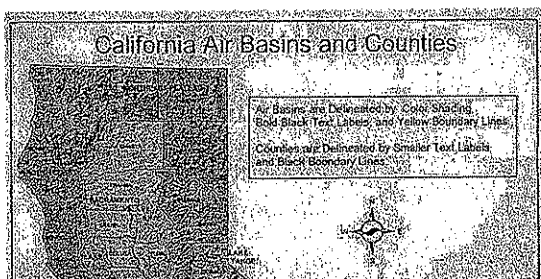
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reach the 2050 emissions target with this approach even if existing emissions were 100 percent controlled.

Threshold 1.3: Uniform Percentage-Based Reduction by Economic Sector. This threshold would use a discrete GHG reduction goal specific to the economic sector associated with the project. There would be specific reduction goals for each economic sector, such as residential, commercial, and industrial development. Specifying different reduction thresholds for each market sector allows selection of the best regulatory goal for each sector taking into account available control technology and costs. This approach would avoid over-regulating projects (i.e. requiring emissions to be controlled in excess of existing technology) or under-regulating projects (i.e. discouraging the use of available technology to control emissions in excess of regulations). This approach requires extensive information on the emission inventories and best available control technology for each economic sector. This data will be compiled as CARB develops its scoping plan under AB 32 and its implementing regulations; as a result, this approach will be more viable in the long term.

Threshold 1.4: Uniform Percentage-Based Reduction by Region. AB 32 and S-3-05 are written such that they apply to a geographic region (i.e. the entire state of California) rather than on a project or sector level. One could specify regions of the state such as the South Coast Air

Bay Area which are required to plan (plans could be developed by regional governments, such as councils of governments) and demonstrate compliance with AB 32 and S-3-05 reduction goals at a regional level. To demonstrate that a project has less than significant emissions, one would have to show compliance with the appropriate regional GHG plan. Effectively this approach allows for analysis of GHG emissions at a landscape scale smaller than the state as a whole. Specifying regions in rough correlation to existing air basins or jurisdictional control allows for regional control of emissions and integration with regional emission reduction strategies for criteria and toxic air pollutants. Although differing GHG reduction controls for each region are possible, it is likely that all regions would be

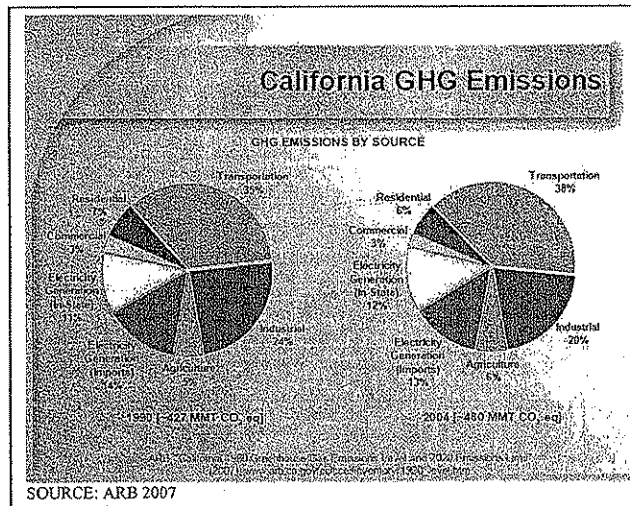


required to achieve 1990 emission inventories by the year 2020 and 80 percent less emissions by 2050. Threshold 1.4 is considered viable long-term significance criteria that is unlikely to be used in the short term.

Implementing CEQA Thresholds Based on Emission Reduction Targets

Characterizing Baseline and Project Emissions

While the population and economy of California is expanding, all new projects can be considered to contribute new emissions. Furthermore, GHG impacts are exclusively cumulative impacts; there are no non-cumulative GHG emission impacts from a climate change perspective. "Business-as-usual" is the projection of GHG emissions at a future date based on current technologies and regulatory requirements in absence of other reductions. For example to determine the future emissions from a power plant for "business-as-usual" one would multiply the projected energy throughput by the current emission factor for that throughput. If adopted regulations (such as those that may be promulgated by CARB for AB 32) dictate that power plant emissions must be reduced at some time in the future, it is appropriate to consider these regulation standards as the new business-as-usual for a future date. In effect, business-as-usual will continue to evolve as regulations manifest. Note that "business-as-usual" defines the CEQA No Project conditions, but does not necessarily form the baseline under CEQA. For instance, it is common to subtract the future traffic with and without a project to determine the future cumulative contribution of a project on traffic conditions. However, existing conditions at the time of issuance of the notice of preparation is normally the baseline.



While the population and economy of California is expanding, all new projects can be considered to contribute new emissions. Furthermore, GHG impacts are exclusively cumulative impacts; there are no non-cumulative GHG emission impacts from a climate change perspective. "Business-as-usual" is the projection of GHG emissions at a future date based on current technologies and regulatory requirements in absence of other reductions. For example to determine the future emissions from a power plant for "business-as-usual" one would multiply the projected energy throughput by the current emission factor for that throughput. If adopted regulations (such as those that may be promulgated by CARB for AB 32) dictate that power plant emissions must be reduced at some time in the future, it is appropriate to consider these regulation standards as the new business-as-usual for a future date. In effect, business-as-usual will continue to evolve as regulations manifest. Note that "business-as-usual" defines the CEQA No Project conditions, but does not necessarily form the baseline under CEQA. For instance, it is common to subtract the future traffic with and without a project to determine the future cumulative contribution of a project on traffic conditions. However, existing conditions at the time of issuance of the notice of preparation is normally the baseline.

Establishing Emission Reduction Targets

One of the obvious drawbacks to using a uniform percent reduction approach to GHG control is that it is difficult to allow for changes in the 1990 and future emission inventories estimates. To determine what emission reductions are required for new projects one would have to know accurately the 1990 budget and efficacy of other GHG promulgated regulations as a function of time. Since CARB will not outline its

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regulation strategy for several more years, it is difficult to determine accurately what the new project reductions should be in the short term. Future updates to the 1990 inventory could necessitate changes in thresholds that are based on that inventory. It is important to note that it is difficult to create near term guidance for a uniform reduction threshold strategy since it would require considerable speculation regarding the implementation and effectiveness of forthcoming CARB regulations.

Of greater importance are the assumptions used to make the projected 2020 emission inventories. Projecting future inventories over the next 15-50 years involves substantial uncertainty. Furthermore, there are likely to be federal climate change regulations and possibly additional international GHG emission treaties in the near future. To avoid such speculation, this paper defines all future emission inventories as hypothetical business-as-usual projections.

This white paper is intended to support local decisions about CEQA and GHG in the near term. During this period, it is unlikely that a threshold based on emission reduction targets would need to be changed. However, it is possible that future inventory updates will show that targets developed on the current inventory were not stringent enough, or were more stringent than was actually needed.

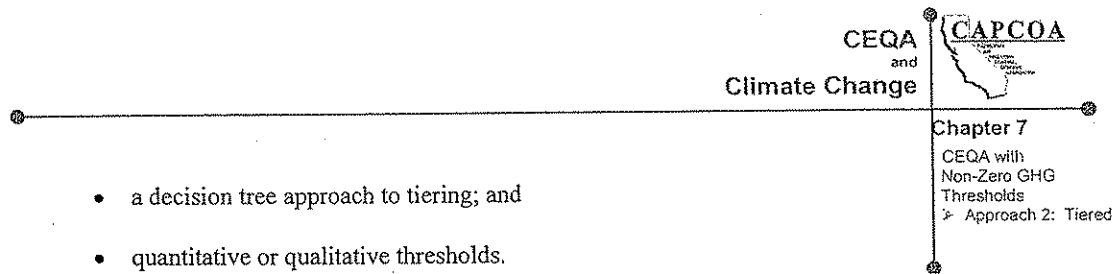
Approach 2 – Tiered Approach

The goal of a tiered threshold is to maximize reduction predictability while minimizing administrative burden and costs. This would be accomplished by prescribing feasible mitigation measures based on project size and type, and reserving the detailed review of an EIR for those projects of greater size and complexity. This approach may require inclusion in a General Plan, or adoption of specific rules or ordinances in order to fully and effectively implement it.

A tiered CEQA significance threshold could establish different levels at which to determine if a project would have a significant impact. The tiers could be established based on the gross GHG emission estimates for a project or could be based on the physical size and characteristics of the project. This approach would then prescribe a set of GHG mitigation strategies that would have to be incorporated into the project in order for the project to be considered less than significant.

The framework for a tiered threshold would include the following:

- disclosure of GHG emissions for all projects;
- support for city/county/regional GHG emissions reduction planning;
- creation and use of a “green list” to promote the construction of projects that have desirable GHG emission characteristics;
- a list of mitigation measures;



- a decision tree approach to tiering; and
- quantitative or qualitative thresholds.

Decision-Tree Approach to Tiering

CEQA guidance that allows multiple methodologies to demonstrate GHG significance will facilitate the determination of significance for a broad range of projects/plans that would otherwise be difficult to address with a single non-compound methodology. Even though there could be multiple ways that a project can determine GHG significance using a decision-tree approach, only one methodology need be included in any single CEQA document prepared by the applicant. The presence of multiple methodologies to determine significance is designed to promote flexibility rather than create additional analysis overhead. Figure 1 shows a conceptual approach to significance determination using a tiered approach that shows the multiple routes to significance determination.

Figure 1 Detail Description

Figure 1 pictorially represents how an agency can determine a project’s or plan’s significance for CEQA analysis using the non-zero threshold methodology. The emissions associated with a project/plan are assumed to have a significant impact unless one can arrive at a less-than-significant finding by at least one of the methodologies below.

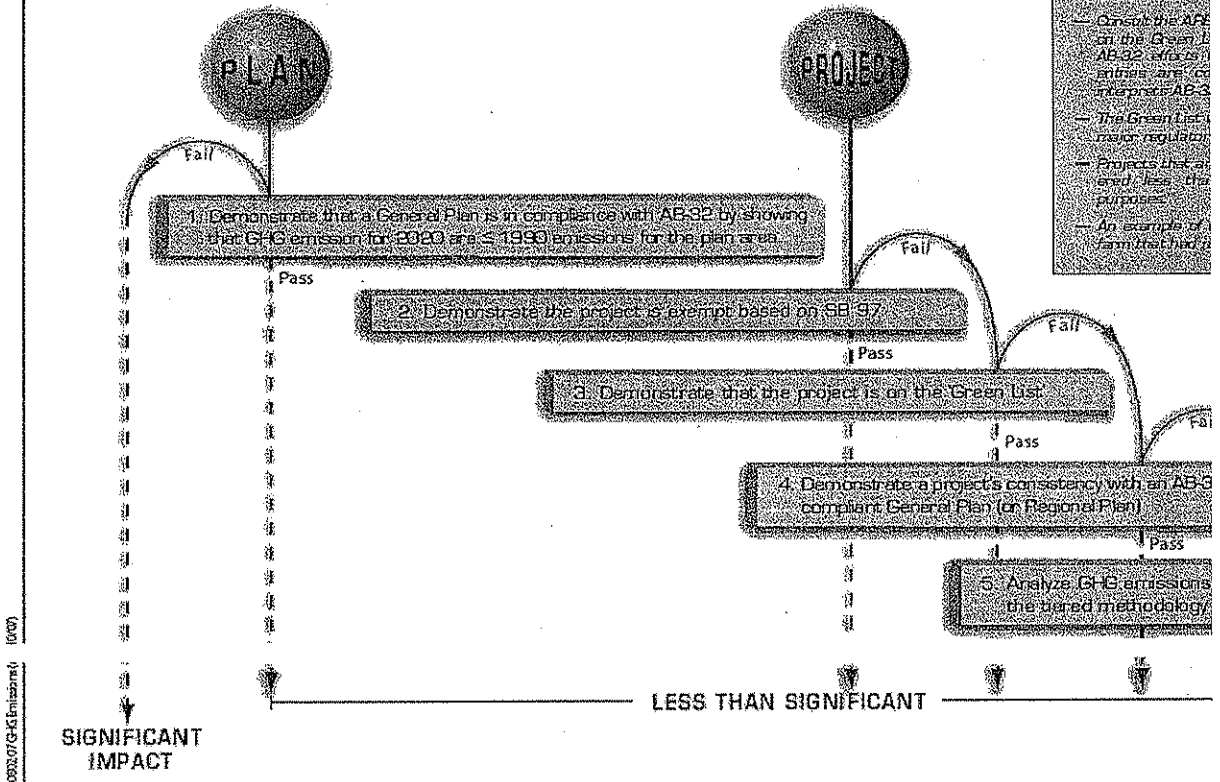
1. Demonstrate that a General Plan (GP) or Regional Plan is in Compliance with AB32
 - For most GPs or RPs this will require demonstration that projected 2020 emissions will be equal to or less than 1990 emissions.
 - GPs or RPs are expected to fully document 1990 and 2020 GHG emission inventories.
 - Projection of 2020 emissions is complicated by the fact that CARB is expected to promulgate emission reductions in the short term. Until explicit CARB regulations are in place, unmitigated GP 2020 emission inventories represent business-as-usual scenarios.
 - EIRs for GPs or RPs which demonstrate 2020 mitigated emissions are less than or equal to 1990 emissions are considered less than significant.
2. Demonstrate the Project is Exempt Based on SB 97
 - As specified in SB 97, projects that are funded under November 2006 Proposition 1B (Highway Safety, Traffic Reduction, Air Quality and Port Security Bond Act) and 1C (Disaster Preparedness and Flood Prevention Bond Act) may be exempt from analysis until January 1, 2010.

Climate Change Significance Criteria Flow Chart

- ☉ This chart pictorially represents how an agency can determine a project's or plan's significance for CEQA analysis.
- ☉ The emissions associated with a project/plan are assumed to have a significant impact unless one can arrive at a less-than-significant finding by at least one of the methodologies below.

The Green List

- Public land or open space that is used for agriculture
- Create the APE on the Green List AB-92 exists in the same or the same AB-92
- The Green List is not regulated
- Projects that are used less than purpose
- An example of farm that has...



- An exemption can be used in an ND, MND, or EIR to support a less than significant finding for GHG impacts.
3. Demonstrate that the Project is on the 'Green List'
- This list would include projects that are deemed a positive contribution to California efforts to reduce GHG emissions. If the project is of the type described on the Green List it is considered less than significant.
 - If the Green List entry description requires mitigation for impacts other than GHG, this methodology can be used in MNDs or EIRs; if the Green List entry does not require mitigation this methodology can be used in NDs, MNDs, or EIRs.
4. Demonstrate a Project's Compliance with a General Plan
- If a project is consistent with an appropriate General Plan's Greenhouse Gas Reduction Plan (GGRP), a project can be declared less than significant.
 - Note that at this time there are no known jurisdictions that have a GGRP that has been fully subject to CEQA review. While Marin County has adopted a forward-thinking GGRP and it is described in the most recent GP update, the associated EIR does not analyze the secondary environmental impacts of some of the GGRP measures such as tidal energy. While one can reference GGRPs that have not been reviewed fully in CEQA, to attempt to show a project's compliance with such a plan as evidence that the project's GHG emission contributions are less than significant may not be supported by substantial evidence that cumulative emissions are being fully addressed in the particular jurisdiction.
 - Compliance with a CEQA-vetted GGRP can be cited as evidence for all CEQA documents (Categorical Exemption, ND, MND, and EIR).
5. Analyze GHG Emissions and Mitigate using the Tiered Methodology
- Guidance and mitigation methodology for various development projects (residential, commercial, industrial) are listed in the form of tiered thresholds. If a project incorporates the mitigation measures specified in the tiered threshold tables the project is considered less than significant.
 - All project emissions are considered less than significant if they are less than the threshold(s).
 - If the tiered approach requires mitigation, this methodology can be used in MNDs or EIRs; if the tiered approach does not require mitigation this methodology can be used in NDs, MNDs, or EIRs.

The Green List

- The Green List would be a list of projects and project types that are deemed a positive contribution to California's efforts to reduce GHG emissions.
- If this approach is followed, it is suggested that CARB and the Attorney General (AG) are consulted prior to listing a project on the Green List to ensure consistency with CARB AB 32 efforts and to ensure that the Green List entries are consistent with how the AG office interprets AB 32 and GHG CEQA compliance.
- The Green List should be updated every 6 months or as major regulatory or legal developments unfold.
- Projects that are on the Green List are to be considered less than significant for GHG emissions purposes.
- A tentative list of potential Green List entries is presented below. Actual Green List entries should be far more specific and cover a broad range of project types and mitigation approaches. The list below is merely a proof-of-concept for the actual Green List.
 1. Wind farm for the generation of wind-powered electricity
 2. Extension of transit lines to currently developed but underserved communities
 3. Development of high-density infill projects with easily accessible mass transit
 4. Small hydroelectric power plants at existing facilities that generate 5 mw or less (as defined in Class 28 Categorical Exemption)
 5. Cogeneration plants with a capacity of 50 mw or less at existing facilities (as defined in Class 29 Cat Exemption)
 6. Increase in bus service or conversion to bus rapid transit service along an existing bus line
 7. Projects with LEED "Platinum" rating
 8. Expansion of recycling facilities within existing urban areas
 9. Recycled water projects that reduce energy consumption related to water supplies that services existing development
 10. Development of bicycle, pedestrian, or zero emission transportation infrastructure to serve existing regions

There are also several options for tiering and thresholds, as shown in Table 2 below. One could establish strictly numeric emissions thresholds and require mitigation to below the specific threshold to make a finding of less than significant. One could establish narrative emissions threshold that are based on a broader context of multiple approaches to GHG reductions and a presumption that projects of sufficiently low GHG intensity are less than significant.

In Concept 2A, a zero threshold would be applied to projects and thus only projects that result in a reduction of GHG emissions compared to baseline emissions would be less than significant absent mitigation. All projects would require quantified inventories. All projects that result in a net increase of GHG emissions would be required to mitigate their emissions to zero through direct mitigation or through fees or offsets or the impacts

Table 2: Approach 2 Tiering Options

	Concept 2A Zero	Concept 2B Quantitative	Concept 2C Qualitative
Tier 1	Project results in a net reduction of GHG emissions <i>Less than Significant</i>	Project in compliance with an AB 32-compliant General/Regional Plan, on the Green List, or below Tier 2 threshold. Level 1 Reductions (Could include such measures as: bike parking, transit stops for planned route, Energy Star roofs, Energy Star appliances, Title 24, water use efficiency, etc.) <i>Less than Significant</i>	Project in compliance with an AB 32-compliant General/Regional Plan, on the Green List, or below Tier 2 threshold. Level 1 Reductions (See measures under 2B) <i>Less than Significant</i>
Tier 2	Project results in net increase of GHG emissions Mitigation to zero (including offsets) <i>Mitigated to Less than Significant</i>	Above Tier 2 threshold Level 2 Mitigation (Could include such measures as: Parking reduction beyond code, solar roofs, LEED Silver or Gold Certification, exceed Title 24 by 20%, TDM measures, etc.) <i>Mitigated to Less than Significant</i>	Above Tier 2 threshold Level 2 Mitigation (See measures under 2B) <i>Mitigated to Less than Significant</i>
Tier 3	Mitigation infeasible to reduce emissions to zero (e.g., cost of offsets infeasible for project or offsets not available) <i>Significant and Unavoidable</i>	Above Tier 2 threshold With Level 1, 2 Mitigation Level 3 Mitigation: (Could include such measures as: On-site renewable energy systems, LEED Platinum certification, Exceed Title 24 by 40%, required recycled water use for irrigation, zero waste/high recycling requirements, mandatory transit passes, offsets/carbon impact fees) <i>Mitigated to Less than Significant</i>	Above Tier 3 thresholds Quantify Emissions, Level 3 Mitigation (see measures under 2B), and Offsets for 90% of remainder <i>Significance and Unavoidable</i>

would be identified as significant and unavoidable. This could be highly problematic and could eliminate the ability to use categorical exemptions and negative declarations for a wide range of projects.

In Concepts 2B and 2C, the first tier of a tiered threshold includes projects that are within a jurisdiction with an adopted greenhouse gas reduction plan (GGRP) and General Plan/Regional Plan that is consistent with AB 32 (and in line with S-3-05), or are on the Green List, or are below the Tier 2 threshold. All Tier 1 projects would be required to implement mandatory reductions required due to other legal authority (Level 1 reductions) such as AB 32, Title 24, or local policies and ordinances. With Level 1

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reduction measures, qualifying Tier 1 projects would be considered less than significant without being required to demonstrate mitigation to zero.

