

GREENHOUSE GAS THRESHOLDS AND SUPPORTING EVIDENCE



Air Pollution Control District
San Luis Obispo County

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LIST OF ACRONYMS

AB	Assembly Bill
APCD	San Luis Obispo County Air Pollution Control District
APS	Alternative Planning Strategy
ARB	California Air Resources Board
BAAQMD	Bay Area Air Quality Management District
BAU	Business as Usual
CalEEMod	California Emissions Estimator Model
CAP	Climate Action Plan
CEQA	California Environmental Quality Act
CO ₂ e	Carbon Dioxide equivalent
DOF	Department of Finance
EDD	Employment Development Department
EIR	Environmental Impact Report
GHG	Greenhouse Gas
GWP	Global Warming Potential
LCFS	Low Carbon Fuel Standard
LU	Land Use
MMT	Million Metric Tons
MPO	Metropolitan Planning Organization
MT	Metric Tons
RTP	Regional Transportation Plan
SB	Senate Bill
SCAQMD	South Coast Air Quality Management District
SCS	Sustainable Communities Strategy
SLO	San Luis Obispo
SLOCOG	San Luis Obispo County Council of Governments
SP	Service Population (Residents + Employees)

1. INTRODUCTION

The San Luis Obispo County Air Pollution Control District (APCD) is a local public agency with the primary mission of realizing and preserving clean air for all county residents and businesses. The APCD's California Environmental Quality Act (CEQA) Air Quality Handbook (Handbook) is one tool for implementing this mission. The Handbook serves as a general guide for lead agencies, consultants, project proponents, and the general public on quantifying project construction and operational emission impacts, comparing those impacts to APCD significance thresholds, and applying appropriate mitigation measures when necessary. The APCD typically acts as a concerned agency (land use projects) or a responsible agency (APCD permit required) in the CEQA process, but can also be designated as the lead or co-lead agency for some projects.

The APCD's CEQA Air Quality Handbook was first released in 1997 and was updated in 2003. These editions primarily focused on evaluating and mitigating the emissions of traditional criteria air pollutants (ozone precursors and particulate matter) from new development. Subsequently, a considerable shift in air quality issues and priorities occurred at both state and local levels. This shift resulted in State programmatic changes and new legislation that placed greater focus on reducing and mitigating health and air quality impacts from toxic diesel particulate matter (DPM) and greenhouse gas (GHG) emissions. The APCD Board adopted significant changes to the Handbook in December 2009 to add comprehensive guidance for toxic DPM and staff is now proposing GHG thresholds of significance and applicable mitigation measures to help lead agencies meet the GHG reduction goals of Assembly Bill (AB) 32, the California Global Warming Solutions Act¹.

In 2007, through the adoption of Senate Bill (SB) 97, California's lawmakers identified the need to analyze greenhouse gas emissions as a part of the CEQA process. Even in the absence of adopted CEQA thresholds for GHG emissions, lead agencies are required to analyze the GHG emissions of proposed projects and must reach a conclusion regarding the significance of those emissions. The proposed GHG thresholds for SLO County provide guidance for lead agencies to implement new development in a manner that will help our region provide its share of the GHG reductions outlined in AB 32. To meet these reduction goals, development in the County must become more sustainable with a focus on energy efficient mixed use urban infill and redevelopment that reduces vehicle dependency and expands alternative transportation modes, all of which supports SLO County's Clean Air Plan². While building efficiency has significantly improved in California over the years and continues to improve, the necessary reductions cannot be achieved by one area or sector alone. It will require careful consideration of site design, location, transportation, energy efficiency, water and waste handling.

¹ San Luis Obispo County Air Pollution Control District. 2009 (December). *APCD CEQA Air Quality Handbook*. San Luis Obispo, CA. Available: www.slocleanair.org/business/regulations.php#ceqa-handbook. Accessed December 1, 2011.

² San Luis Obispo County Air Pollution Control District. 2001. *Clean Air Plan San Luis Obispo County*. San Luis Obispo, CA. Available: <http://www.slocleanair.org/business/pdf/CAP.pdf>. Accessed December 1, 2011

Since the adoption of our 2009 Handbook, a number of agencies in California have subsequently developed GHG thresholds of significance for new development being evaluated under CEQA. Extensive research was conducted by the APCD to determine the most appropriate methodology for establishing GHG thresholds for our county³. After reviewing the GHG threshold analyses performed by other Air Districts and discussions with the California Attorney General, the California Office of Planning and Research and the Center for Biodiversity, staff determined the methodology used by the Bay Area Air Quality Management District (BAAQMD) was the most appropriate approach. Although SLO County's size and population is not comparable to that of the Bay Area, the technical approach they used to develop appropriate GHG thresholds for their regions was found to be scientifically sound and supported the State's effort to reach defined GHG reduction goals. The methodology employed by the BAAQMD was applied to specific data for SLO County and used to define the land use threshold for our region.