In Concept 2B, the Tier 2 threshold would be quantitative, and quantified inventories would be required. Several quantitative threshold options are discussed below. A more comprehensive set of Level 2 mitigation would be required. If the project's emissions still exceed the Tier 2 threshold, an even more aggressive set of Level 3 mitigation measures would be required including offsets (when feasible) to reduce emissions below the Tier 2 threshold.

In Concept 2C, there would be two thresholds, a lower Tier 2 threshold (the "low bar") and a higher Tier 3 threshold (the "high bar"). The Tier 2 threshold would be the significance threshold for the purposes of CEQA and would be qualitative in terms of units (number of dwelling units, square feet of commercial space, etc.) or a per capita ratio. Projects above the Tier 2 threshold would be required to implement the comprehensive set of Level 2 mitigation. Projects below the Tier 2 threshold would not be required to quantify emissions or reductions. The Tier 3 threshold would be a threshold to distinguish the larger set of projects for which quantification of emissions would be required. Level 3 mitigation would be required and the project would be required to purchase offsets (when feasible) in the amount of 90 percent of the net emissions after application of Level 1 reductions and Level 2 and 3 mitigation. A variant on Concept 2C would be to require mandatory Level 3 mitigation without quantification and offsets.

Approach 2 Threshold Options

to capture different levels of new development in the CEQA process and thus allow different levels of mitigation. Options range from a zero first-tier threshold (Threshold 2.1) up to a threshold for GHG that would be equivalent to the capture level (i.e., number of units) of the current criteria pollutant thresholds used by some air districts (Threshold 2.4). The decision-based implementation approach discussed above could be used for any of these options. Table 3 below compares the results of each of the approaches discussed here.

Threshold 2.1: Zero First Tier Tiered Threshold.

This option would employ the decision tree concept and set the first tier cut-point at zero. The second tier cut-point could be one of the qualitative or quantitative thresholds discussed below. First-tier projects would be required to implement a list of very feasible and readily available mitigation measures.

Threshold 2.2: Quantitative Threshold Based on Market Capture

A single quantitative threshold was developed in order to ensure capture of 90 percent or more of likely future discretionary developments. The objective was to set the emission

threshold low enough to capture a substantial fraction of future residential and non-residential development that will be constructed to accommodate future statewide population and job growth, while setting the emission threshold high enough to exclude small development projects that will contribute a relatively small fraction of the cumulative statewide GHG emissions.

The quantitative threshold was created by using the following steps:

- Reviewing data from four diverse cities (Los Angeles in southern California and Pleasanton, Dublin, and Livermore in northern California) on pending applications for development.
- Determining the unit (dwelling unit or square feet) threshold that would capture approximately 90 percent of the residential units or office space in the pending application lists.
- Based on the data from the four cities, the thresholds selected were 50 residential units and 30,000 square feet of commercial space.
- The GHG emissions associated with 50 single-family residential units and 30,000 square feet of office were estimated and were found to be 900 metric tons and 800 metric tons, respectively. Given the variance on individual projects, a single threshold of 900 metric tons was selected for residential and office projects.
- A 900 metric ton threshold was also selected for non-office commercial projects and industrial projects to provide equivalency for different projects in other economic sectors.
- If this threshold is preferred, it is suggested that a more robust data set be examined to increase the representativeness of the selected thresholds. At a minimum, a diverse set of at least 20 cities and/or counties from throughout the state should be examined in order to support the market capture goals of this threshold. Further, an investigation of market capture may need to be conducted for different commercial project types and for industrial projects in order to examine whether multiple quantitative emissions thresholds or different thresholds should be developed.

The 900-ton threshold corresponds to 50 residential units, which corresponds to the 84th percentile of projects in the City of Los Angeles, the 79th percentile in the City of Pleasanton, the 50th percentile in the City of Livermore and the 4th percentile in the City of Dublin. This is suggestive that the GHG reduction burden will fall on larger projects that will be a relatively small portion of overall projects within more developed central cities (Los Angeles) and suburban areas of slow growth (Pleasanton) but would be the higher portion of projects within moderately (Livermore) or more rapidly developing areas (Dublin). These conclusions are suggestive but not conclusive due to the small sample size. The proposed threshold would exclude the smallest proposed developments

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from potentially burdensome requirements to quantify and mitigate GHG emissions under CEQA. While this would exclude perhaps 10 percent of new residential development, the capture of 90 percent of new residential development would establish a strong basis for demonstrating that cumulative reductions are being achieved across the state. It can certainly serve as an interim measure and could be revised if subsequent regulatory action by CARB shows that a different level or different approach altogether is called for.

The 900-ton threshold would correspond to office projects of approximately 35,000 square feet, retail projects of approximately 11,000 square feet, or supermarket space of approximately 6,300 square feet. 35,000 square feet would correspond to the 46th percentile of commercial projects in the City of Los Angeles, the 54th percentile in the City of Livermore, and the 35th percentile in the City of Dublin. However, the commercial data was not separated into office, retail, supermarket or other types, and thus the amount of capture for different commercial project types is not known. The proposed threshold would exclude smaller offices, small retail (like auto-parts stores), and small supermarkets (like convenience stores) from potentially burdensome requirements to quantify and mitigate GHG emissions under CEQA but would include many medium-scale retail and supermarket projects.

The industrial sector is less amenable to a unit-based approach given the diversity of projects within this sector. One option would be to adopt a quantitative GHG emissions threshold (900 tons) for industrial projects equivalent to that for the residential/commercial thresholds described above. Industrial emissions can result from both stationary and mobile sources. CARB estimates that their suggested reporting threshold for stationary sources of 25,000 metric tons accounts for more than 90 percent (and likely more) of new industrial and manufacturing sources (see discussion). If the CARB rationale holds, then a 900 metric ton threshold would likely capture at least 90 percent (and likely more) of new industrial and manufacturing sources. If this approach is advanced, we suggest further examination of industrial project data to determine market capture.

This threshold would require the vast majority of new development emission sources to quantify their GHG emissions, apportion the forecast emissions to relevant source categories, and develop GHG mitigation measures to reduce their emissions.

Threshold 2.3: CARB Reporting Threshold

CARB has recently proposed to require mandatory reporting from cement plants, oil refineries, hydrogen plants, electric generating facilities and electric retail providers, cogeneration facilities, and stationary combustion sources emitting $\geq 25,000$ MT CO₂e/yr. AB 32 requires CARB to adopt a regulation to require the mandatory reporting and verification of emissions. CARB issued a preliminary draft version of its proposed reporting requirements in August 2007 and estimates that it would capture 94 percent of the GHG emissions associated with stationary sources.



This threshold would use 25,000 metric tons per year of GHG as the CEQA significance level. CARB proposed to use the 25,000 metric tons/year value as a reporting threshold, not as a CEQA significance threshold that would be used to define mitigation requirements. CARB is proposing the reporting threshold to begin to compile a statewide emission inventory, applicable only for a limited category of sources (large industrial facilities using fossil fuel combustion).

A 25,000 metric ton significance threshold would correspond to the GHG emissions of approximately 1,400 residential units, 1 million square feet of office space, 300,000 square feet of retail, and 175,000 square feet of supermarket space. This threshold would capture far less than half of new residential or commercial development.

As noted above, CARB estimates the industrial-based criteria would account for greater than 90 percent of GHG emissions emanating from stationary sources. However, industrial and manufacturing projects can also include substantial GHG emissions from mobile sources that are associated with the transportation of materials and delivery of products. When all transportation-related emissions are included, it is unknown what portion of new industrial or manufacturing projects a 25,000-ton threshold would actually capture.

An alternative would be to use a potential threshold of 10,000 metric tons considered by the Market Advisory Committee for inclusion in a Greenhouse Gas Cap and Trade System in California. A 10,000 metric ton significance threshold would correspond to the GHG emissions of approximately 550 residential units, 400,000 square feet of office space, 120,000 square feet of retail, and 70,000 square feet of supermarket space. This threshold would capture roughly half of new residential or commercial development.

Threshold 2.4: Regulated Emissions Inventory Capture

Most California air districts have developed CEQA significance thresholds for NOx and ROG emissions to try to reduce emissions of ozone precursors from proposed sources that are not subject to NSR pre-construction air quality permitting. The historical management of ozone nonattainment issues in urbanized air districts is somewhat analogous to today's concerns with greenhouse gas emissions in that regional ozone concentrations are a cumulative air quality problem caused by relatively small amounts of NOx and ROG emissions from thousands of individual sources, none of which emits enough by themselves to cause elevated ozone concentrations. Those same conditions apply to global climate change where the environmental problem is caused by emissions from a countless number of individual sources, none of which is large enough by itself to cause the problem. Because establishment of NOx/ROG emissions CEQA significance thresholds has been a well-tested mechanism to ensure that individual projects address cumulative impacts and to force individual projects to reduce emissions under CEQA, this threshold presumes the analogy of NOx/ROG emission thresholds could be used to develop similar GHG thresholds.

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The steps to develop a GHG emission threshold based on the NOx/ROG analogy were as follows:

- For each agency, define its NOx/ROG CEQA thresholds.
- For each agency, define the regional NOx/ROG emission inventory the agency is trying to regulate with its NOx/ROG thresholds.
- For each agency, calculate the percentage of the total emission inventory for NOx represented by that agency's CEQA emission threshold. That value represents the "minimum percentage of regulated inventory" for NOx.
- The current (2004) California-wide GHG emission inventory is 499 million metric tons per year of CO₂ equivalent (MMT CO₂e). Apply the typical "minimum percentage of regulated inventory" value to the statewide GHG inventory, to develop a range of analogous GHG CEQA thresholds.

The preceding methodology was applied to two different air quality districts: the Bay Area Air Quality Management District (BAAQMD), a mostly-urbanized agency within which most emissions are generated from urban areas; and the San Joaquin Valley Air Pollution Control District (SJVAPCD), which oversees emissions emanating in part from rural areas that are generated at dispersed agricultural sources and area sources. For example, in the Bay Area the NOx threshold is 15 tons/year. The total NOx inventory for 2006 was 192,000 tons/year (525 tons/day). The threshold represents 0.008 percent of the total NOx inventory. Applying that ratio to the total statewide GHG emissions inventory of 499 MMT CO₂e (2004) yields an equivalent GHG threshold of 39,000 MMT

The range of analogous CEQA GHG thresholds derived from those two agencies is tightly clustered, ranging from 39,000 to 46,000 tons/year. A 39,000 to 46,000 metric ton threshold would correspond to the GHG emissions of approximately 2,200 to 2,600 residential units, 1.5 to 1.8 million square feet of office space, 470,000 to 560,000 square feet of retail, and 275,000 to 320,000 square feet of supermarket space. This threshold would capture far less than half of new residential or commercial development. Similarly, this threshold would capture less of new industrial/manufacturing GHG emissions inventory than Thresholds 2.2 or 2.3.

Threshold 2.5: Unit-Based Thresholds Based on Market Capture

Unit thresholds were developed for residential and commercial developments in order to capture approximately 90 percent of future development. The objective was to set the unit thresholds low enough to capture a substantial fraction of future housing and commercial developments that will be constructed to accommodate future statewide population and job growth, while setting the unit thresholds high enough to exclude small development projects that will contribute a relatively small fraction of the cumulative statewide GHG emissions. Sector-based thresholds were created by using the same steps

and data used to create Threshold 2.2- Quantitative Threshold Based on Market Capture above.

The distribution of pending application data suggests that the GHG reduction burden will fall on larger projects that will be a relatively small portion of overall projects within more developed central cities and suburban areas of slow growth but would be the higher portion of projects within moderately or rapidly developing areas. The proposed threshold would exclude the smallest proposed developments from potentially burdensome requirements to quantify and mitigate GHG emissions under CEQA. While this would exclude perhaps 10 percent of new residential development, the capture of 90 percent of new residential development would establish a strong basis for demonstrating that cumulative reductions are being achieved across the state. It can certainly serve as an interim measure and could be revised if subsequent regulatory action by CARB shows that a different level or different approach altogether is called for.

A similar rationale can be applied to the development of a commercial threshold. Threshold 2.5 would exclude many smaller businesses from potentially burdensome requirements to quantify and mitigate GHG emissions under CEQA. It should be noted that the GHG emissions of commercial projects vary substantially. For example, the carbon dioxide emissions associated with different commercial types were estimated as follows:

- 30,000 square-foot (SF) office = 800 metric tons/year CO₂
- 30,000 SF retail = 2,500 metric tons/year CO₂
- 30,000 SF supermarket = 4,300 metric tons/year CO₂

Thus, in order to assure appropriate market capture on an emissions inventory basis, it will be important to examine commercial project size by type, instead of in the aggregate (which has been done in this paper).

The industrial sector is less amenable to a unit-based approach given the diversity of projects within this sector. One option would be to use a quantitative threshold of 900 tons for industrial projects in order to provide for rough equivalency between different sectors. Industrial emissions can result from both stationary and mobile sources. However, if the CARB rationale for > 90 percent stationary source capture with a threshold of 25,000 metric tons holds, then a 900 metric ton threshold would likely capture at least 90 percent (and likely more) of new industrial sources. Further examination of unit-based industrial thresholds, such as the number of employees or manufacturing floor space or facility size, may provide support for a unit-based threshold based on market capture.

This threshold would require the vast majority of new development emission sources to quantify their GHG emissions, apportion the forecast emissions to relevant source categories, and develop GHG mitigation measures to reduce their emissions.

Threshold 2.6. Projects of Statewide, Regional, or Areawide Significance

For this threshold, a set of qualitative, tiered CEQA thresholds would be adopted based on the definitions of “projects with statewide, regional or areawide significance” under the Guidelines for California Environmental Quality Act, CCR Title 14, Division 6, Section 15206(b).

Project sizes defined under this guideline include the following:

- Proposed residential development of more than 500 dwelling units.
- Proposed shopping center or business establishment employing more than 1,000 persons or encompassing more than 500,000 square feet of floor space.
- Proposed commercial office building employing more than 1,000 persons or encompassing more than 250,000 square feet of floor space.
- Proposed hotel/motel development of more than 500 rooms.
- Proposed industrial, manufacturing or processing plant or industrial park planned to house more than 1,000 persons, or encompassing more than 600,000 square feet of floor space.

These thresholds would correspond to the GHG emissions of approximately 9,000 metric tons for residential projects, 13,000 metric tons for office projects, and 41,000 metric tons development and substantially less than half of new commercial development. It is unknown what portion of the new industrial or manufacturing GHG inventory would be captured by this approach.

Threshold 2.7 Efficiency-Based Thresholds

For this approach, thresholds would be based on measurements of efficiency. For planning efforts, the metric could be GHG emissions per capita or per job or some combination thereof. For projects, the metric could be GHG emission per housing unit or per square foot of commercial space. In theory, one could also develop metrics for GHG emissions per dollar of gross product to measure the efficiency of the economy.

This approach is attractive because it seeks to benchmark project GHG intensity against target levels of efficiency. The thresholds would need to be set such that there is reasonably foreseeable and sufficient reductions compared to business as usual to support meeting AB 32 and S-3-05 goals in time (in combination with command and control regulations). Because this approach would require substantial data and modeling to fully develop, this is a concept considered as a potential future threshold and not appropriate

for interim guidance in the short term. Thus, it is not evaluated in the screening evaluation in the next section.

Table 3 compares the results for each of the approaches.

Table 3: Comparison of Approach 2 Tiered Threshold Options

Threshold	GHG Emission Threshold (metric tons/year)	Future Development Captured by GHG Threshold
2.1: Zero Threshold	0 tons/year	All
2.2: Quantitative Threshold Based on Market Capture	~900 tons/year	Residential development > 50 dwelling units Office space > 36,000 ft ² Retail space >11,000 ft ² Supermarkets >6,300 ft ² small, medium, large industrial
2.3: CARB GHG Mandatory Reporting Threshold OR Potential Cap and Trade Entry Level	25,000 metric tons/year OR 10,000 metric tons/year	Residential development >1,400 dwelling units OR 550 dwelling units Office space >1 million ft ² OR 400,000 ft ² Retail space >300,000 ft ² OR 120,000 ft ² Supermarkets >175,000 ft ² OR 70,000 ft ² medium/larger industrial
2.4: Regulated Inventory Capture	40,000 – 50,000 metric tons/year	Residential development >2,200 to 2,600 dwelling units Office space >1.5 to 1.8 million ft ² Retail space >470,000 to 560,000 ft ² Supermarkets >270,000 to 320,000 ft ² medium/larger industrial
2.5: Unit-Based Threshold Based on Market Capture	Not applicable.	Residential development >50 dwelling units Commercial space >50,000 ft ² > small, medium, large industrial (with GHG emissions > 900 tonsCO ₂ e)
2.6: Projects of Statewide, Regional, or Areawide Significance	Not applicable.	Residential development >500 dwelling units Office space >250,000 ft ² Retail space >500,000 ft ² Hotels >500 units Industrial project >1,000 employees Industrial project >40 acre or 650,000 ft ²
2.7: Efficiency-Based Thresholds	TBD tons/year/person TBD tons/year/unit	Depends on the efficiency measure selected.

Implementing CEQA With Tiered Thresholds

Several issues related to Approach 2 are addressed below:

1. *Some applications of this approach may need to be embodied in a duly approved General Plan, or in some other formal regulation or ordinance to be fully enforceable.* Because CEQA does not expressly provide that projects may be deemed insignificant based on implementation of a set of mitigations, this approach may need to be supported with specific and enforceable mechanisms adopted with due public process.
2. *How would this concept affect adoption of air district rules and regulations?* Proposed air district rules and regulations may be subject to CEQA like other projects and plans. Thus, if significance thresholds were adopted by an APCD or AQMD, then they could also apply to air district discretionary actions. If GHG emissions would be increased by a rule or regulation for another regulated pollutant, that would be a potential issue for review under CEQA.
3. *Mitigation measures may not be all-inclusive; better measures now or new future technology would make these measures obsolete.* The mandatory mitigation measures could be periodically updated to reflect current technology, feasibility, and efficiency.
4. *Total reduction may not be quantified or difficult to quantify.* CEQA only requires the adoption of feasible mitigation and thus the reduction effectiveness of required mitigation should not be in question. However, the precise reduction effectiveness may indeed be difficult to identify. As described above, if a quantitative threshold is selected as the measure of how much mitigation is mandated, then best available evidence will need to be used to estimate resultant GHG emissions with mitigation adoption. If a qualitative threshold is selected, then it may not be necessary to quantify reductions.
5. *Difficult to measure progress toward legislative program goals.* One could require reporting of project inventories to the Climate Action Registry, air district, or regional council of governments, or other suitable body. Collection of such data would allow estimates of the GHG intensity of new development over time, which could be used by CARB to monitor progress toward AB 32 goals.
6. *Measures may have adverse impacts on other programs.* The identification of mandatory mitigation will need to consider secondary environmental impacts, including those to air quality.
7. *Consideration of life-cycle emissions.* In many cases, only direct and indirect emissions may be addressed, rather than life-cycle emissions. A project applicant has traditionally been expected to only address emissions that are closely related and within the capacity of the project to control and/or influence. The long chain

8. of economic production resulting in materials manufacture, for example, involves numerous parties, each of which in turn is responsible for the GHG emissions associated with their particular activity. However, there are situations where a lead agency could reasonably determine that a larger set of upstream and downstream emissions should be considered because they are being caused by the project and feasible alternatives and mitigation measures may exist to lessen this impact.

Approach 2 Tiered Threshold with Mandatory Mitigation

As shown in Table 2, due to the cumulative nature of GHG emissions and climate change impacts, there could be a level of mandatory reductions and/or mitigation for all projects integrated into a tiered threshold approach. In order to meet AB 32 mandates by 2020 and S-3-05 goals, there will need to be adoption of GHG reduction measures across a large portion of the existing economy and new development. As such, in an effort to support a determination under CEQA that a project has a less than considerable contribution to significant cumulative GHG emissions, mitigation could be required on a progressively more comprehensive basis depending on the level of emissions.

- Level 1 Reductions – These reduction measures would apply to all projects and would only consist of AB 32 and other local/state mandates. They would be applied to a project from other legal authority (not CEQA). Level 1 reductions could include such measures as bike parking, transit stops for planned routes, Energy Star roofs, Energy Star appliances, Title 24 compliance, water use efficiency, and other measures. All measures would have to be mandated by CARB or local regulations and ordinances.
- Level 2 Mitigation – Projects that exceed the determined threshold would be required to first implement readily available technologies and methodologies with widespread availability. Level 2 Mitigation could include such measures as: parking reduction below code minimum levels, solar roofs, LEED Silver or Gold Certification, exceed Title 24 building standards by 20 percent, Traffic Demand Management (TDM) measures, and other requirements.
- Level 3 Mitigation - If necessary to reduce emissions to the thresholds, more extensive mitigation measures that represent the top tier of feasible efficiency design would also be required. Level 3 Mitigation could include such measures as: on-site renewable energy systems, LEED Platinum certification, exceed Title 24 building requirements by 40 percent, required recycled water use for irrigation, zero waste/high recycling requirements, mandatory transit pass provision, and other measures.
- Offset Mitigation – If, after adoption of all feasible on-site mitigation, the project is still found to exceed a Tier 2 quantitative threshold, or exceed a Tier 3 qualitative threshold, or if a project cannot feasibly implement the mandatory on-site mitigation, then purchases of offsets could be used for mitigation. In the case

of a quantitative threshold, the amount of purchase would be to offset below the Tier 2 significance threshold. In the case of a qualitative threshold, the amount of purchase could be to offset GHG emissions overall to below the lowest equivalent GHG emissions among the Tier 2 qualitative thresholds. With Threshold 2.5, this would be approximately 900 tons of GHG emissions (corresponding to 50 residential units). With Threshold 2.6, this would be approximately 9,000 tons (corresponding to 500 residential units). Alternatively, one could require purchase of offsets in the amount of a set percentage (such as 90% or 50% for example) of the residual GHG emissions (after other mitigation). As discussed earlier, any decision to include or require the use of emission reduction credits (or offsets) must consider issues of availability, quality, and environmental justice.

Substantial Evidence Supporting Different Thresholds

If a project can be shown by substantial evidence not to increase GHG emissions relative to baseline emissions, then no fair argument will be available that the project contributes considerably to a significant cumulative climate change impact.

It is more challenging to show that a project that increases GHG emissions above baseline emissions does not contribute considerably to a significant cumulative climate change impact. It is critical therefore, to establish an appropriate cumulative context, in which, although an individual project may increase GHG emissions, broader efforts will result in net GHG reductions.

Approach 1-based thresholds that by default will require an equal level of GHG supportable in the short run (especially before 2012) than Approach 1.2 (which requires new development to be relatively more efficient than a retrofitted existing economy). This is because, prior to 2012, there will only be limited mandatory regulations implementing AB 32 that could address the existing economy in a truly systematic way that can be relied upon to demonstrate that overall GHG reduction goals can be achieved by 2020. Approach 1.2 will still rely on substantial reductions in the existing economy but to a lesser degree.

Approach 1-based thresholds that would spread the mitigation burden across a sector (Threshold 1.3) or across a region (Threshold 1.4) will allow for tradeoffs between projects or even between municipalities. In order to demonstrate that a sector or a region is achieving net reductions overall, there would need to be feasible, funded, and mandatory requirements in place promoting an overall reduction scheme, in order for a project to result in nominal net increased GHG emissions.

Approach 2-based thresholds that capture larger portions of the new development GHG inventory (Thresholds 2.2 and 2.5) would promote growth that results in a smaller increase in GHG emissions; they may therefore be more supportable than thresholds that do not and that have a greater reliance on reductions in the existing economy (Thresholds

2.3, 2.4, and 2.6), especially in the next three to five years. With an established cumulative context that demonstrates overall net reductions, all threshold approaches could be effective in ensuring growth and development that significantly mitigates GHG emissions growth in a manner that will allow the CARB to achieve the emission reductions necessary to meet AB 32 targets. In that respect, all of these thresholds are supported by substantial evidence.

Evaluation of Non-Zero Threshold Options

Overarching issues concerning threshold development are reviewed below. Where appropriate, different features or application of the two conceptual approaches and the various options for thresholds under each conceptual approach described above are analyzed. The screening evaluation is summarized in Tables 4 (Approach 1) and 5 (Approach 2). The summary tables rate each threshold for the issues discussed below based on the level of confidence (low, medium or high) ascribed by J&S. The confidence levels relate to whether a threshold could achieve a particular attribute, such as emission reduction effectiveness. For example, a low emission reduction effectiveness rating means the threshold is not expected to capture a relatively large portion of the new development inventory.

As described above, Threshold 2.7 is not included in this evaluation because the data to develop an efficiency-based threshold has not been reviewed at this time and because this threshold is not considered feasible as an interim approach until more detailed inventory information is available across the California economy.

What is the GHG Emissions Effectiveness of Different Thresholds?

Effectiveness was evaluated in terms of whether a threshold would capture a large portion of the GHG emissions inventory and thus require mitigation under CEQA to control such emissions within the larger framework of AB 32. In addition, effectiveness was also evaluated in terms of whether a threshold would require relatively more or less GHG emissions reductions from the existing economy versus new development. This is presumptive that gains from the existing economy (through retrofits, etc.) will be more difficult and inefficient relative to requirements for new development.

Approach 1-based thresholds that require equivalent reductions relative to business-as-usual (Thresholds 1.1, 1.3, and 1.4) for both the existing and new economy will be less effective than thresholds that support lower-GHG intensity new development (Approach 1.2). However, since Approach 1-based thresholds do not establish a quantitative threshold below which projects do not have to mitigate, the market capture for new development is complete.

Approach 2-based thresholds can be more or less effective at capturing substantial portions of the GHG inventory associated with new development depending on where the quantitative or qualitative thresholds are set. Lower thresholds will capture a broader range of projects and result in greater mitigation. Based on the review of project data for

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the select municipalities described in the Approach 2 section above, thresholds based on the CARB Reporting Threshold/Cap and Trade Entry Level (Threshold 2.4) or CEQA definitions of “Statewide, Regional or Areawide” projects (Threshold 2.6) will result in a limited capture of the GHG inventory. Lower quantitative or qualitative thresholds (Thresholds 2.1, 2.2 and 2.5) could result in capture of greater than 90 percent of new development.

Are the Different Thresholds Consistent with AB 32 and S-3-05?

Thresholds that require reductions compared to business-as-usual for all projects or for a large portion of new development would be consistent with regulatory mandates. In time, the required reductions will need to be adjusted from 2020 (AB 32) to 2050 (S-3-05) horizons, but conceptually broad identification of significance for projects would be consistent with both of these mandates. Thresholds that exclude a substantial portion of new development would likely not be consistent, unless it could be shown that other more effective means of GHG reductions have already been, or will be adopted, within a defined timeframe.

All Approach 1-based thresholds would be consistent with AB 32 and S-3-05 if it can be demonstrated that other regulations and programs are effective in achieving the necessary GHG reduction from the existing economy to meet the overall state goals.

Approach 2-based thresholds that include substantive parts of the new development GHG inventory (Thresholds 2.1, 2.2 and 2.5) will be more consistent with AB 32 and S-3-05 than those that do not (Thresholds 2.3, 2.4, and 2.6) unless it can be demonstrated that other regulations and programs are effective in achieving the necessary GHG reduction from the existing economy to meet the overall state goals.

What are the Uncertainties Associated with Different Thresholds?

All thresholds have medium to high uncertainties associated with them due to the uncertainty associated with the effectiveness of AB 32 implementation overall, the new character of GHG reduction strategies on a project basis, the immaturity of GHG reduction technologies or infrastructure (such as widespread biodiesel availability), and the uncertainty of GHG reduction effectiveness of certain technologies (such as scientific debate concerning the relative lifecycle GHG emissions of certain biofuels, for example).

In general, Approach 1-based thresholds have higher uncertainties than Approach 2 thresholds because they rely on a constantly changing definition of business-as-usual. Threshold 1.2, with its relatively smaller reliance on the existing economy for GHG reductions has relatively less uncertainty than other Approach 1 thresholds. Thresholds that spread mitigation more broadly (Thresholds 1.3 and 1.4) have less uncertainty by avoiding the need for every project to mitigate equally.

Approach 2 thresholds with lower quantitative (2.1 and 2.2) or qualitative (2.5) thresholds will have uncertainties associated with the ability to achieve GHG reductions



from small to medium projects. Approach 2 thresholds with higher quantitative (2.3, 2.4) or qualitative (2.6) thresholds will have uncertainties associated with the ability to achieve relatively larger GHG reductions from the existing economy.

What are Other Advantages/Disadvantages of the Different Thresholds?

Thresholds with a single project metric (Thresholds 1.1, 1.2, 2.1, 2.2, 2.3, 2.4, 2.5, and 2.6) will be easier to apply to individual projects and more easily understood by project applicants and lead agencies broadly. Thresholds that spread mitigation across sectors (1.3) or regions (1.4), while simple in concept, will require adoption of more complicated cross-jurisdictional reduction plans or evaluation of broad sector-based trends in GHG intensity reduction over time. Approach 1 options would require all projects to quantify emissions in order to determine needed reductions relative to business-as-usual (which will change over time as described above). Concepts that are unit-based (Threshold 2.5 and 2.6) will not result in thresholds that have equal amount of GHG emissions, and thus equity issues may arise.

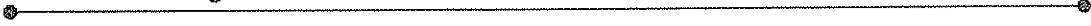
Table 4: Non-Zero Threshold Evaluation Matrix – Approach 1

Approach 1	1.1	1.2	1.3	1.4
	28% - 33% Reduction from BAU by 2020 by Project	50% Reduction from BAU by 2020 by Project	28% - 33% Reduction by 2020 by Sector	28% Reduction by Sector
<i>GHG Emissions Reduction Effectiveness</i>	Low - Captures all new projects but relies on a high level of reductions from the existing economy.	Medium - Captures all new projects and has a more realistic level of reductions from the existing economy.	Low - Captures all new projects but relies on a high level of reductions from the existing economy.	Low - Captures all new projects but relies on a high level of reductions from the existing economy.
<i>Economic Feasibility</i>	Low - Some projects will not be able to afford this level of reduction without effective market-based mechanisms like offsets.	Low - Some projects will not be able to afford this level of reduction without effective market-based mechanisms like offsets.	Medium - Sectors as a whole will be better able to achieve reductions than individual projects.	Low - Some projects will not be able to afford this level of reduction without effective market-based mechanisms like offsets.
<i>Technical Feasibility</i>	Medium - Some projects will not be able to achieve this level of reduction without effective market-based mechanisms like offsets	Low - Relatively larger set of projects will not be able to achieve this level of reduction without effective market-based mechanisms like offsets	High - Some projects will not be able to achieve this level of reduction without effective market-based mechanisms like offsets	Medium - Some projects will not be able to achieve this level of reduction without effective market-based mechanisms like offsets
<i>Logistical Feasibility</i>	Low - Absent broader reductions strategies, each project may reinvent the wheel each time to achieve mandated reductions.	Low - Absent broader reductions strategies, each project may reinvent the wheel each time to achieve mandated reductions.	Low - Absent broader reductions strategies, each project may reinvent the wheel each time to achieve mandated reductions.	Low - Absent broader reductions strategies, each project may reinvent the wheel each time to achieve mandated reductions.
<i>Consistency with AB-32 and S-03-05</i>	Medium - Would require heavy reliance on command and control gains.	High	Medium-High - Would rely on command and control gains, but would allow sectoral flexibility.	Medium - Would require heavy reliance on command and control gains.
<i>Cost Effectiveness</i>	Low - Will require all types of projects to reduce the same regardless of the cost/ton of GHG reductions.	Low - Will require all types of projects to reduce the same regardless of the cost/ton of GHG reductions.	Low/Medium - Allows tradeoffs within sector between high and low cost reduction possibilities but not between sectors.	Low - Will require all types of projects to reduce the same regardless of the cost/ton of GHG reductions.
<i>Uncertainties</i>	High - BAU changes over time. Ability to reduce GHG emissions from existing economy will take years to demonstrate. Ability to limit GHG emissions from other new development will take years to demonstrate.	Medium/High - BAU changes over time. Ability to limit GHG emissions from other new development will take years to demonstrate.	High - BAU changes over time. Ability to reduce GHG emissions from existing economy will take years to demonstrate. Ability to limit GHG emissions from other new development will take years to demonstrate.	High - BAU changes over time. Ability to reduce GHG emissions from existing economy will take years to demonstrate. Ability to limit GHG emissions from other new development will take years to demonstrate.
<i>Other Advantages</i>	Simple/easy to explain.	Simple/easy to explain.	Spreads mitigation broadly	Simple/easy to explain.
<i>Other Disadvantages</i>	Requires all projects to quantify emissions.	Requires all projects to quantify emissions.	Requires all projects to quantify emissions.	Requires all projects to quantify emissions.

Table 5: Non-Zero Threshold Evaluation Matrix – Approach 2

Approach 2	2.1	2.2	2.3	2.4	2.5
	Zero Threshold	Quantitative (900 tons)	Quantitative CARB Reporting Threshold/Cap and Trade (25,000 tons/ 10,000 tons)	Quantitative Regulated Inventory Capture (~40,000 - 50,000 tons)	Qualitative Unit-Based Threshold
<i>GHG Emissions Reduction Effectiveness</i>	High - Captures all sources.	High - Market capture at >90%. Captures diverse sources.	Medium - Moderate market capture.	Low - Low market capture.	High - Market capture ~90%. Captures diverse sources; excl. small.
<i>Economic Feasibility</i>	Low - Early phases will be substantial change in BAU, esp. for smaller projects; may be infeasible to mitigate.	Medium - Early phases will be substantial change in BAU, esp. for smaller projects; may be infeasible to mitigate.	High - Large projects have greater ability to absorb cost.	High - Large projects have greater ability to absorb cost.	Medium - Early phases will be substantial change in BAU, esp. for smaller projects; may be infeasible to mitigate.
<i>Technical Feasibility</i>	Low - Early phases will be substantial change in BAU, esp. for smaller projects; may be infeasible to mitigate.	Medium - Early phases will be substantial change in BAU, esp. for smaller projects; may be inefficient to mitigate.	High - Greater opportunities for multiple reduction approaches.	High - Greater opportunities for multiple reduction approaches.	Medium - Early phases will be substantial change in BAU, particularly for smaller projects; may be inefficient to mitigate.
<i>Logistical Feasibility</i>	Low - Unless fee or offset basis, very difficult to mitigate all projects.	Medium - BMPs broadly written to allow diversity; new req. will take time to integrate into new dev.	High - Less mitigation.	High - Less mitigation.	Medium - BMPs broadly written to allow diversity; new req. will take time to integrate into new dev.
<i>Consistency with AB-32 and S-03-05</i>	High - Market capture.	High - Market capture at >90%.	Low - Would rely on command and control success heavily.	Low - Would rely on command and control success heavily.	Medium - Need to demonstrate adequate market capture over time.
<i>Cost Effectiveness</i>	Low - Will result in inefficient mitigation approaches. Efficiency will improve in time.	Medium - Emphasis is on new dev., req. for mitigation will result in inefficient mitigation approaches in early phases. Efficiency will improve in time.	Medium - Relies on command and control reductions for existing economy more heavily. With focus on larger projects, eff. of mitigation for new dev. high.	Medium - Relies on command and control reductions for existing economy more heavily. With focus on larger projects, eff. of mitigation for new dev. high.	Medium - Emphasis on new dev.; req. for mitigation will result in inefficient mitigation approaches in early phases. Efficiency will improve in time.
<i>Uncertainties</i>	High - Time to adapt for res. and comm. sectors. Ability to mitigate without market-based mechanism for smaller projects unlikely.	Medium/High - Time to adapt for res. and comm. sectors. Ability to mitigate without market-based mechanism for smaller projects uncertain.	High - Gains from command and control likely longer to be realized.	High - Gains from command and control likely longer to be realized.	Medium/High - Time to adapt for res. and comm. sectors. Ability to mitigate without market-based mechanism for smaller projects uncertain.
<i>Other Advantages</i>	Single threshold.	Single threshold. BMPs can be updated. Greenlist can be updated.	Single threshold. Does not change CEQA processing for most projects. CARB inventory = project inv.. All projects treated same.	Single threshold. Does not change CEQA processing for most projects. Follows established SIP practice.	BMPs can be updated. Greenlist can be updated. Unit-Based threshold can be updated.
<i>Other Disadvantages</i>	Requires all projects to quantify emissions.	Requires nearly all projects to quantify emissions.			Sectoral projects have different GHG emissions. Largest projects to quantify emissions.

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Introduction

This chapter evaluates the availability of various analytical methods and modeling tools that can be applied to estimate the greenhouse gas emissions from different project types subject to CEQA. This chapter will also provide comments on the suitability of the methods and tools to accurately characterize a projects emissions and offer recommendations for the most favorable methodologies and tools available. Some sample projects will be run through the methodologies and modeling tools to demonstrate what a typical GHG analysis might look like for a lead agency to meet its CEQA obligations. The air districts retained the services of EDAW environmental consultants to assist with this effort.

Methodologies/Modeling Tools

There are wide varieties of discretionary projects that fall under the purview of CEQA. Projects can range from simple residential developments to complex expansions of petroleum refineries to land use or transportation planning documents. It is more probably than not, that a number of different methodologies would be required by any one project to estimate its direct and indirect GHG emissions. Table 10 contains a summary of numerous modeling tools that can be used to estimate GHG emissions associated with various emission sources for numerous types of project's subject to CEQA. The table also contains information about the models availability for public use, applicability, scope, data requirements and its advantages and disadvantages for estimating GHG emissions.

In general, there is currently not one model that is capable of estimating all of a project's direct and indirect GHG emissions. However, one of the models identified in Table 9 would probably be the most consistently used model to estimate a projects direct GHG emissions based on the majority of projects reviewed in the CEQA process. The Urban Emissions Model (URBEMIS) is designed to model emissions associated with development of urban land uses. URBEMIS attempts to summarize criteria air pollutants and CO₂ emissions that would occur during construction and operation of new development. URBEMIS is publicly available and already widely used by CEQA practitioners and air districts to evaluate criteria air pollutants emissions against air district-adopted significance thresholds. URBEMIS is developed and approved for statewide use by CARB. The administrative reasons for using URBEMIS are less important than the fact that this model would ensure consistency statewide in how CO₂ emissions are modeled and reported from various project types.

One of the shortfalls of URBEMIS is that the model does not contain emission factors for GHGs other than CO₂, except for methane (CH₄) from mobile-sources, which is converted to CO₂e. This may not be a major problem since CO₂ is the most important GHG from land development projects. Although the other GHGs have a higher global warming potential, a metric used to normalize other GHGs to CO₂e, they are emitted in far fewer quantities. URBEMIS does not calculate other GHG emissions associated with

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off-site waste disposal, wastewater treatment, emissions associated with goods and services consumed by the residents and workers supported by a project. Nor does URBEMIS calculate GHGs associated with consumption of energy produced off-site. (For that matter, URBEMIS does not report criteria air pollutant emissions from these sources either).

Importantly, URBEMIS does not fully account for interaction between land uses in its estimation of mobile source operational emissions. Vehicle trip rates are defaults derived from the Institute of Transportation Engineers trip generation manuals. The trip rates are widely used and are generally considered worst-case or conservative. URBEMIS does not reflect “internalization” of trips between land uses, or in other words, the concept that a residential trip and a commercial trip are quite possibly the same trip, and, thus, URBEMIS counts the trips separately. There are some internal correction settings that the modeler can select in URBEMIS to correct for “double counting”; however, a project-specific “double-counting correction” is often not available. URBEMIS does allow the user to overwrite the default trip rates and characteristics with more project-specific data from a traffic study prepared for a project.

Residential, Commercial, Mixed-Use Type Projects/ Specific Plans

Direct Emissions

URBEMIS can be used to conduct a project-specific model run and obtain CO₂e emissions for area and mobile sources from the project, and convert to metric tons CO₂e. When a project-specific traffic study is not available, the user should consult with their local air district for guidance. Many air district staff are experienced practitioners of

URBEMIS default input parameters to conduct a project-specific model run. When a traffic study has been prepared for the project, the user must overwrite default trip length and trip rates in URBEMIS to match the total number of trips and vehicle miles traveled (VMT) contained in the traffic study to successfully conduct a project-specific model run. URBEMIS is recommended as a calculation tool to combine the transportation study (if available) and EMFAC emission factors for mobile-sources. Use of a project-specific traffic study gets around the main shortfall of URBEMIS: the lack of trip internalization. URBEMIS also provides the added feature of quantifying direct area-source GHG emissions.

Important steps for running URBEMIS

1. Without a traffic study prepared for the project, the user should consult with the local air district for direction on which default options should be used in the modeling exercise. Some air districts have recommendations in the CEQA guidelines.
2. If a traffic study was prepared specifically for the project, the following information must be provided:

- a. Total number of average daily vehicle trips or trip-generation rates by land use type per number of units; and,
 - b. Average VMT per residential and nonresidential trip.
 - c. The user overwrites the “Trip Rate (per day)” fields for each land use in URBEMIS such that the resultant “Total Trips” and the “Total VMT” match the number of total trips and total VMT contained in the traffic study.
 - d. Overwrite “Trip Length” fields for residential and nonresidential trips in URBEMIS with the project-specific lengths obtained from the traffic study.
3. Calculate results and obtain the CO₂ emissions from the URBEMIS output file (units of tons per year [TPY]).

Indirect Emissions

URBEMIS does estimate indirect emissions from landscape maintenance equipment, hot water heaters, etc. URBEMIS does not however, provide modeled emissions from indirect sources of emissions, such as those emissions that would occur off-site at utility providers associated with the project’s energy demands. The California Climate Action Registry (CCAR) Protocol v.2.2 includes methodology, which could be used to quantify and disclose a project’s increase in indirect GHG emissions from energy use. Some assumptions must be made for electrical demand per household or per square foot of commercial space, and would vary based on size, orientation, and various attributes of a given structure. An average rate of electrical consumption for residential uses is 7,000 kilowatt hours per year per household and 16,750 kilowatt hours per thousand square feet of commercial floor space. Commercial floor space includes offices, retail uses, warehouses, and schools. These values have been increasing steadily over the last 20 years. Energy consumption from residential uses has increased due to factors such as construction and occupation of larger homes, prices of electricity and natural gas, and increased personal income allowing residents to purchase more electronic appliances. Commercial energy consumption is linked to factors such as vacancy rates, population, and sales.

The modeler will look up the estimated energy consumption for the project’s proposed land uses under year of project buildout, or use the values given in the previous paragraph for a general estimate. The CCAR Protocol contains emission factors for CO₂, CH₄, and nitrous oxide. The “CALI” region grid serves most of the State of California. If a user has information about a specific utility provider’s contribution from renewable sources, the protocol contains methodology to reflect that, rather than relying on the statewide average grid. The incremental increase in energy production associated with project operation should be accounted for in the project’s total GHG emissions for inclusion in the environmental document.

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The incremental increase in energy production associated with project operation should be accounted for in the project's total GHG emissions, but it should be noted that these emissions would be closely controlled by stationary-source control-based regulations and additional regulations are expected under AB 32. However, in the interest of disclosing project-generated GHG emissions and mitigating to the extent feasible, the indirect emissions from off-site electricity generation can be easily calculated for inclusion in the environmental document.

Example Project Estimates for GHG Emissions

Residential Project

Project Attributes:

- 68 detached dwelling units
- 15.9 acres
- 179 residents
- 0 jobs
- Located in unincorporated Placer County (PCAPCD jurisdiction)
- Analysis year 2009

As shown in Table 6, the project's direct GHG emissions per service population (SP) would be approximately 8 metric tons CO₂e/SP/year.

Table 6: Residential Project Example GHG Emissions Estimates

URBEMIS Output (Project Specific)	Metric Tons/Year	Demographic Data	
Area-source emissions	251	Residents	179
Mobile-source emissions	1,044	Jobs	0
Indirect emissions (from CCAR Protocol)	174		
Total operational emissions	1,469	Service population	179
Operational emissions/SP	8.2		
Notes: CO ₂ e = carbon dioxide equivalent; CCAR = California Climate Action Registry; SP = service population(see definition of service population below in discussion of Normalization/Service Population Metric).			
Sources: EDAW 2007, ARB 2007b, CCAR 2007, CEC 2000			

Commercial Project

Project Attributes:

- Free Standing Discount Superstore: 241 thousand square feet (ksf)
- 0 residents

- 400 jobs
- Located in the San Joaquin Valley Air Pollution Control District's (SJVAPCD) jurisdiction
- Analysis year 2009

Table 7: Commercial Project Example GHG Emissions Estimates

URBEMIS Output (Project Specific)	Metric Tons/Year CO ₂ e	Demographic Data	
Area-source emissions	464	Residents	0
Mobile-source emissions	13,889	Jobs	400
Indirect emissions (from CCAR Protocol)	1,477		
Total operational emissions	15,830	Service population	400
Operational emissions/SP	39.6		

Notes:
CO₂e = carbon dioxide equivalent; CCAR = California Climate Action Registry; SP = service population (see definition of service population below in discussion of Normalization/Service Population Metric).

Sources: EDAW 2007, ARB 2007b, CCAR 2007, CEC 2000

Specific Plan

If used traditionally with default trip rates and lengths, rather than project-specific (Traffic Analysis Zone-specific) trip rates and lengths, URBEMIS does not work well for specific plan or general plan-sized projects with multiple land use types proposed. However, in all instances, projects of these sizes (several hundred or thousand acres) would be accompanied by a traffic study. Thus, for large planning-level projects, URBEMIS can be used as a calculation tool to easily obtain project-specific mobile-source emissions. The user should follow the steps discussed above; wherein he/she overwrites the default ITE trip rates for each land use type with that needed to make total VMT match that contained in the traffic study. The URBEMIS interface is a simple calculator to combine the traffic study and EMFAC emissions factors for mobile-source CO₂.

Project Attributes:

- 985 acres
- Total dwelling units: 5,634
- Commercial/Mixed Use: 429 ksf
- Educational: 2,565 ksf
- 14,648 residents
- 3,743 jobs
- Located in Sacramento County (SMAQMD jurisdiction)
- Analysis year 2009

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Table 8: Specific Plan Example GHG Emissions Estimates

URBEMIS Output (Project Specific)	Metric Tons/Year CO ₂ e	Demographic Data	
Area-source emissions	23,273	Residents	14,648
Mobile-source emissions	73,691	Jobs	3,743
Indirect emissions (from CCAR Protocol)	32,744		
Total operational emissions	129,708	Service population	18,391
Operational emissions/SP	7.1		
Notes: CO ₂ e = carbon dioxide equivalent; CCAR = California Climate Action Registry; SP = service population (see definition of service population below in discussion of Normalization/Service Population Metric).			
Sources: EDAW 2007, ARB 2007b, CCAR 2007, CEC 2000			

The specific plan example, when compared to the residential or commercial examples, illustrates the benefit of a mixed-use development when you look at CO₂e emissions per resident or job (service population) metric (see definition of service population below in discussion of Normalization/Service Population Metric). Though this particular specific plan is not an example of a true jobs/housing balance, the trend is clear: accommodating residents and jobs in a project is more efficient than residents or jobs alone.

Stationary- and Area-Source Project Types

GHG emissions from stationary or area sources that require a permit from an air district also contain both direct and indirect sources of emissions. Examples of these types of sources would be fossil fuel power plants, cement plants, landfills, wastewater treatment plants, gas stations, dry cleaners and industrial boilers. All air districts have established procedures and methodologies for projects subject to air district permits to calculate their regulated pollutants. It is anticipated that these same procedures and methodologies could be extended to estimate a permitted facility's GHG calculations. For stationary and area sources that do not require air district permits, the same methodologies used for permitted sources could be used in addition to URBEMIS and CCAR GRP to calculate GHG emissions from these facilities.

Wastewater Treatment Facilities

Direct GHG emissions associated with a proposed waste water treatment plant can be calculated using AP-42 emission factors from Chapter 4.3.5 Evaporative Loss Sources: Waste Water-Greenhouse Gases and the CCAR methodology. In general, most wastewater operations recover CH₄ for energy, or use a flare to convert the CH₄ to CO₂. There are many types of wastewater treatment processes and the potential for GHG emissions from different types of plants varies substantially. There is not one standard set of emission factors that could be used to quantify GHG emissions for a state

“average” treatment plant. Thus, research will need to be conducted on a case-by-case basis to determine the “Fraction Anaerobically Digested” which is a function of the type of treatment process. Indirect emissions from these facilities can be calculated using the CCAR energy use protocols and URBEMIS model for transportation emissions.

Solid Waste Disposal Facilities

Air districts will have emission estimate methodologies established for methane emissions at permitted landfills. In addition, EPA’s Landfill Gas Emissions Model (LandGem) and the CCAR methodology could also be used to quantify GHG emissions from landfill off gassing; however, this model requires substantial detail be input. The model uses a decomposition rate equation, where the rate of decay is dependent on the quantity of waste in place and the rate of change over time. This modeling tool is free to the public, but substantial project detail about the operation of the landfill is needed to run the model. Indirect emissions from these facilities can be calculated using the CCAR energy use protocols and URBEMIS model for transportation emissions.

Construction Emissions

GHG emissions would occur during project construction, over a finite time. In addition, a project could result in the loss of GHG sequestration opportunity due primarily to the vegetation removed for construction. URBEMIS should be used to quantify the mass of CO₂ that would occur during the construction of a project for land development projects. Some construction projects would occur over an extended period (up to 20–30 years on a planning horizon for general plan buildout, or 5–10 years to construct a dam, for example). OFFROAD emission factors are contained in URBEMIS for CO₂ emissions from construction equipment. For other types of construction projects, such as roadway construction projects or levee improvement projects, SMAQMD’s spreadsheet modeling tool, the Road Construction Emissions Model (RoadMod), should be used. This tool is currently being updated to include CO₂ emissions factors from OFFROAD.

The full life-cycle of GHG emissions from construction activities is not accounted for in the modeling tools available, and the information needed to characterize GHG emissions from manufacture, transport, and end-of-life of construction materials would be speculative at the CEQA analysis level. The emissions disclosed will be from construction equipment and worker commutes during the duration of construction activities. Thus, the mass emissions in units of metric tons CO₂e/year should be reported in the environmental document as new emissions.

General Plans

In the short-term, URBEMIS can be used as a calculation tool to model GHG emissions from proposed general plans, but only if data from the traffic study is incorporated into model input. The same methodology applied above in the specific plan example applies to general plans. The CCAR GRP can be used to approximate indirect emissions from

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increased energy consumption associated with the proposed plan area. The same models and methodologies discussed previously for wastewater, water supply and solid waste would be used to estimate indirect emissions resulting from buildout of the general plan.

In the longer-term, more complex modeling tools are needed, which would integrate GHG emission sources from land use interaction, such as I-PLACE³S or CTG Energetics' Sustainable Communities Custom Model attempt to do. These models are not currently available to the public and only have applicability in certain areas of the state. It is important that a tool with statewide applicability be used to allow for consistency in project treatment, consideration, and approval under CEQA.

Scenarios

At the general plan level, the baseline used for analyzing most environmental impacts of a general plan update is typically no different from the baseline for other projects. The baseline for most impacts represents the existing conditions, normally on the date the Notice of Preparation is released. Several comparative scenarios could be relevant, depending on the exact methodological approach and significance criteria used for GHG assessment:

- Existing Conditions. The GHG emissions associated with the existing, on-the-ground conditions within the planning area.
- 1990 conditions. The GHG emissions associated with the general plan area in 1990. This is relevant due to the state's AB 32 GHG emission reduction goals' benchmark year of 1990. The GHG-efficiency of 1990 development patterns could be compared to that of the proposed plan.
- Buildout of the Existing General Plan. The GHG emissions associated with buildout of the existing general plan (without the subject update). This is the no project alternative for the purposes of general plan CEQA analysis.
- Buildout of the Updated General Plan. The GHG emissions associated with buildout of the general plan, as proposed as a part of the subject update. This would include analysis of any changes included as a part of the general plan update for the existing developed portions of the planning area. Many communities include redevelopment and revitalization strategies as a part of the general plan update. The general plan EIR can include assumptions regarding what level and type of land use change could be facilitated by infill and redevelopment. Many jurisdictions wish to provide future projects consistent with these land use change assumptions with some environmental review streamlining. In addition, many communities include transit expansions, pedestrian/bicycle pathway improvements, multi-modal facility construction, travel demand policies, energy efficiency policies, or other measures that could apply to the existing developed area, just as they may apply to any new growth

areas. Such policies could affect the overall GHG emissions of the built out general plan area.

- Increment between Buildout of Updated General Plan and Existing General Plan Area. There are many important considerations associated with the characterization of the impact of the General Plan update. The actual GHG emissions impact could be described as the difference between buildout under the existing and proposed land use plan (No-Build Alternative). However, the courts have held that an EIR should also analyze the difference between the proposed General Plan and the existing environment (*Environmental Planning & Information Council v. County of El Dorado* (EPIC) (1982) 131 Cal.App.3d 350). At the General Plan level, over the course of buildout, some new land uses are introduced, which could potentially add operational GHG emissions and potentially remove existing sequestration potential. Some properties become vacant and are not redeveloped. Other properties become vacant and then are redeveloped. Communities cannot pretend to understand fully in advance each component of land use change. The programmatic document is the preferred method of environmental analysis. Through this programmatic framework, communities develop buildout assumptions as a part of the General Plan that are normally used as a basis of environmental analysis. For certain aspects of the impact analysis, it becomes important not just to understand how much “new stuff” could be accommodated under the updated General Plan, but also the altered interactions between both “new” and “existing” land uses within the planning area. As addressed elsewhere, there are tools available for use in understanding land use/transportation interactions at the General Plan level. Without the GHG targets established by AB 32, a simple mass comparison of existing conditions to General Plan buildout might be appropriate.

However, within the current legal context, the GHG efficiency of the updated General Plan becomes the focus of analysis. Some options in this regard include:

- Estimate the GHG emissions associated with all the land uses included within the planning area upon buildout of the General Plan using no project specific information (regional, countywide, or statewide defaults). Estimate GHG emissions using project specific information from the transportation engineer, transportation demand policies, community design elements, energy efficiency requirements, wastewater treatment and other public infrastructure design changes, and other components. Compare these two calculations. Is the second calculation reduced by the percent needed to meet AB 32 goals compared to the first calculation?
- Estimate the GHG emissions associated with the 1990 planning area and the per-capita or per-service population GHG associated with the 1990 planning area. (Many communities are establishing GHG inventories using different tools). Estimate the GHG emissions associated with buildout of the proposed General Plan update and the resulting per-capita or per-service population GHG

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emissions. Compare the two calculations. Is the General Plan buildout per-capita or per-service population level greater than the 1990 estimate?

Example General Plan Update: Proposed new growth area

Project Attributes:

- 10,050 single family dwelling units
- 652 multi-family dwelling units
- 136 acres parks
- 2,047 ksf commercial (regional shopping center)
- 2,113 ksf office
- 383 acres industrial park
- 31,293 new residents
- 4,945 new jobs
- Located in Stanislaus County (SJVAPCD jurisdiction)
- Analysis year 2025

Table 9: General Plan Example GHG Emissions Estimates

URBEMIS Output (Project Specific)	Metric CO ₂ e	Tons/Year	Demographic Data
Construction emissions	12,083*		Residents 31,293
Area-source emissions	45,708		
Mobile-source emissions	263,954		Jobs 4,945
Indirect emissions (from CCAR Protocol)	78,385		
Total operational emissions	388,046		26,220
Operational emissions/SP	10.7		

* Approximately 241,656 metric tons CO₂e total at general plan buildout (assumes 20-year buildout period). Construction emissions were not included in total operational emissions.

Notes:
CO₂e = carbon dioxide equivalent; CCAR = California Climate Action Registry; SP = service population (see definition of service population below in discussion of Normalization/Service Population Metric).
Sources: EDAW 2007, ARB 2007b, CCAR 2007, CEC 2000

Due to the programmatic level of analysis that often occurs at the general plan level, and potential for many relevant GHG emission quantities, it could be preferable to use a qualitative approach. Such an analysis could address the presence of GHG-reducing policy language in the general plan.

Three possible tiers of approaches to addressing GHG mitigation strategies, either as general plan policy, general plan EIR mitigation measures, or both, include:

- Forward planning
- Project toolbox
- Defer to GHG reductions plan

The three basic approaches are described below.

1. Bring reduction strategies into the plan itself. The most effective way for local jurisdictions to achieve GHG emissions reductions in the medium- and long-term is through land use and transportation policies that are built directly into the community planning document. This involves creating land use diagrams and circulation diagrams, along with corresponding descriptive standards, that enable and encourage alternatives to travel and goods movement via cars and trucks. The land use and circulation diagrams provide a general framework for a community where people can conduct their everyday business without necessarily using their cars. The overall community layout expressed as a part of the land use and circulation diagrams is accompanied by a policy and regulatory scheme designed to achieve this community layout. Impact fees, public agency spending, regulations, administrative procedures, incentives, and other techniques are designed to facilitate land use change consistent with the communities' overall vision, as expressed in policy and in the land use diagram. There are many widely used design principles that can be depicted in land use and circulation diagrams and implemented according to narrative objectives, standards, and policies:

- Connectivity. A finely-connected transportation network shortens trip lengths and creates the framework for a community where homes and destinations can be placed close in proximity and along direct routes. A hierarchical or circuitous transportation network can increase trip lengths and create obstacles for walking, bicycling, and transit access. This policy language would likely be found in the Circulation Element.
- Compactness. Compact development, by its nature, can increase the efficiency of infrastructure provision and enable travel modes other than the car. If communities can place the same level of activity in a smaller space, GHG emissions would be reduced concurrently with VMT and avoid unnecessary conversion of open space. This policy language would likely be found in the Land Use Element.
- Diversity. Multiple land use types mixed in proximity around central "nodes" of higher-activity land uses can accommodate travel through means other than a car. The character and overall design of this land use mix is, of course, different from community to community. This policy language would likely be found in the Land Use Element.
- Facilities. Pedestrian, bicycle, and public transportation improvements, planning, and programming are sometimes an afterthought. To get a more GHG-efficient mode share, safe and convenient bike lanes, pedestrian pathways, transit shelters, and other facilities are required to be planned along with the vehicular travel network. This policy language would likely be found in the Circulation Element.

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- Redevelopment. One way to avoid GHG emissions is to facilitate more efficient and economic use of the lands in already-developed portions of a community. Reinvestment in existing neighborhoods and retrofit of existing buildings is appreciably more GHG efficient than greenfield development, and can even result in a net reduction in GHG emissions. This policy language would likely be found in the Conservation or Land Use Element.
- Housing and Employment. Most communities assess current and future economic prospects along with long-range land use planning. Part of the objective for many communities is to encourage the coalescence of a labor force with locally available and appropriate job opportunities. This concept is best known as “jobs-housing balance.” This policy language would likely be found in the Housing Element.
- Planning Level Versus Project Level. For transportation-related GHG emissions that local governments can mitigate through land use entitlement authority, the overall community land use strategy and the overall transportation network are the most fruitful areas of focus. The reduction capacity of project-specific mitigation measures is greatly limited if supportive land use and transportation policies are lacking at the community planning level. The regional economic context, of course, provides an important backdrop for land use and transportation policy to address GHG emissions. Within this context, the general plan is the readily available tool for local governments to establish such land use and transportation strategies. This policy language would likely be found in the Land Use and Circulation Elements.

access. Some modes of shipping are more GHG-intensive than others. Rail, for example, requires only about 15 to 25 percent of the energy used by trucks to ship freight equivalent distances and involves reduced transportation-related GHG emissions. Cities and counties have little direct control over the method of shipment that any business may choose. Nevertheless, as a part of the general planning process, cities and counties can address constraints on the use of rail for transporting goods. This policy language would likely be found in the Land Use and Circulation Elements.

2. Provide a “toolbox” of strategies after the project site has been selected. In addition to the examples of design principles that are built into the community planning process, communities can offer project applicants a range of tools to reduce GHG emissions. Mitigation strategies are elaborated in detail in Chapter 9.

3. Defer to General Plan implementation measure. Develop and implement a GHG Emissions Reduction Plan. Another option for local governments would be development of an implementation measure as a part of the general plan that outlines an enforceable GHG reduction program. Perhaps the most well known example of this approach is the result of California’s Attorney General settlement of the lawsuit brought against San

Bernardino County. The County has agreed to create a 1990 GHG inventory and develop measures to reduce such emissions according to the state's overall goals. Other communities have pursued similar programs (i.e., the City of San Diego, Marin County). Along with the inventories, targets, and example reduction measures, these programs would include quantitative standards for new development; targets for reductions from retrofitting existing development; targets for government operations; fee and spending program for GHG reduction programs; monitoring and reporting; and other elements. The local government itself should serve as a model for GHG reduction plan implementation, by inventorying emissions from government operations and achieving emission reductions in accordance with the plan's standards. An optional climate change element could be added to contain goals, policies, and this implementation strategy, or this could belong in an optional air quality element.

Chapter 8
Analytical Methodologies For GHG

Other Project Types

Air District Rules, Regulations and Air Quality Plans

Air district air quality plans, rules and regulations could have the potential to increase or decrease GHG emissions within their respective jurisdiction. In general, air district air quality plans, rules and regulations act to reduce ozone precursors, criteria air pollutant and toxic air contaminant emissions, which would almost always act to reduce GHG emissions simultaneously. However, this may not always be the case.

Air Quality Plans

Air districts will have to include GHG emissions analysis as part of their criteria air pollutant and toxic air contaminant air pollutant analysis when considering the adoption of air quality plans and their subsequent rules and regulations needed to implement the plans. Multiple models and methodologies will be needed to accomplish this analysis.

Regional Transportation Plans

Regional transportation plans would also need to be evaluated on a case-by-case basis to determine if a net increase or decrease in GHG emissions would occur. Complex interactions between the roadway network, operating conditions, alternative transportation availability (such as public transit, bicycle pathways, and pedestrian infrastructure), and many other independent parameters specific to a region should be considered. Regional transportation models exist to estimate vehicular emissions associated with regional transportation plans, which includes the ability to estimate GHG emissions.

Normalization/Service Population Metric

The above methodology would provide an estimate of the mass GHG emissions generated by a proposed project, which could be compared to a mass emission threshold. EDAW developed a methodology that would measure a project's overall GHG efficiency

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in order to determine if a project is more efficient than the existing statewide average for per capita GHG emissions. The following steps could be employed to estimate the GHG-“efficiency,” which may be more directly correlated to the project’s ability to help obtain objectives outlined in AB 32, although it relies on establishment of an efficiency-based significance threshold. The subcommittee believes this methodology may eventually be appropriate to evaluate the long-term GHG emissions from a project in the context of meeting AB 32 goals. However, this methodology will need substantially more work and is not considered viable for the interim guidance presented in this white paper.

- Divide the total operational GHG emissions by the Service Population (SP) supported by the project (where SP is defined as the sum of the number of residents and the number of jobs supported by the project). This value should be compared to that of the projected statewide GHG emissions inventory from the applicable end-use sectors (electricity generation, residential, commercial/institutional, and mobile-source) in 1990 divided by the projected statewide SP for the year 2020 (i.e., AB 32 requirements), to determine if the project would conflict with legislative goals.
 - If the project’s operational GHG/SP falls below AB 32 requirements, then the project’s GHG emissions are less than cumulatively considerable.
 - If the project’s operational GHG/SP exceed AB 32 requirements (a substantial contribution), then the project’s GHG emissions would conflict with legislative requirements, and the impact would be cumulatively considerable and mitigation would be required where feasible.

CCAR GRP. All GHG emissions associated with new stationary or area sources should be treated as a net increase in emissions, and if deemed significant, should be mitigated where feasible.

- Road or levee construction projects or other construction-only projects: calculate GHG emissions using the RoadMod, which will be updated to contain GHG emission factors from EMFAC and OFFROAD. All construction-generated GHG emissions should be treated as a net increase, and if deemed significant, should be mitigated to the extent feasible.
- Air District rulemaking or air quality management plan-type projects should be evaluated on a case-by-case basis for secondary impacts of increased GHG emissions generation. In most cases, the types of projects that act to reduce regional air pollution simultaneously act to reduce GHG emissions, and would be beneficial, but should be evaluated for secondary effects from GHG emissions.
- Regional transportation plans should also be evaluated on a case-by-case basis for potential to either reduce or increase GHG emissions from the transportation sector. EMFAC can be utilized to determine the net change in GHG emissions

associated with projected vehicle VMT and from operating speed changes associated with additional or alleviated congestion.

To achieve the goals of AB 32, which are tied to GHG emission rates of specific benchmark years (i.e., 1990), California would have to achieve a lower rate of emissions per unit of population and per unit of economic activity than it has now. Further, in order to accommodate future population and economic growth, the state would have to achieve an even lower rate of emissions per unit than was generated in 1990. (The goal to achieve 1990 quantities of GHG emissions by 2020 means that this will need to be accomplished in light of 30 years of population and economic growth in place beyond 1990.) Thus, future planning efforts that would not encourage new development to achieve its fair share of reductions in GHG emissions would conflict with the spirit of the policy decisions contained in AB 32, thus impeding California's ability to comply with the mandate.

Thus, if a statewide context for GHG emissions were pursued, any net increase in GHG emissions within state boundaries would be considered "new" emissions. For example, a land development project, such as a specific plan, does not necessarily create "new" emitters of GHG, but would theoretically accommodate a greater number of residents in the state. Some of the residents that move to the project could already be California residents, while some may be from out of state (or would 'take the place' of in-state residents who 'vacate' their current residences to move to the new project). Some may also be associated with new births over deaths (net population growth) in the state. The out-of-state residents would be contributing new emissions in a statewide context, but would not necessarily be generating new emissions in a global context. Given the California context established by AB 32, the project would need to accommodate an increase in population in a manner that would not inhibit the state's ability to achieve the goals of lower total mass of emissions.

The average net influx of new residents to California is approximately 1.4 percent per year (this value represents the net increase in population, including the net contribution from births and deaths). With population growth, California also anticipates economic growth. Average statewide employment has grown by approximately 1.1 percent over the last 15 years. The average percentage of population employed over the last 15 years is 46 percent. Population is expected to continue growing at a projected rate of approximately 1.5 percent per year through 2050. Long-range employment projection data is not available from the California Department of Finance (DOF) and can be extrapolated in different ways (e.g., linear extrapolation by percentage rate of change, percentage of population employed, mathematical series expansion, more complex extrapolation based on further research of demographic projections such as age distribution). Further study would be needed to refine accurate employment projections from the present to 2050. For developing this framework, employment is assumed to have a constant proportionate relationship with the state's population. The projected number of jobs is assumed to be roughly 46 percent of the projected population.

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In light of the statewide context established by California law, consistency is most important for evaluating GHG emissions from projects. Thus, URBEMIS and the CCAR GRP are the recommended tools for quantification of GHG emissions from most project types in the short term. Over the long term, more sophisticated models that integrate the relationship between GHG emissions and land use, transportation, energy, water, waste, and other resources, and have similar application statewide would have better application to the problem, but may not currently be as accessible or as easily operable. I-PLACE³S and CTG Energetics' Sustainable Communities Model (SCM) are two examples of such models that contain emission factors for GHGs, which could be refined to have applicability statewide and made available to CEQA practitioners. Other models are likely to be developed, given the importance of this issue.

Short-Term and Long-Term Methodologies

The following tools can be used to quantify a project's GHG emissions until tools that are more comprehensive become available statewide:

1. Land development projects: URBEMIS 2007 v. 9.2 and the CCAR GRP v. 2.2 (short-term); further development of I-PLACE³S or CTG's Sustainable Communities Model (long-term).
2. New stationary and area sources/facilities: AP-42 Chapter 4.3, LandGem v. 3.02, and/or CCAR GRP v. 2.2.
3. Road or levee construction projects or other construction-only projects: RoadMod/OFFROAD 2007.

Ideally, I-PLACE³S or CTG's Sustainable Communities Model would be expanded to include an integrated approach which is the best approach for reasonably approximating the emissions that result from interaction between land uses, but neither is available to the public and would create consistency problems in reporting emissions from projects across the state if these were used today. However, a similar model with statewide applicability will likely be developed due to the importance of the issue. Table 10 Summary of Modeling Tools for Estimating GHG Emissions and Project Applicability

Table 10: Summary of Modeling Tools for GHG Emissions

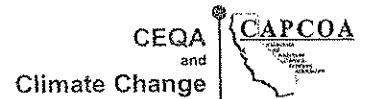
Method/Tool Description	Availability	Applicability	Scope	Ease of Use	Data Input (Requirements and Guidance)	Data Output	Recommendation/Comments
URBEMIS 2007	Public domain -Download (www.urbemis.com) free of charge	Land development and construction projects (construction, mobile- and area-source emissions)	Local	Fairly Easy	Land use information, construction and operational data and assumptions (e.g., jurisdiction, acres of land use type, year of operation, etc.)	Mobile-source Construction & Operational CO ₂ (lb/day or tons/year)	-Recommend land development construction projects or -Also recommend for net change in land use (operation, etc.)
California Climate Action Registry General Reporting Protocol v. 2.2	Public guidance document	Indirect emissions from land development projects, stationary-area-source facilities regulated under AB 32	State	Easy	Energy consumption	CO ₂ e (Metric tons/year)	-Recommend indirect emissions from land development projects, and new stationary area-sources regulated
Clean Air and Climate Projection (CACP) Software	Public agencies (members of ICLEI, NACAA, or similar)	Local governments used for emissions inventories	Local	N/A	Energy usage, waste generation/disposal transportation	CO ₂ e (tons/year)	-Recommend inventories of government activities (member of agency or grc)
CTG Sustainable Communities Model	Custom model	Land development	Regional, scalable	N/A	Land use information, operational (mobile, energy, economic, infrastructure) assumptions	CO ₂ e (tons/year)	-An integrative comprehensive modeling tool cannot obtain

Method/Tool Description	Availability	Applicability	Scope	Ease of Use	Data Input (Requirements and Guidance)	Data Output	Recommendation/Comments
I-PLACE ³ S	Access fee through local COG Only available for eight California counties	Land use change	Regional, scalable	Fairly Easy	Parcel information	CO ₂ (lb/day or tons/year)	-Recommend land development projects and use changes -Especially general plans
EMFAC 2007	Public domain	On-road mobile-sources	Statewide, regional	Fairly Easy	Vehicle information	fleet CO ₂ (grams/mile)	-Not recommended for most projects (URBEMIS preferred) -Could be used in certain Air Quality Rulemaking applications
OFFROAD 2007	Public domain	Off-road mobile sources (construction equipment)	Statewide, regional	Fairly Easy	Construction information	fleet CO ₂ (lb/day)	-Not recommended (URBEMIS preferred) -could be used in certain Air Quality Rulemaking applications (construction equipment)
RoadMod (to be updated to include CO ₂)	Public domain	Off-road and on-road mobile sources (construction equipment and material haul trucks)	Statewide	Easy	Construction information	CO ₂ (lb/day or tons/project)	-Recommend construction projects (linear nature; i.e., roads, pipelines)

Method/Tool Description	Availability	Applicability	Scope	Ease of Use	Data Input (Requirements and Guidance)	Data Output	Recommendation
DTIM	Public domain	On-road mobile-sources	Statewide, regional	Difficult (consists of a series of three programs and requires input files from traffic and emissions modeling)	-EMFAC files -Traffic model output files (e.g., link, interzonal, and trip end data) -User options file -Optional files	CO ₂ (tons/year)	-Not recommended
Southeast Climate Change Partnership Spreadsheet Model (UK)	Public domain http://www.climate-southeast.org.uk/	UK government/agencies/organizations used for emissions inventories	Local, county, regional	Fairly easy	Energy usage, waste generation/disposal, transportation	CO ₂ (tonnes/year)	-Not recommended for use in California, but could be a valuable tool for building applicable spreadsheets
EPA AP-42; Evaporation Loss Sources Chapter 4.3.5	Public reference document	GHG emissions from waste water treatment facilities	Facility level	Easy equation; substantial research needed to use	Biochemical oxygen demand (BOD) loading, anaerobically digested	Fraction CH ₄ (lb/year)	-Recommendation: Publicly treatment (POTW) projects
LandGem v. 3.02	Public domain http://www.epa.gov/ttn/catc/dir1/landgem-v302.xls	GHG emissions from anaerobic decomposition associated with landfills	Facility Level	Moderate	Solid waste processing, year of analysis, lifetime of waste in place	CO ₂ , CH ₄ (Mega grams/year)	-Recommendation: landfill emissions

Method/Tool Description	Availability	Applicability	Scope	Ease of Use	Data Input (Requirements and Guidance)	Data Output	Recommendation/Comments
CARROT	Registry members	Stationary source emissions, vehicle fleet, mobile sources	Facility level	Moderate	Facility-specific information	All GHGs	-Recommend reporting for indirect emissions from consumption Protocol)
<p>Notes:</p> <p>GHG = greenhouse gas; AB = assembly bill; CO₂e = carbon dioxide equivalent; CH₄ = methane; N₂O = nitrous oxide; COG = council of governments ; ITE = Institutional Emissions</p> <p>Source: Data compiled by EDAW and the California Air Pollution Control Officers Association in 2007</p>							

Chapter 9: Mitigation Strategies for GHG



Chapter 9

Mitigation
Strategies for
GHG

Introduction

This chapter (and Appendix B) identifies existing and potential mitigation measures that could be applied to projects during the CEQA process to reduce a project's GHG emissions that would be identified using the analytical methodologies included in this white paper. The Subcommittee retained the services of EDAW to assist with this effort. EDAW performed a global search of mitigation measures currently in practice and under study that would reduce GHG emissions.

Table 16 (Appendix B) provides a brief description of each measure along with an assessment of their feasibility (from a standpoint of economical, technological, and logistical feasibility, and emission reduction effectiveness), and identifies their potential for secondary impacts to air quality. During the global search performed, EDAW also took note of GHG reduction strategies being implemented as rules and regulation (e.g., early action items under AB 32), which are summarized in Table 18 (Appendix C). It is important to note that though compliance with such would be required by regulation for some sources, such strategies may be applicable to other project and source types.

The recurring theme that echoes throughout a majority of these measures is the shift toward New Urbanism, and research has consistently shown that implementation of Neotraditional Development techniques reduces VMT and associated emissions. The material reviewed assessed reductions from transportation-related measures (e.g., bicycle, pedestrian, transit, and parking) as a single comprehensive approach to land use. This comprehensive approach focuses on development design criteria conducive to enhancing alternate modes of transportation, including transit, walking, and bicycling. Transportation Demand Management (TDM) programs are viewed as a mechanism to implement specific measures. TDM responsibilities may include offering incentives to potential users of alternative modes of transportation and monitoring and reporting mode split changes.

The comprehensive approach makes it more difficult to assess reductions attributable to each measure. Nevertheless, there is a strong interrelationship between many of the measures, which justifies a combined approach. Consider the relationship between bike parking nonresidential, bike parking residential, endtrip facilities, and proximity to bike path/bike lane measures. In reality, these measures combined act as incentives for one individual to bike to work, while implementation of a single measure without the others reduces effectiveness.

The global nature of GHG emissions is an important feature that enables unique mitigation: abatement. When designing a project subject to CEQA, the preferred practice is first to avoid, then to minimize, and finally to compensate for impacts. Where the impact cannot be mitigated on-site, off-site mitigation is often and effectively implemented in several resource areas, either in the form of offsetting the same impact or preserving the resource elsewhere in the region. Frequently, mitigation fee programs or funds are established, where the proponent pays into the program and fees collected

throughout the region or state are used to implement projects that, in turn, proportionately offset the impacts of the projects to the given resource. It may be more cost-effective to reduce as much GHG on-site as feasible (economically and technologically). Then the proponent would pay into a “GHG retrofit fund” to reduce equivalent GHG emissions off-site. In contrast to regional air pollutant offset programs such as the Carl Moyer Program, it matters greatly where reductions of ozone precursors occur, as ozone affects regional air quality. The GHG retrofit fund could be used to provide incentives to upgrade older buildings and make them more energy efficient. This would reduce demand on the energy sector and reduce stationary source emissions associated with utilities. This program has been successfully implemented in the United Kingdom where developments advertise “carbon neutrality.” Of course, some GHG emissions occur associated with operation of the development, but the development would offset the remainder of emissions through off-site retrofit. Avoiding emissions that would otherwise continue to occur at existing development would be a unique opportunity for mitigation of GHG emissions. Reduction of GHG emissions also may have important side benefits including reduction of other forms of pollution.

Depending on the significance threshold concept adopted, projects subject to the CEQA process would either qualitatively or quantitatively identify the amount of GHG emissions associated with their project using the analytical methodologies identified in the previous chapter. The analysis would then apply the appropriate number of mitigation measures listed in Appendix B to their project to reduce their GHG emissions below the significance level. Calculating the amount of GHG emission reductions attributable to a given mitigation measure would require additional research. The examples below illustrate how a project would be mitigated using this approach.

Residential Project Example

Project Attributes:

- 68 detached dwelling units
- 15.9 acres
- Located in unincorporated Placer County PCAPCD jurisdiction)
- Assume URBEMIS defaults for a rural project in Placer County, in absence of a traffic study (This is contrary to the recommendations contained under Task 1; a traffic study is necessary to assess project-specific GHG emissions).
- Analysis year 2009

Table 11: Residential Project Example GHG Emissions Estimates with Mitigation

URBEMIS Output (Unmitigated)	Metric Tons/Year CO ₂ e	URBEMIS Output (Mitigated)	Metric Tons/Year CO ₂ e	Percent Reduction
Area-source emissions	252	Area-source emissions	215	14.6
Mobile-source emissions	1,047	Mobile-source emissions	916	12.5
Total direct operational emissions (area + mobile)	1,299	Total operational emissions (area + mobile)	1,131	12.9
Notes: CO ₂ e = carbon dioxide equivalent				
Sources: Data compiled by EDAW in 2007				

Using URBEMIS 2007 and assuming the project would implement the mitigation measures listed below, yearly project-generated emissions of CO₂e would be reduced by approximately 13 percent. Implementation of the following mitigation measures is assumed:

- 100 housing units within one-half-mile radius of project’s center, including this project’s 68 residential units;
- provision of 80 jobs in the study area;
- retail uses present with one-half-mile radius of project’s center;
- 10 intersections per square mile;
- 100% of streets with sidewalks on one side;
- 50% of streets with sidewalks on both sides;
- 30% of collectors and arterials with bike lanes, or where suitable, direct parallel routes exist;
- 15% of housing units deed restricted below market rate;
- 20% energy efficiency increase beyond Title 24; and
- 100% of landscape maintenance equipment electrically powered and electrical outlets in front and rear of units.

Example Project Methodology and Mitigation

Table 12 –Residential Projects Example Methodology and Mitigation

Source	Methodology	Mitigation
Direct Emissions		
Construction	URBEMIS (OFFROAD emission factors)	MM C-1→MM C-4
Mobile Sources	URBEMIS (EMFAC emission factors)	MM T-3→MM T-8, MM T-10→ MM T-14, MM T-16, MM T-19→ MM T-21 MM D-2→MM D-8, MM D-10→ MM D-15, MM D-17 MM S-1→MM S-2 MM M-1→MM M-2
Area Sources	URBEMIS	MM D-13→MM D-15, MM D-17
Indirect Emissions		
Energy Consumption	CCAR GRP & CEC	MM E-1→MM E-8, MM E-10, MM E-12→MM E-23 MM S-1→MM S-2 MM M-1→MM M-2

Source	Methodology	Mitigation
Direct Emissions		
Construction	URBEMIS (OFFROAD emission factors)	MM C-1→MM C-4
Mobile Sources	URBEMIS (EMFAC emission factors)	MM T-1→MM T-2, MM T-4→ MM T-15, MM T-17→MM T-21 MM D-1→MM D-3, MM D-5→ MM D-6, MM D-10, MM D-12, MM D-14→MM D-17 MM E-24 MM S-1→MM S-2 MM M-1→MM M-2
Area Sources	URBEMIS	MM D-14→MM D-17
Indirect Emissions		
Energy Consumption	CCAR GRP & CEC	MM E-1, MM E-4→MM E-13, MM E-16→MM E-24 MM S-1→MM S-2 MM M-1→MM M-2



Table 14 – Specific Plans Example Methodology and Mitigation

Source	Methodology	Mitigation
Direct Emissions		
Construction	URBEMIS (OFFROAD emission factors)	MM C-1→MM C-4
Mobile Sources	Short-term: URBEMIS (EMFAC emission factors). Long-term: I-PLACE ³ S/CTG SCM	MM T-1→MM T-21 MM D-1→MM D-12, MM D-18→MM D-19 MM E-24 MM S-1→MM S-2 MM M-1→MM M-2
Area Sources	Short-term: URBEMIS (EMFAC emission factors). Long-term: I-PLACE ³ S/CTG SCM	MM D-13→MM D-19 MM E-1→MM E-24
Indirect Emissions		
Energy Consumption	Short-term: CCAR GRP & CEC. Long-term: I-PLACE ³ S/CTG SCM	MM S-1→MM S-2 MM M-1→MM M-2

General Plans

- Include a general plan policy to reduce emissions within planning area to a level consistent with legislative requirements.
- Implementation strategies include preparation of a GHG reduction plan.
- Projects consistent with a general plan could be responsible for complying with such a policy.

Table 15 – General Plans Example Methodology and Mitigation

Source	Methodology	Mitigation
Direct Emissions		
Construction	URBEMIS (OFFROAD emission factors).	MS G-1 MM G-15
Mobile Sources	Short-term: URBEMIS (EMFAC emission factors). Long-term: I-PLACE ³ S/CTG SCM	MS G-1 MS G-2→MS C-7, MS G-9, MS G-12, MS-13→MS-14, MS-16→MS-23
Area Sources	Short-term: URBEMIS (EMFAC emission factors). Long-term: I-PLACE ³ S/CTG SCM	MS G-1 MS G-8→MS C-11, MS G-134, MS G-12, MS-15, MS-17, MS-22
Indirect Emissions		
Energy Consumption	Short-term: CCAR GRP & CEC. Long-term: I-PLACE ³ S/CTG SCM	

Other Project Types

Air District Rules and Regulations

Air district rules and regulations could have the potential to increase or decrease GHG emissions within the respective jurisdiction. In general, air district rules and regulations act to decrease criteria air pollutant or toxic air contaminant emissions, which would usually act to reduce GHG emissions simultaneously. However, this may not always be the case and air district rules and regulations could address emissions from a large variety of different source types. Reductions of GHG emissions associated with implementation of applicable mitigation, which could also vary greatly, would need to be evaluated on a case-by-case basis. However, once applicable mitigation measures are identified, percent reductions based on the best available research to date, such as those specified in Table 15, could be applied to determine mitigated emissions.

Air Quality Plans

Similarly to air district rules and regulations, air quality plans could have the potential to increase or decrease GHG emissions because of criteria air pollutant reduction strategies. In general, strategies implemented by air districts to reduce criteria air pollutants also act to reduce GHG emissions. However, this may not always be the case. Reductions of GHG emissions associated with implementation of applicable mitigation would need to be evaluated on a case-by-case basis. The methodology identified above for determining whether the strategies contained within the GHG reduction plan would adhere to the level specified in general plan policy could also be used to determine the reductions associated with CAP strategies.

Regional Transportation Plans

Regional transportation plans and reductions of GHG emissions associated with implementation of applicable mitigation would also need to be evaluated on a case-by-case basis to determine if a net increase or decrease in GHG emissions would occur. Complex interactions between the roadway network, operating conditions, alternative transportation availability (such as public transit, bicycle pathways, and pedestrian infrastructure), and many other independent parameters specific to a region should be considered. EMFAC 2007 can be used with VMT from the RTP to create an inventory of GHG emissions. Reductions associated with implementation of applicable measures contained in Table 16 could be accomplished by accounting for VMT reductions in the traffic model.

Chapter 10: Examples of Other Approaches

Chapter 10

Examples of
Other
Approaches

Many states, counties, and cities have developed policies and regulations concerning greenhouse gas emissions that seek to require or promote reductions in GHG emissions through standards for vehicle emissions, fuels, electricity production/renewables, building efficiency, and other means. However, we could only identify three public agencies in the United States that are considering formally requiring the analysis of greenhouse gas emissions and climate change for development projects during their associated environmental processes. There may be others, but they were not identified during research conducted during preparation of this paper.

The following is a summary of those three efforts.

Commonwealth of Massachusetts - MEPA Greenhouse Gas Emissions Policy and Protocol

The Massachusetts Executive Office of Energy and Environmental Affairs (EEA) has determined that the phrase “damage to the environment” as used in the Massachusetts Environmental Policy Act (MEPA) includes the emission of greenhouse gases caused by projects subjects to MEPA Review. EEA has published a Greenhouse Gas Emissions Policy (GGEP) to fulfill the statutory obligation to take all feasible measures to avoid, minimize or mitigate damage to the environment.

The GGEP concerns the following projects only:

- The Commonwealth or a state agency is the proponent;
- The Commonwealth or a state agency is providing financial assistance;
- The project is privately funded, but requires an Air Quality Permit from the department of Environmental Protection;
- The project is privately funded, but will generate:
 - 3,000 or more new vehicle trips per day for office projects;
 - 6,000 or more new vehicle trips per day for mixed use projects that are 25% or more office space; or
 - 10,000 or more new vehicle trips per day for other projects.

As a comparison, the trip generation amounts correspond as follows:

- 3,000 vehicle trips per day = approximately 250,000 square foot office development;
- 6,000 or more new vehicle trips per day for mixed use projects that are 25% or more office space = if 25% office space, then equivalent to approximately 130,000 square feet of office and either 100,000 square feet of retail or 450 single-family residential units or some combination thereof.
- 10,000 or more new vehicle trips per day = approximately 1,000 single family residential units or 250,000 square feet retail.

CEQA
and
Climate Change

The draft policy states it is not intended to create a numerical GHG emission limit or a numerical GHG emissions reduction target, but rather to ensure that project proponents and reviewers have considered the GHG emissions impacts of their projects and taken all feasible means and measure to reduce those impacts.

The draft policy notes that some projects within these categories will have little or no greenhouse gas emission and the policy will not apply to such projects. EEA intends to identify in the scoping certificate whether a project falls within this *de minimis* exception.

The GGEP requires qualifying projects to do the following:

- to quantify their GHG emissions;
- identify measures to minimize or mitigate such emissions;
- quantify the reduction in emissions and energy savings from mitigation.

Emissions inventories are intended to focus on carbon dioxide, but analysis of other GHGs may be required for certain projects. EEA will require analysis of direct GHG emissions and indirect (electricity and transportation) emissions. The GGEP references the protocols prepared by the World Resource Institute as guidance for inventory preparation.

The policy is still in draft form, but the comment period closed on August 10, 2007.

King County, Washington - Executive Order on the Evaluation of Climate Change Impacts through the State Environmental Policy Act (SEPA)

Departments, as follows:

"...effective September 1, 2007 to require that climate impacts, including, but not limited to those pertaining to greenhouse gases, be appropriately identified and evaluated when such Departments are acting as the lead agency in reviewing the environmental impacts of private or public proposals pursuant to the State Environmental Policy Act".

The Executive Order does not define what a "climate impact" is. Based on statements of the County Deputy Chief of Staff*

- County agencies will ask project proponents to supply information on transportation, energy usage and other impacts of proposed projects using the County's existing SEPA checklist.

* Marten Law Group: Environmental News, August 1, 2007, "King County (WA) First in Nation to Require Climate Change Impacts to be Considered During Environmental Review of New Projects".

- There is no current plan to require project proponents to take action to mitigate the impacts identified.
- Development of emissions thresholds and mitigation requirements will be undertaken in connection with the County's upcoming 2008 update of its Comprehensive Plan.

Sacramento Metropolitan Air Quality Management District

The Sacramento Metropolitan Air Quality Management District released an interim guidance on addressing climate change in CEQA documents on September 6, 2007. While very general in nature, the District recommends that CEQA environmental documents include a discussion of anticipated GHG emissions during both the construction and operation phases of the project. This includes assessing the GHG emissions from projects (using readily available models) to determine whether a project may have a significant impact. If so, then the District recommends addressing all of the District's GHG mitigation measures (drawn from comments made by the California Attorney General) – with explanations on how the mitigation will be implemented or providing rationale for why a measure would be considered infeasible. The District provides assistance to agencies in their analysis of GHG emissions and the applicability of specific mitigation measures. The District's guidance can be found at: <http://64.143.64.21/climatechange/ClimateChangeCEQAguidance.pdf>

Mendocino Air Quality Management District – CEQA Guidelines

The Mendocino AQMD updated its "Guidelines for Use During Preparation of Air Quality Impacts in EIRs or Mitigated Negative Declarations" in May 2007. The guidelines call for preparing estimates of the increased emissions of air contaminations (including GHG) for projects.

The guidelines state that GHG emissions should be presumed to have a significant impact if CO emissions from District-approved modeling exceed either of the following:

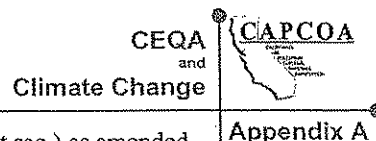
- 80% of the level defined as significant for stationary sources in Regulation 1, Rule 130 (s2) of the District (which is 550 lbs/day for CO, meaning a threshold of 440 lbs/day for CO for stationary sources); or
- levels established in District Regulation 1 Rule 130 (i2) for indirect sources (which is 690 lbs/day for CO for indirect sources).

If an average passenger vehicle emits 22 grams of CO/mile and 0.8 lb/mile of CO₂, then the 690-lb/day threshold for CO corresponds to approximately 11,400 lb/day CO₂ threshold for passenger vehicle-related emissions. If one assumes that the average passenger vehicle goes 12,500 miles/year (about 35 miles/day), then this is a threshold equivalent to about 420 vehicles. Using an average in California of about 1.77 vehicles/household, this would correspond to about 250 households/dwelling units.

Appendix A

Relevant Citations

Appendix A: Relevant Citations



Citations from the Public Resources Code (Division 13, §21000 et seq.) as amended through January 1, 2005.

Public Resources Code – Section 21004, MITIGATING OR AVOIDING A SIGNIFICANT EFFECT; POWERS OF PUBLIC AGENCY:

“In mitigating or avoiding a significant effect of a project on the environment, a public agency may exercise only those express or implied powers provided by law other than this division. However, a public agency may use discretionary powers provided by such other law for the purpose of mitigating or avoiding a significant effect on the environment subject to the express or implied constraints or limitations that may be provided by law.”

Public Resources Code – Section 21082.2, SIGNIFICANT EFFECT ON ENVIRONMENT; DETERMINATION; ENVIRONMENTAL IMPACT REPORT PREPARATION:

- (a) The lead agency shall determine whether a project may have a significant effect on the environment based on substantial evidence in light of the whole record.
- (b) The existence of public controversy over the environmental effects of a project shall not require preparation of an environmental impact report if there is no substantial evidence in light of the whole record before the lead agency that the project may have a significant effect on the environment.
- (c) Argument, speculation, unsubstantiated opinion or narrative, evidence which is clearly inaccurate or erroneous, or evidence of social or economic impacts which do not contribute to, or are not caused by, physical impacts on the environment, is not substantial evidence. Substantial evidence shall include facts, reasonable assumptions predicated upon facts, and expert opinion supported by facts.
- (d) If there is substantial evidence, in light of the whole record before the lead agency, that a project may have a significant effect on the environment, an environmental impact report shall be prepared.
- (e) Statements in an environmental impact report and comments with respect to an environmental impact report shall not be deemed determinative of whether the project may have a significant effect on the environment.

Citations from the Guidelines for California Environmental Quality Act, CCR, Title 14, Division 6 (§15000 et seq.) as amended through July 27, 2007.

AG=Attorney General; ARB=California Air Resources Board; ASTM=American Society for Testing and Material; BAAQMD=Bay Area Air Quality Management District; BEES= Building for Environmental and Economic Sustainability; CA=California; Caltrans=California Department of Transportation; CAPs=Criteria Air Pollutants; CCAP=Center for Clean Air Policy; CF=Connectivity Factor; CIWMB=California Integrated Waste Management Board; CO= Carbon Monoxide; CO₂=Carbon Dioxide; DGS=Department of General Services; DOE=U.S. Department of Energy; DPF=Diesel particulate Filter; E85=85% Ethanol; EERE=Energy Efficiency and Renewable Energy; EOE=Encyclopedia of Earth; EPA=U.S. Environmental Protection Agency; ETC=Edmonton Trolley Coalition; EVs/CNG=Electric Vehicles/Compressed Natural Gas; FAR=Floor Area Ratio; GHG=Greenhouse Gas; ITE=Institute of Transportation Engineers; kg/m²=kilogram per square meter; km=Kilometer; lb=pound; LEED=Leadership in Energy and Environmental Design; M=Million; NA=Not Available; NEV=Neighborhood Electric Vehicle; NIST=National Institute of Standards and Technology; NO_x=Oxides of Nitrogen; NREL=National Renewable Energy Laboratory; N/S=North/South; PG&E=Pacific Gas and Electric; PM=Particulate Matter; SJVAPCD=San Joaquin Valley Air Pollution Control District; SMAQMD=San Joaquin Valley Air Quality Management District; SMUD=Sacramento Municipal Utilities District; SO_x=Sulfur Oxides; SRI=Solar Reflectance Index; TACs=Toxic Air Contaminants; TDM=Transportation Demand Management; TMA=Transportation Management Association; THC=Total Hydrocarbon; ULEV=Ultra Low Emission Vehicle; USGBC=U.S. Green Building Council; and VTPI=Victoria Transit Policy.

A-1

State CEQA Guidelines – Section 15064, DETERMINING THE SIGNIFICANCE OF THE ENVIRONMENTAL EFFECTS CAUSED BY A PROJECT:

- (a) Determining whether a project may have a significant effect plays a critical role in the CEQA process.
- (1) If there is substantial evidence, in light of the whole record before a lead agency, that a project may have a significant effect on the environment, the agency shall prepare a draft EIR.
- (2) When a final EIR identifies one or more significant effects, the Lead Agency and each Responsible Agency shall make a finding under Section 15091 for each significant effect and may need to make a statement of overriding considerations under Section 15093 for the project.
- (b) The determination of whether a project may have a significant effect on the environment calls for careful judgment on the part of the public agency involved, based to the extent possible on scientific and factual data. An ironclad definition of significant effect is not always possible because the significance of an activity may vary with the setting. For example, an activity which may not be significant in an urban area may be significant in a rural area.
- (c) In determining whether an effect will be adverse or beneficial, the Lead Agency shall consider the views held by members of the public in all areas affected as expressed in the whole record before the lead agency. Before requiring the preparation of an EIR, the Lead Agency must still determine whether environmental change itself might be substantial.
- (d) In evaluating the significance of the environmental effect of a project, the Lead Agency shall consider direct physical changes in the environment which may be caused by the project and reasonably foreseeable indirect physical changes in the environment
- (1) A direct physical change in the environment is a physical change in the environment which is caused by and immediately related to the project. Examples of direct physical changes in the environment are the dust, noise, and traffic of heavy equipment that would result from construction of a sewage treatment plant and possible odors from operation of the plant.
- (2) An indirect physical change in the environment is a physical change in the environment which is not immediately related to the project, but which is caused indirectly by the project. If a direct physical change in the environment in turn causes another change in the environment, then the other change is an indirect physical change in the environment. For example, the construction of a new sewage treatment plant may facilitate population growth in the service area due to the increase in sewage treatment capacity and may lead to an increase in air pollution.
- (3) An indirect physical change is to be considered only if that change is a reasonably foreseeable impact which may be caused by the project. A change which is speculative or unlikely to occur is not reasonably foreseeable.
- (e) Economic and social changes resulting from a project shall not be treated as significant effects on the environment. Economic or social changes may be used, however, to determine that a physical change shall be regarded as a significant effect on the environment. Where a physical change is caused by economic or social effects of a

project, the physical change may be regarded as a significant effect in the same manner as any other physical change resulting from the project. Alternatively, economic and social effects of a physical change may be used to determine that the physical change is a significant effect on the environment. If the physical change causes adverse economic or social effects on people, those adverse effects may be used as a factor in determining whether the physical change is significant. For example, if a project would cause overcrowding of a public facility and the overcrowding causes an adverse effect on people, the overcrowding would be regarded as a significant effect.

(f) The decision as to whether a project may have one or more significant effects shall be based on substantial evidence in the record of the lead agency.

(1) If the lead agency determines there is substantial evidence in the record that the project may have a significant effect on the environment, the lead agency shall prepare an EIR (*Friends of B Street v. City of Hayward* (1980) 106 Cal.App.3d 988). Said another way, if a lead agency is presented with a fair argument that a project may have a significant effect on the environment, the lead agency shall prepare an EIR even though it may also be presented with other substantial evidence that the project will not have a significant effect (*No Oil, Inc. v. City of Los Angeles* (1974) 13 Cal.3d 68).

(2) If the lead agency determines there is substantial evidence in the record that the project may have a significant effect on the environment but the lead agency determines that revisions in the project plans or proposals made by, or agreed to by, the applicant would avoid the effects or mitigate the effects to a point where clearly no significant effect on the environment would occur and there is no substantial evidence in light of the whole record before the public agency that the project, as revised, may have a significant effect on the environment then a mitigated negative declaration shall be prepared.

(3) If the lead agency determines there is no substantial evidence that the project may have a significant effect on the environment, the lead agency shall prepare a negative declaration (*Friends of B Street v. City of Hayward* (1980) 106 Cal.App. 3d 988).

(4) The existence of public controversy over the environmental effects of a project will not require preparation of an EIR if there is no substantial evidence before the agency that the project may have a significant effect on the environment.

(5) Argument, speculation, unsubstantiated opinion or narrative, or evidence that is clearly inaccurate or erroneous, or evidence that is not credible, shall not constitute substantial evidence. Substantial evidence shall include facts, reasonable assumptions predicated upon facts, and expert opinion support by facts.

(6) Evidence of economic and social impacts that do not contribute to or are not caused by physical changes in the environment is not substantial evidence that the project may have a significant effect on the environment.

(7) The provisions of sections 15162, 15163, and 15164 apply when the project being analyzed is a change to, or further approval for, a project for which an EIR or negative declaration was previously certified or adopted (e.g. a tentative subdivision, conditional use permit). Under case law, the fair argument standard does not apply to determinations of significance pursuant to sections 15162, 15163, and 15164.

(g) After application of the principles set forth above in Section 15064(f)(g), and in marginal cases where it is not clear whether there is substantial evidence that a project may have a significant effect on the environment, the lead agency shall be guided by the following principle: If there is disagreement among expert opinion supported by facts

over the significance of an effect on the environment, the Lead Agency shall treat the effect as significant and shall prepare an EIR.

(h)(1) When assessing whether a cumulative effect requires an EIR, the lead agency shall consider whether the cumulative impact is significant and whether the effects of the project are cumulatively considerable. An EIR must be prepared if the cumulative impact may be significant and the project's incremental effect, though individually limited, is cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.

(2) A lead agency may determine in an initial study that a project's contribution to a significant cumulative impact will be rendered less than cumulatively considerable and thus is not significant. When a project might contribute to a significant cumulative impact, but the contribution will be rendered less than cumulatively considerable through mitigation measures set forth in a mitigated negative declaration, the initial study shall briefly indicate and explain how the contribution has been rendered less than cumulatively considerable.

(3) A lead agency may determine that a project's incremental contribution to a cumulative effect is not cumulatively considerable if the project will comply with the requirements in a previously approved plan or mitigation program which provides specific requirements that will avoid or substantially lessen the cumulative problem (e.g., water quality control plan, air quality plan, integrated waste management plan) within the geographic area in which the project is located. Such plans or programs must be specified in law or adopted by the public agency with jurisdiction over the affected resources through a public review process to implement, interpret, or make specific the law enforced or administered by the public agency. If there is substantial evidence that

notwithstanding that the project complies with the specified plan or mitigation program addressing the cumulative problem, an EIR must be prepared for the project.

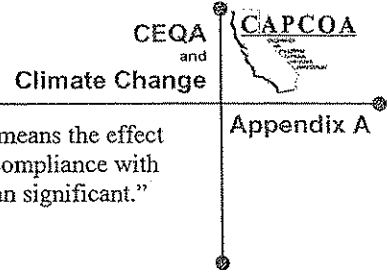
(4) The mere existence of significant cumulative impacts caused by other projects alone shall not constitute substantial evidence that the proposed project's incremental effects are cumulatively considerable.

State CEQA Guidelines – Section 15130, DISCUSSION OF CUMULATIVE IMPACTS:

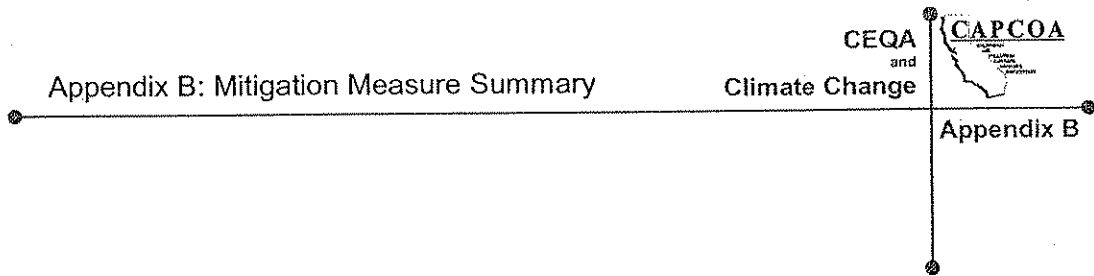
(a)(3). "An EIR may determine that a project's contribution to a significant cumulative impact will be rendered less than cumulatively considerable and thus is not significant. A project's contribution is less than cumulatively considerable if the project is required to implement or fund its fair share of a mitigation measure or measures designed to alleviate the cumulative impact. The lead agency shall identify facts and analysis supporting its conclusion that the contribution will be rendered less than cumulatively considerable.

State CEQA Guidelines – Section 15064.7, THRESHOLDS OF SIGNIFICANCE:

"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. A threshold of significance is an identifiable quantitative, qualitative or performance level



of a particular environmental effect, non-compliance with which means the effect will normally be determined to be significant by the agency and compliance with which means the effect normally will be determined to be less than significant.”



Appendix B

Mitigation Measure Summary

**Table 16
Mitigation Measure Summary**

Mitigation Measure	Applicable Project/Source Type ¹	Effective	Cost (Yes/No) ³	Technical ⁴	Logistical ⁵	Secondary Effects (Yes/No)	Agency/Organization/Other ⁶	Description/Comments
Transportation								
Bicycle/Pedestrian/Transit Measures								
MM T-1: Bike Parking	LD (C, M), I, SP, TP, AQP, RR, P/Mobile	1%-5%/High: CCAP presents combined % reductions for a range of mitigation measures (Dierkers et al. 2007). SMAQMD allocates combined reductions among individual measures (e.g., 2.5% reduction for all bicycle-related measures and one-quarter of 2.5% for each individual measure) (TIAx 2005, EDaw 2006, SMAQMD 2007). VTPI presents % reductions for showers and combined measures in the TDM encyclopedia (VTPI	Yes: Lockers (\$1,200-\$2,950, \$700/bike on average). Racks (\$70-\$2,000, \$70/bike on average).	Yes (Caltrans 2005, Dierkers et al. 2007, VTPI 2007)	Yes (Caltrans 2005, Dierkers et al. 2007, VTPI 2007)	Adverse: No Beneficial: CAPs, TACs	Caltrans, Portland Bicycle Master Plan (City of Portland 1998), CCAP Transportation Emissions Guidebook (Dierkers et al. 2007), SMAQMD Recommended Guidance for Land Use Emission Reductions (SMAQMD 2007), VTPI, CA air quality management and control districts, and cities/counties.	Nonresidential projects provide plentiful short- and long-term bicycle parking facilities to meet peak season maximum demand (e.g., one bike rack space per 20 vehicle/employee parking spaces).
MM T-2: End of Trip Facilities	LD (C, M), I, SP, TP, AQP, RR, P/Mobile		Yes	Yes (Caltrans 2005, Dierkers et al. 2007, VTPI 2007)	Yes (Caltrans 2005, Dierkers et al. 2007, VTPI 2007)	Adverse: No Beneficial: CAPs, TACs	Caltrans, Portland Bicycle Master Plan (City of Portland 1998), CCAP Transportation Emissions Guidebook (Dierkers et al. 2007), SMAQMD Recommended Guidance for Land Use Emission Reductions (SMAQMD 2007), VTPI, CA air quality management and control districts, and cities/counties.	Nonresidential projects provide "end-of-trip" facilities including showers, lockers, and changing space (e.g., four clothes lockers and one shower provided for every 80 employee parking spaces, separate facilities for each gender for projects with 160 or more employee parking spaces).
MM T-3: Bike-Parking at Multi-	LD (R, M), SP, AQP, RR,	measures in the TDM encyclopedia (VTPI	Yes: Lockers (\$1,200-	Yes (Caltrans 2005,	Yes (Caltrans 2005,	Adverse: No Beneficial:		Long-term bicycle parking is provided at apartment

AG=Attorney General; ARB=California Air Resources Board; ASTM=American Society for Testing and Material; BAAQMD=Bay Area Air Quality Management District; BEES= Building for Environmental and Economic Sustainability; CA=California; Caltrans=California Department of Transportation; CAPs=Criteria Air Pollutants; CCAP=Center for Clean Air Policy; CF=Connectivity Factor; CIWMB=California Integrated Waste Management Board; CO= Carbon Monoxide; CO₂=Carbon Dioxide; DGS=Department of General Services; DOE=U.S. Department of Energy; DPF=Diesel particulate Filter; E85=85% Ethanol; EERE=Energy Efficiency and Renewable Energy; EOE=Encyclopedia of Earth; EPA=U.S. Environmental Protection Agency; ETC=Edmonton Trolley Coalition; EVs/CNG=Electric Vehicles/Compressed Natural Gas; FAR=Floor Area Ratio; GHG=Greenhouse Gas; ITE=Institute of Transportation Engineers; kg/m³=kilogram per square meter; km=Kilometer; lb=pound; LEED=Leadership in Energy and Environmental Design; M=Million; NA=Not Available; NEV=Neighborhood Electric Vehicle; NIST=National Institute of Standards and Technology; NO_x=Oxides of Nitrogen; NREL=National Renewable Energy Laboratory; NS=Norfolk/South; PG&E=Pacific Gas and Electric; PM=Particulate Matter; SIVAPCD=San Joaquin Valley Air Pollution Control District; SMAQMD=California Air Quality Management District; SMUD=San Joaquin Municipal Utilities District; SO_x=Sulfur Oxides; SRI=Solar Reflectance Index; TACs=Toxic Air Contaminants; TDM=Transportation Demand Management; TMA=Transportation Management Association; THC=Total Hydrocarbon; ULEV=Ultra Low Emission Vehicle; USGBC=U.S. Green Building Council; and VTPI=Victoria Transit Policy.

Mitigation Measure Summary		Mitigation Measure Summary		Mitigation Measure Summary	
Mitigation Measure	Applicable Project/Source Type ¹	Effective	Cost (Yes/No) ³	Technical ⁴	Logistical ⁵
		Emissions Reduction/Score ²			
Joint Residential	P/Mobile	2007). JSA bases estimates on CCAP information (JSA 2004).	\$2,950, \$700/bike on average), Racks (\$70-\$2,000, \$70/bike on average).	Dierkers et al. 2005, VTPI 2007)	2005, CAPs, TACs Dierkers et al. 2007, VTPI 2007)
<p>complexes or condominiums without garages (e.g., one long-term bicycle parking space for each unit without a garage). Long-term facilities shall consist of one of the following: a bicycle locker, a locked room with standard racks and access limited to bicyclists only, or a standard rack in a location that is staffed and/or monitored by video surveillance 24 hours per day.</p>					
<p>Entire project is located within one-half mile of an existing/planned Class I or Class II bike lane and project design includes a comparable network that connects the project uses to the existing offsite facility. Project design includes a designated bicycle route connecting all units, on-site bicycle parking facilities, offsite bicycle facilities, site entrances, and primary building entrances to existing Class I or Class II bike lane(s) within one-half mile. Bicycle route connects to all streets contiguous with project site. Bicycle route has minimum conflicts with automobile parking and circulation</p>					

**Table 16
Mitigation Measure Summary**

Mitigation Measure	Applicable Project/Source Type ¹	Effective	Feasible (Yes/No)	Secondary Effects (Yes/No)	Agency/Organization/Other ²	Description/Comments
		Emissions Reduction/Score ²	Technical ⁴	Cost (Yes/No) ³	Logistical ⁵	
						facilities. All streets internal to the project wider than 75 feet have Class II bicycle lanes on both sides.

AG=Attorney General; ARB=California Air Resources Board; ASTM=American Society for Testing and Material; BAAQMD=Bay Area Air Quality Management District; BEES=Building for Environmental and Economic Sustainability; CA=California; Caltrans=California Department of Transportation; CAFs=Criteria Air Pollutants; CCAP=Center for Clean Air Policy; CF=Connecticut Factor; CIWMB=California Integrated Waste Management Board; CO=Carbon Monoxide; CO₂=Carbon Dioxide; DGS=Department of General Services; DOE=U.S. Department of Energy; DPF=Diesel particulate Filter; E85=85% Ethanol; EERE=Energy Efficiency and Renewable Energy; EOE=Encyclopedia of Earth; EPA=U.S. Environmental Protection Agency; ETC=Edmonton Trolley Coalition; EVs/CNG=Electric Vehicles/Compressed Natural Gas; FAR=Floor Area Ratio; GHC=Greenhouse Gas; ITE=Institute of Transportation Engineers; kg/m³=kilogram per square meter; km=Kilometer; lb=pound; LEED=Leadership in Energy and Environmental Design; M=Million; NA=Not Available; NEV=Neighborhood Electric Vehicle; NIST=National Institute of Standards and Technology; NO_x=Oxides of Nitrogen; NREL=National Renewable Energy Laboratory; N/S=North/South; PG&E=Pacific Gas and Electric; PM=Particulate Matter; SJVAPCD=San Joaquin Valley Air Pollution Control District; SMAQMD=Sacramento Metropolitan Air Quality Management District; SMUD=Sacramento Municipal Utilities District; SO₂=Sulfur Oxides; SRI=Solar Reflectance Index; TACs=Toxic Air Contaminants; TDM=Transportation Demand Management; TMA=Transportation Management Association; THC=Total Hydrocarbon; ULEV=Ultra Low Emission Vehicle; USGBC=U.S. Green Building Council; and VTPI=Victoria Transit Policy.

Mitigation Measure Summary		Feasible (Yes/No)		Secondary Effects (Yes/No)		Agency/Organization/Other ^f		Description/Comments	
Mitigation Measure	Applicable Project/Source Type ^e	Effective	Cost (Yes/No) ³	Technical ⁴	Logistical ⁵	Adverse: No	Beneficial: Yes		
		Emissions Reduction/Score ²	Yes	(Dierkers et al. 2007, VTPI 2007)	(Dierkers et al. 2007, VTPI 2007)	Yes	Yes		
MM T-5: Pedestrian Network	LD (R, C, M), I, SP, TP, AQP, RR, P/Mobile	1%-10%/High; CCAP presents combined % reductions for a range of mitigation measures (Dierkers et al. 2007). SMAQMD allocates 1% for each individual measure (TIAX 2005, EDAW 2006, SMAQMD 2007).	Yes	Y: (Dierkers et al. 2007, VTPI 2007) N: (Dierkers et al. 2007, VTPI 2007)	Y: (Dierkers et al. 2007, VTPI 2007) N: (Dierkers et al. 2007, VTPI 2007)	Adverse: No Beneficial: CAPs, TACs	CCAP Transportation Emissions Guidebook (Dierkers et al. 2007), SMAQMD Recommended Guidance for Land Use Emission Reductions (SMAQMD 2007), VTPI, CA air quality management and control districts, and cities/counties.	The project provides a pedestrian access network that internally links all uses and connects to all existing/planned external streets and pedestrian facilities contiguous with the project site. Project design includes a designated pedestrian route interconnecting all internal uses, site entrances, primary building entrances, public facilities, and adjacent uses to existing external pedestrian facilities and streets. Route has minimal conflict with parking and automobile circulation facilities. Streets (with the exception of alleys) within the project have sidewalks on both sides. All sidewalks internal and adjacent to project site are minimum of five feet wide. All sidewalks feature vertical curbs. Pedestrian facilities and improvements such as grade separation, wider sidewalks, and traffic calming are implemented wherever feasible to minimize pedestrian barriers. All site entrances provide pedestrian access.	
MM T-6: Pedestrian	LD (R, C, M), I, SP, TP,		Yes	Y: (Dierkers et al. 2007, VTPI 2007) N: (Dierkers et al. 2007, VTPI 2007)	Y: (Dierkers et al. 2007, VTPI 2007) N: (Dierkers et al. 2007, VTPI 2007)	Adverse: No Beneficial:		Site design and building placement minimize barriers to	

**Table 16
Mitigation Measure Summary**

Mitigation Measure	Applicable Project/Source Type ¹	Effective	Feasible (Yes/No)	Secondary Effects (Yes/No)	Agency/Organization/Other ²	Description/Comments
		Emissions Reduction/Score ²	Cost (Yes/No) ³	Technical ⁴	Logistical ⁵	
Barriers Minimized	AQP, RR, P/Mobile		VTPI 2007	al. 2007, VTPI 2007	CAPs, TACs	pedestrian access and interconnectivity. Physical barriers such as walls, berms, landscaping, and slopes between residential and nonresidential uses that impede bicycle or pedestrian circulation are eliminated.
MM T-7: Bus Shelter for Existing/Planned Transit Service	LD (R, C, M), I, SP, TP, AQP, RR, P/Mobile	1%-2%/High: CCAP presents these % reductions (Dierkers et al., 2007). SMAQMD assigns from .25%-1%, depending on headway frequency (TIAx 2005, EDAW 2006, SMAQMD 2007).	Yes: \$15,000-\$70,000.	Yes (Dierkers et al. 2007, VTPI 2007)	Adverse: No Beneficial: CAPs, TACs	Bus or streetcar service provides headways of one hour or less for stops within one-quarter mile; project provides safe and convenient bicycle/pedestrian access to transit stop(s) and provides essential transit stop improvements (i.e., shelters, route information, benches, and lighting).

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Mitigation Measure Summary		Mitigation Measure Summary		Mitigation Measure Summary		
Mitigation Measure	Applicable Project/Source Type ¹	Effective	Cost (Yes/No) ³	Chemical ⁴	Logistical ⁵	
		Emissions Reduction/Score ²				
MM T-8: Traffic Calming	LD (R, C, M), I, SP, TP, AQP, RR, P/Mobile	1%-10%/High: CCAP presents combined % reductions for a range of mitigation measures (Dierkers et al. 2007). SMAQMD allocates .25%-1.0% for each individual measure depending on percent of intersections and streets with improvements (TIA X 2005, ED A W 2006, SMAQMD 2007).	Yes	Yes	Yes	<p>Project design includes pedestrian/bicycle safety and traffic calming measures in excess of jurisdiction requirements. Roadways are designed to reduce motor vehicle speeds and encourage pedestrian and bicycle trips by featuring traffic calming features. All sidewalks internal and adjacent to project site are minimum of five feet wide. All sidewalks feature vertical curbs. Roadways that converge internally within the project are routed in such a way as to avoid "skewed intersections," which are intersections that meet at acute, rather than right, angles. Intersections internal and adjacent to the project feature pedestrian safety/traffic calming design techniques: marked crosswalks, count-down signal timers, curb extensions, speed tables, raised crosswalks, raised intersections, median islands, tight corner radii, and roundabouts or mini-circles. Streets internal and adjacent to the project feature pedestrian safety/traffic calming measures such as on-street parking, planter strips with street trees,</p>

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Mitigation Measure Summary**

Mitigation Measure	Applicable Project/Source Type ¹	Effective	Feasible (Yes/No)	Secondary Effects (Yes/No)	Agency/Organization/Other ⁶	Description/Comments
		Emissions Reduction/Score ²	Cost (Yes/No) ³	Technical ⁴	Logistical ⁵	
<i>Parking Measures</i>						
MM T-9; Paid Parking (Parking Cash Out)	LD (C, M), I, SP, TP, AQP, RR, P/Mobile	1%-30%/High: CCAP presents a range of 15%-30% reduction for parking programs (Dierkers et al. 2007). SMAQMD presents a range of 1.0%-7.2%, depending on cost/day and distance to transit (TIAx 2005, EDAW 2006, SMAQMD 2007). Shoupe presents a 21% reduction [\$5/day for commuters to downtown LA, with elasticity of -0.18 (e.g., if price increases 10%, then solo driving goes down by 1.8% more)] (Shoupe 2005). Urban Transit Institute	Yes: Vary by location and project size.	Yes (Dierkers et al. 2007, VTPI 2007)	Adverse: No Beneficial: CAPs, TACs	Project provides employee and/or customer paid parking system. Project must have a permanent and enforceable method of maintaining user fees for all parking facilities. The facility may not provide customer or employee validations. Daily charge for parking must be equal to or greater than the cost of a transit day/monthly pass plus 20%.
						and chicanes/chokers (variations in road width to discourage high-speed travel).

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Mitigation Measure Summary		Mitigation Measure Summary		Mitigation Measure Summary	
Mitigation Measure	Applicable Project/Source Type ¹	Effective	Feasible (Yes/No)	Agency/Organization/Other ⁶	Description/Comments
		Emissions Reduction/Score ²	Technical ⁴	Logistical ⁵	
		Cost (Yes/No) ³			
MM T-10: Minimum Parking	LD (R, C, M), I, SP, TP, AQP, RR, P/Mobile	<p>presents a range of 1%-10% reduction in trips to central city sites, and 2%-4% in suburban sites (VTPI 2007).</p> <p>1%-30%/High: CCAP presents a range of 15%-30% reduction for parking programs (Dierkers et al. 2007). SMAQMD presents a maximum of 6% (Nelson/Nygaard Consulting Associates, 2005, TIAX 2005, EDAW 2006).</p>	<p>Yes</p> <p>Y V</p>	<p>Adverse: No Beneficial: CAPs, TACs</p>	<p>Provide minimum amount of parking required. Once land uses are determined, the trip reduction factor associated with this measure can be determined by utilizing the ITE parking generation publication. The reduction in trips can be computed as shown below by the ratio of the difference of minimum parking required by code and ITE peak parking demand to ITE peak parking demand for the land uses multiplied by 50%. Percent Trip Reduction = 50 * [(min parking required by code - ITE peak parking demand) / (ITE peak parking demand)]</p>

Table 16 Mitigation Measure Summary								
Mitigation Measure	Applicable Project/Source Type ¹	Effective	Cost (Yes/No) ³	Technical ⁴	Logistical ⁵	Secondary Effects (Yes/No)	Agency/Organization/Other ⁶	Description/Comments
MM T-11: Parking Reduction Beyond Code/Shared Parking	LD (R, C, M), I, SP, TP, AQP, RR, P/Mobile	Emissions Reduction/Score ² 1%-30%/High: CCAP presents a range of 15%-30% reduction for parking programs (Dierkers et al. 2007). SMAQMD presents a maximum of 12% (Nelson/Nygaard, 2005, TIA X 2005, EDAW 2006).	Yes	Yes (Dierkers et al. 2007, VTPI 2007)	Yes (Dierkers et al. 2007, VTPI 2007)	Adverse: No Beneficial: CAPs, TACs		Provide parking reduction less than code. This measure can be readily implemented through a shared parking strategy, wherein parking is utilized jointly among different land uses, buildings, and facilities in an area that experience peak parking needs at different times of day and day of the week.
MM T-12: Pedestrian Pathway Through Parking	LD (R, C, M), I, SP, TP, AQP, RR, P/Mobile	1%-4%/Moderate: CCAP presents combined % reductions for a range of mitigation measures (Dierkers et al. 2007). SMAQMD allocates 0.5% reduction for this measure (TIA X 2005, EDAW 2006, SMAQMD 2007).	Yes	Yes (Dierkers et al. 2007, VTPI 2007)	Yes (Dierkers et al. 2007, VTPI 2007)	Adverse: No Beneficial: CAPs, TACs		Provide a parking lot design that includes clearly marked and shaded pedestrian pathways between transit facilities and building entrances.

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Mitigation Measure Summary		Emissions Reduction/Score ²		Cost (Yes/No) ³		Technical ⁴		Logistical ⁵		Feasible (Yes/No)		Secondary Effects (Yes/No)		Agency/Organization/Other ⁶		Description/Comments	
Mitigation Measure	Applicable Project/Source Type ¹	Effective	Cost (Yes/No) ³	Technical ⁴	Logistical ⁵	Feasible (Yes/No)	Secondary Effects (Yes/No)	Agency/Organization/Other ⁶	Description/Comments								
MM T-13: Off-Street Parking	LD (R, C, M), I, SP, TP, AQP, RR, P/Mobile	1%-4%/Moderate: CCAP presents combined % reductions for a range of mitigation measures (Dierkers et al. 2007). SMAQMD allocates a range of 0.1%-1.5% for this measure (TIAX 2005, EDWA 2006, SMAQMD 2007).	Yes	Y (Dierkers et al. 2007, VTPI 2007)	Yes	Adverse: No Beneficial: CAPs, TACs		Parking facilities are not adjacent to street frontage.									
MM T-14: Parking Area Tree Cover	LD (R, C, M), I, SP, TP, AQP, RR, P/Mobile	Annual net CO ₂ reduction of 3.1 kg/m ² canopy cover/Moderate (McPherson 2001).	Yes: \$19 per new tree for CA, cost varies for removal and replacement (McPherson 2001).	Yes	Yes	Adverse: VOCs Beneficial: CAPs, TACs	AG, State of CA Department of Justice (Goldberg 2007) and cities/counties (e.g., parking lot ordinances in Sacramento, Davis, and Los Angeles, CA).	Provide parking lot areas with 50% tree cover within 10 years of construction, in particular low emitting, low maintenance, native drought resistant trees. Reduces urban heat island effect and requirement for air conditioning, effective when combined with other measures (e.g., electrical maintenance equipment and reflective paving material).									
MM T-15: Valet Bicycle Parking	LD (C, M), SP, AQP, TP, RR, P/Mobile	NA/Low	Yes	Yes	Yes: Raley Field (Sacramento, CA)	Adverse: No Beneficial: CAPs, TACs	Raley Field (Sacramento, CA).	Provide spaces for the operation of valet bicycle parking at community event "centers" such as amphitheaters, theaters, and stadiums.									
MM T-16: Garage Bicycle Storage	LD (R, M), SP, AQP, TP, RR, P/Mobile	NA/Low	Yes: Less than \$200/multiple bike rack.	Yes	Yes	Adverse: No Beneficial: CAPs, TACs	City of Fairview, OR	Provide storage space in one-car garages for bicycles and bicycle trailers.									

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Mitigation Measure	Applicable Project/Source Type ¹	Effective	Cost (Yes/No) ³	Technical ⁴	Logistical ⁵	Agency/Organization/Other	Description/Comments	
		Emissions Reduction/Score ²				Secondary Effects (Yes/No)		
MM T-17: Preferential Parking for EVs/CNG Vehicles	LD (C, M), I, SP, TP, AQP, RR, P/Mobile	NA/Low	Yes	Yes	Yes	Adverse: No Beneficial: CAPs, TACs	USGBC, CA air quality management and control districts and cities/counties (e.g., BAAQMD).	Provide preferential parking space locations for EVs/CNG vehicles.
MM T-18: Reduced/No Parking Fee for EVs/CNG Vehicles	LD (C, M), I, SP, TP, AQP, RR, P/Mobile	NA/Low	Yes	Yes	Yes	Adverse: No Beneficial: CAPs, TACs	Hotels (e.g., Argonaut in San Francisco, CA)	Provide a reduced/no parking fee for EVs/CNG vehicles.

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Mitigation Measure		Applicable Project/Source Type ¹	Effective	M		gation Measure Summary		Secondary Effects (Yes/No)	Agency/Organization/Other ⁶	Description/Comments
			Emissions Reduction/Score ²	Cost (Yes/No) ³	Technical ⁴	Logistical ⁵	Feasible (Yes/No)	Adverse: No Beneficial: (Yes/No)		
<i>Miscellaneous Measures</i>										
MM T-19: TMA Membership	LD (R, C, M), I, SP, TP, AQP, RR, P/Mobile	1%-28%/High: CCAP presents a range of 3%-25% for TDMs with complementary transit and land use measures (Dierkers et al. 2007). VTPI presents a range of 6%-7% in the TDM encyclopedia (VTPI 2007). URBEMIS offers a 2%-10% range in reductions for a TDM that has 5 elements that are pedestrian and transit friendly and 1%-5% for 3 elements. SMAQMD presents a reduction of 5% (TIAX 2005, EDAW 2006, SMAQMD 2007).	Yes	Yes	Yes (Dierkers et al. 2007, VTPI 2007)	Yes (Dierkers et al. 2007, CAPs, TACs VTPI 2007)	Adverse: No Beneficial: CAPs, TACs (e.g., SMAQMD).	CA air quality management and control districts and cities/counties (e.g., SMAQMD).	Facilities District or County Service Area or other nonrevocable funding mechanism. TDMs have been shown to reduce employee vehicle trips up to 28% with the largest reductions achieved through parking pricing and transit passes. The impact depends on the travel alternatives.	
MM T-20: ULEV	LD (R, C, M), I, SP, TP, AQP, RR, P/Mobile	NA/Low	Yes: Higher than corresponding gasoline models.	Yes	Yes	Yes: Fueling stations might not be readily available depending on location. More than 900 E85 fueling	Adverse: No Beneficial: CAPs, TACs (e.g., SMAQMD).	DGS, CA air quality management and control districts and cities/counties (e.g., SMAQMD).	Use of and/or provide ULEV that are 50% cleaner than average new model cars (e.g., natural gas, ethanol, electric).	

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Mitigation Measure	Applicable Project/Source Type ¹	Effective	Cost (Yes/No) ³	Technical ⁴	Logistical ⁵	Secondary Effects (Yes/No)	Agency/Organization/Other ⁶	Description/Comments
		Emissions Reduction/Score ²						
MM T-21: Flex Fuel Vehicles	LD (R, C, M), I, SP, TP, AQP, RR, P/Mobile	5466.97 lb GHG/year/Low (DOE Fuel Economy)	Yes: E85 costs less than gasoline per gallon, but results in lower fuel economy.	Yes	Yes: More than 900 E85 fueling stations in the U.S., 5 in CA. Vehicles available in select regions only	Adverse: Yes Issues with the energy intensive ethanol production process (e.g., wastewater treatment requirements). Beneficial: CAPs, TACs	DGS, CA air quality management and control districts and cities/counties (e.g., SJVAPCD).	Use of and/or provide vehicles that utilize gasoline/ethanol blends (e.g., E85).
Design								
Commercial & Residential Building Design Measures								
MM D-1: Office/Mixed Use Density	LD (C, M), SP, TP, AQP, RR, P/Mobile	0.05%-2%/Moderate: This range is from SMAQMD, depending	Yes	Yes (VTPI 2007)	Yes (VTPI 2007)	Adverse: No Beneficial: CAPs, TACs	CA air quality management and control districts and cities/counties to transit. Project must provide	Project provides high density office or mixed-use proximate to transit. Project must provide

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Mitigation Measure Summary		Mitigation Measure Summary		Mitigation Measure Summary		
Mitigation Measure	Applicable Project/Source Type ¹	Effective	Mitigation Measure	Feasible (Yes/No)	Agency/Organization/Other ⁶	Description/Comments
		Emissions Reduction/Score ²	Cost (Yes/No) ³	Technical ⁴	Logistical ⁵	
		on FAR and headway frequencies (Nelson/Nygaard Consulting Associates 2005, EDW 2006, SMAQMD 2007).	Yes	Yes	(e.g., SMAQMD).	safe and convenient pedestrian and bicycle access to all transit stops within one-quarter mile.
MM D-2: Orientation to Existing/Planned Transit, Bikeway, or Pedestrian Corridor	LD (R, C, M), I, SP, TP, AQP, RR, P/Mobile	0.4%-1%/Moderate: CCAP attributes a 0.5% reduction per 1% improvement in transit frequency (Dierkers et al. 2007). SMAQMD presents a range of 0.25%-5% (JSA 2005, EDW 2006, SMAQMD 2007).	Yes	Yes	CA air quality management and control districts and cities/counties (e.g., SMAQMD).	Project is oriented towards existing transit, bicycle, or pedestrian corridor. Setback distance between project and existing or planned adjacent uses is minimized or nonexistent. Setback distance between different buildings on project site is minimized. Setbacks between project buildings and planned or existing sidewalks are minimized. Buildings are oriented towards existing or planned street frontage. Primary entrances to buildings are located along planned or existing public street frontage. Project provides bicycle access to any planned bicycle corridor(s). Project provides pedestrian access to any planned pedestrian corridor(s).
MM D-3: Services Operational	LD (R, C, M), I, SP, TP, AQP, RR, P/Mobile	0.5%-5%/Moderate	Yes	Yes	Adverse: No Beneficial: CAPs, TACs	Project provides on-site shops and services for employees.

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Mitigation Measure Summary**

Mitigation Measure	Applicable Project/Source Type ¹	Effective	Cost (Yes/No) ²	Technical ⁴	Logistical ⁵	Secondary Effects (Yes/No)	Agency/Organization/Other ⁶	Description/Comments
MM D-4: Residential Density (Employ Sufficient Density for New Residential Development to Support the Use of Public Transit)	LD (R, M), SP, TP, AQP, RR, P/Mobile	Emissions Reduction/Score ² 1%-40%/High: #7, EPA presents a range of 32%-40% (EPA 2006). SMAQMD presents a range of 1%-12% depending on density and headway frequencies (Nelson/Nygaard Consulting Associates 2005, JSA 2005, EDAW 2006, SMAQMD 2007). Nelson/Nygaard presents a trip reduction formula: Trip Reduction = $0.6 * (1 - (19749 * ((4.814 + \text{households per residential acre}) / (4.814 + 7.14)))^{-0.639}) / 25914$.	Yes	Yes (VTPI 2007, Holtzclaw 2007)	Yes (VTPI 2007, Holtzclaw 2007)	Adverse: No Beneficial: CAPs, TACs	CA air quality management and control districts and cities/counties (e.g., SMAQMD).	Project provides high-density residential development. Transit facilities must be within one-quarter mile of project border. Project provides safe and convenient bicycle/pedestrian access to all transit stop(s) within one-quarter mile of project border.
MM D-5: Street Grid	LD (R, C, M), I, SP, TP, AQP, RR,	1%/Moderate: SMAQMD presents this % reduction (JSA	Yes	Yes (Dierkers et al. 2007, VTPI 2007)	Yes (Dierkers et al. 2007, VTPI 2007)	Adverse: No Beneficial: CAPs, TACs	CA air quality management and control districts and cities/counties measure only applies to projects	Multiple and direct street routing (grid style). This measure only applies to projects

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Table 16 Mitigation Measure Summary		Agency/Organization/Other ⁶		Description/Comments	
Mitigation Measure	Applicable Project/Source Type ¹	Effective	Feasible (Yes/No)	Secondary Effects (Yes/No)	
	Emissions Reduction/Score ²	Cost (Yes/No) ³	Technical ⁴	Logistical ⁵	
P/Mobile	2005, EDAW 2006, SMAQMD 2007).		VTPI 2007)	(e.g., SMAQMD).	with an internal CF >/= 0.80, and average of one-quarter mile or less between external connections along perimeter of project. [CF= # of intersections / (# of cul-de-sacs + intersections)]. Cul-de-sacs with bicycle/pedestrian through access may be considered "complete intersections" when calculating the project's internal connectivity factor. External connections are bike/pedestrian pathways and access points, or streets with safe and convenient bicycle and pedestrian access that connect the project to adjacent streets, sidewalks, and uses. If project site is adjacent to undeveloped land; streets, pathways, access points, and right-of-ways that provide for future access to adjacent uses may count for up to 50% of the external connections. Block perimeter (the sum of the measurement of the length of all block sides) is limited to no more than 1,350 feet. Streets internal to the project should connect to streets external to the project whenever possible.

Table 16 Mitigation Measure Summary							
Mitigation Measure	Applicable Project/Source Type ¹	Effective	Feasible (Yes/No)		Secondary Effects (Yes/No)	Agency/Organization/Other ⁶	Description/Comments
			Cost (Yes/No) ³	Technical ⁴			
		Emissions Reduction/Score ²					
MM D-6: NEV Access	LD (R, C, M), SP, TP, AQP, RR, P/Mobile	0.5%-1.5%/Low: SMAQMD presents this % reduction (EDAW 2006, SMAQMD 2007).	Yes	Yes (Litman 1999, Sperling 1994)	Yes (Litman 1999, Sperling 1994)	Adverse: No Beneficial: CAPs, TACs	CA air quality management and control districts and cities/counties (e.g., SMAQMD). Make physical development consistent with requirements for neighborhood electric vehicles. Current studies show that for most trips, NEVs do not replace gas-fueled vehicles as the primary vehicle.
MM D-7: Affordable Housing Component	LD (R, M), SP, TP, AQP, RR, P/Mobile	0.4%-6%/Moderate: SMAQMD presents this % reduction (Nelson/Nygaard Consulting Associates 2005, EDAW 2006, SMAQMD 2007).	Yes	Yes	Yes	Adverse: No Beneficial: CAPs, TACs	Residential development projects of five or more dwelling units provide a deed-restricted low-income housing component on-site (or as defined in the code). Developers who pay into In-Lieu Fee Programs are not considered eligible to receive credit for this measure. The award of emission reduction credit shall be based only on the proportion of affordable housing developed on-site because in-lieu programs simply induce a net increase in development. Percentage reduction shall be calculated according to the following formula:

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Mitigation Measure		Applicable Project/Source Type ¹		Effective		Emissions Reduction/Score ²		Cost (Yes/No) ³		Investigation Measure Summary		Description/Comments	
										Feasible (Yes/No)		Agency/Organization/Other ⁶	
										Technical ⁴		Secondary Effects (Yes/No)	
										Logistical ⁵			
MM D-8:	Recharging Area	LD (R, M), SP, TP, AQP, RR, P/Mobile	NA/Low	Yes				Yes	Yes	Adverse: No Beneficial: CAPs, TACs	Yes		% reduction = % units deemed-restricted below market rate housing * 0.04 Provide residential buildings with a "utility" room or space for recharging batteries, whether for use in a car, electric lawnmower, other electric landscaping equipment, or even batteries for small items such as flashlights.
<i>Mixed-Use/Development Measures</i>													
MM D-9:	Urban Mixed-Use	LD (M), SP, TP, AQP, RR, P/Mobile	3%-9%/Moderate: SMAQMD presents this % reduction (TIA X 2005, EDA W 2006, SMAQMD 2007).	Yes				Yes (EPA 2006)	Yes (EPA 2006)	Adverse: No Beneficial: CAPs, TACs	Yes (EPA 2006)		Development of projects predominantly characterized by properties on which various uses, such as office, commercial, institutional, and residential, are combined in a single building or on a single site in an integrated development project with functional interrelationships and a coherent physical design.
MM D-10:	Suburban Mixed-Use	LD (R, C, M), SP, TP, AQP, RR, P/Mobile	3%/Moderate: SMAQMD presents this % reduction (TIA X 2005, EDA W 2006, SMAQMD 2007).	Yes				Yes (EPA 2006)	Yes (EPA 2006)	Adverse: No Beneficial: CAPs, TACs	Yes (EPA 2006)		Have at least three of the following on site and/or offsite within one-quarter mile: Residential Development, Retail Development, Park, Open Space, or Office.
MM D-11:	Other Mixed-Use	LD (R, M), SP, TP, AQP, RR, P/Mobile	1%/Moderate: SMAQMD presents this % reduction (TIA X 2005, EDA W 2007).	Yes				Yes (EPA 2006)	Yes (EPA 2006)	Adverse: No Beneficial: CAPs, TACs	Yes (EPA 2006)		All residential units are within one-quarter mile of parks, schools or other civic uses.

Table 16 Mitigation Measure Summary								
Mitigation Measure	Applicable Project/Source Type ¹	Effective	Cost (Yes/No) ²	Technical ⁴	Logistical ⁵	Secondary Effects (Yes/No)	Agency/Organization/Other ⁶	Description/Comments
		Emissions Reduction/Score ²						
		2006, SMAQMD 2007).						
MM D-12: Infill Development	LD (R, C, M), I, SP, TP, AQP, RR, P/Mobile	3%-30%/High: Infill development reduces vehicle trips and VMT by 3% and 20%, respectively (Fehr & Peers 2007). CCAP identifies a site level VMT reduction range of 20%-30% (Dierkers et al. 2007).	Yes	Yes (Dierkers et al. 2007)	Yes (Dierkers et al. 2007)	Adverse: No Beneficial: CAPs, TACs	CA air quality management and control districts and cities/counties (e.g., SMAQMD).	Project site is on a vacant infill site, redevelopment area, or brownfield or greyfield lot that is highly accessible to regional destinations, where the destinations rating of the development site (measured as the weighted average travel time to all other regional destinations) is improved by 100% when compared to an alternate greenfield site.
<i>Miscellaneous Measures</i>								
MM D-13: Electric Lawnmower	LD (R, M), SP, AQP, RR, P/Area	1%/Low: SMAQMD presents this % reduction (EDA W 2006, SMAQMD 2007).	Yes	Yes	Yes	Adverse: No Beneficial: CAPs, TACs	CA air quality management and control districts and cities/counties (e.g., SMAQMD).	Provide a complimentary electric lawnmower to each residential buyer.

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Table 16 Mitigation Measure Summary		Effective		Cost (Yes/No) ³		Technical ⁴		Logistical ⁵		Secondary Effects (Yes/No)		Agency/Organization/Other ⁶		Description/Comments	
Mitigation Measure	Applicable Project/Source Type ¹	Emissions Reduction/Score ²	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Agency/Organization/Other ⁶	Description/Comments	
MM D-14: Enhanced Recycling/Waste Reduction, Reuse, Composting	LD (R, C, M), NA/Low I, SP, AQP, RR, P/Stationary & Area	NA/Low	Yes		Yes		Yes: Association with social awareness.		Yes: More than 700 buildings of different certifications in CA (USGBC 2007).		Adverse: No Beneficial: CAPs, TACs		CIWMB	Provide infrastructure/education that promotes the avoidance of products with excessive packaging, recycle, buying of refills, separating of food and yard waste for composting, and using rechargeable batteries.	
MM D-15: LEED Certification	LD (R, C, M), NA/Moderate I, SP, AQP, RR, P/Stationary & Area	NA/Moderate	Yes		Yes		Yes: Receive tax rebates, incentives (e.g., EDAW San Diego office interior remodel cost \$1,700,000 for 32,500 square feet) (USGBC 2007)		Yes: More than 700 buildings of different certifications in CA (USGBC 2007).		Adverse: No Beneficial: CAPs, TACs		USGBC, CA air quality management and control districts and cities/counties (e.g., BAAQMD).	LEED promotes a whole-building approach to sustainability by recognizing performance in five key areas of human and environmental health: sustainable site development, water savings, energy efficiency, materials selection, and indoor environmental quality.	
MM D-16: Retro-Commissioning	LD (C, M), I, SP, AQP, RR, P/Stationary & Area	8%-10% reduction in energy usage/Moderate: (Mills et al. 2004)	Yes		Yes		Yes: Average \$0.28/square feet, varies with building size (Haasi and Sharp 1999).		Yes: 27 projects underway in CA, 21 more to be completed in 2007, mostly state buildings owned by DGS (DGS 2007).		Adverse: No Beneficial: CAPs, TACs		DGS, CA air quality management and control districts and cities/counties (e.g., BAAQMD).	The process ensures that all building systems perform interactively according to the contract documents, the design intent and the owner's operational needs to optimize energy performance.	
MM D-17 Landscaping	LD (R, C, M), NA/Low I, SP, AQP, RR,	NA/Low	Yes		Yes		Yes		Yes		Adverse: No Beneficial: CAPs, TACs		Alliance for the Chesapeake Bay, EPA Green Landscaping	Project shall use drought resistant native trees, trees with low emissions and high carbon	

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Table 16 Mitigation Measure Summary						
Mitigation Measure	Applicable Project/Source Type	Effective	Feasible (Yes/No)	Secondary Effects (Yes/No)	Agency/Organization/Other	Description/Comments
		Emissions Reduction/Score ²	Technical ⁴	Logistical ⁵	Cost (Yes/No) ³	
	P/Stationary & Area				Resources	sequestration potential. Evergreen trees on the north and west sides afford the best protection from the setting summer sun and cold winter winds. Additional considerations include the use of deciduous trees on the south side of the house that will admit summer sun; evergreen plantings on the north side will slow cold winter winds; constructing a natural planted channel to funnel summer cooling breezes into the house. Neighborhood CCR's not requiring that front and side yards of single family homes be planted with turf grass. Vegetable gardens, bunch grass, and low-water landscaping shall also be permitted, or even encouraged.
MM D-18: Local LD (M), Farmers' Market Stationary, &			Yes	Yes	Adverse: No Beneficial: Associated with social CAPs, TACs	Project shall dedicate space in a centralized, accessible location for a weekly farmers' market.

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Mitigation Measure Summary		Mitigation Measure Summary				Secondary Effects (Yes/No)	Agency/Organization/Other ⁶	Description/Comments
Mitigation Measure	Applicable Project/Source Type ¹	Effective	Feasible (Yes/No)	Cost (Yes/No) ³	Technical ⁴			
Area		Emissions Reduction/Score ²						
MM D-19: Community Gardens	LD (M), SP/Mobile, Stationary, & Area	NA/Low	Yes	Yes	Yes	choice and public awareness.	Cities/counties (e.g., Davis)	Project shall dedicate space for community gardens.
Energy Efficiency/Building Component								
MM E-1: High-Efficiency Pumps	LD (R, C, M), SP, AQP, RR, P/Stationary & Area	NA/Low	Yes	Yes	Yes	choice and public awareness.	CA air quality management and control districts and cities/counties (e.g., BAAQMD).	Project shall use high-efficiency pumps.
MM E-2: Wood Burning Fireplaces/Stoves	LD (R, M), SP, AQP, RR, P/Stationary & Area	NA/Low: EDAW 2006	Yes	Yes	Yes	Yes	CA air quality management and control districts and cities/counties (e.g., SMAQMD).	Project does not feature fireplaces or wood burning stoves.
MM E-3: Natural Gas Stove	LD (R, M), SP, AQP, RR, P/Stationary & Area	NA/Low: EDAW 2006	Yes: Cost of stove—\$350 (gas) and \$360 (electric) same brand, total yearly cost of \$42.17 as opposed to \$56.65 for electric (Saving Electricity 2006).	Yes	Yes	Yes	CA air quality management and control districts and cities/counties (e.g., SMAQMD).	Project features only natural gas or electric stoves in residences.