This document provides the necessary substantial evidence⁴ in support of the GHG thresholds of significance that the APCD developed. Once adopted by the APCD Board, the 2009 CEQA Air Quality Handbook will be updated to include these thresholds. The APCD will then recommend lead agencies within the county use the adopted GHG thresholds of significance when considering the significance of GHG impacts of new projects subject to CEQA. Projects with GHG emissions that exceed the thresholds will need to implement mitigation to reduce the impacts to less than significant. This process can be accomplished through a Mitigated Negative Declaration or an Environmental Impact Report.

2. GREENHOUSE GAS THRESHOLDS

No single land use project could generate enough GHG emissions to noticeably change the global average temperature. Cumulative GHG emissions, however, contribute to global climate change and its significant adverse environmental impacts. Thus, the primary goal in adopting GHG significance thresholds, analytical methodologies, and mitigation measures is to ensure new land use development provides its fair share of the GHG reductions needed to address cumulative environmental impacts from those emissions. As reviewed herein, climate change impacts include an increase in extreme heat days, higher ambient concentrations of air pollutants, sea level rise, impacts to water supply and water quality, public health impacts, impacts to ecosystems, impacts to agriculture, and other environmental impacts.

³ Mathison, Nancy. 2010 (December). *Emerging Trends in Greenhouse Gas Thresholds of Significance for Use under the California Environmental Quality Act*. Master's Thesis, California Polytechnic State University.

⁴ As defined in the California Public Resources code (§21080(c)) "Substantial evidence" includes facts, reasonable assumptions, predicted upon facts, or an expert opinion supported by facts, but does not include argument, speculation, unsubstantiated opinion or narrative, evidence that is clearly inaccurate erroneous, or evidence of social or economic impacts that do not contribute to, or are not caused by, physical impacts on the environment.; see also CEQA Guidelines §15384.

2.1 JUSTIFICATION FOR ESTABLISHING GHG THRESHOLDS

The APCD's approach to developing a threshold of significance for GHG emissions is to identify the emissions level for which a project would not be expected to substantially conflict with existing California legislation adopted to reduce statewide GHG emissions. If a project has the potential to generate GHG emissions above the threshold level, it would be considered a substantial contribution to a cumulative impact and therefore significant. If mitigation can be applied to lessen the emissions such that the project meets its share of emission reductions needed to address the cumulative impact, the project would normally be considered less than significant.

The APCD's framework for developing a GHG threshold for land development projects is based on comprehensive policy and regulatory analysis, as well as considerable technical evaluation of development trends in SLO County.

Scientific and Regulatory Justification

Climate Science Overview

Prominent GHG emissions that contribute to the greenhouse effect are carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons, chlorofluorocarbons, and sulfur hexafluoride. Human-caused emissions of these GHGs in excess of natural ambient concentrations are responsible for intensifying the natural greenhouse effect and have led to a trend of unnatural warming of the earth's climate, known as global climate change or global warming.

According to Article 2 of the United Nations Framework Convention on Climate Change (UNFCCC), "Avoiding Dangerous Climate Change" means: *"stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system"*⁵. Dangerous climate change defined in the UNFCCC is based on several key indicators including the potential for severe degradation of coral reef systems, disintegration of the West Antarctic Ice Sheet, and shut down of the large-scale, salinity- and thermally-driven circulation of the oceans. The global atmospheric concentration of carbon dioxide has increased from a pre-industrial value of about 280 ppm to 370 ppm currently⁶. "Avoiding dangerous climate change" is generally understood to be achieved by stabilizing global average temperature to 2 degrees Celsius above pre-industrial levels. It is estimated that global atmospheric levels of carbon

⁵ United Nations Framework Convention on Climate Change. 2009. Article 2 of the UNFCCC. Available: http://unfccc.int/essential_background/convention/background/items/2536.php. Accessed December 1, 2011.

⁶ United Nations Framework Convention on Climate Change. 2011. Essential Background > Basic Facts & Figures. Available: http://unfccc.int/essential_background/basic_facts_figures/items/6246.php. Accessed December 1, 2011.

dioxide equivalent (CO₂e⁷) cannot exceed 450 ppm if we are to prevent global temperatures from rising above 2 degrees Celsius⁸.

Executive Order S-3-05

Executive Order S-3-05, signed by Governor Schwarzenegger in 2005, proclaims California's vulnerability to the impacts of climate change, including potentially significant reductions in the Sierra snowpack, further exacerbation of air quality problems and rising sea levels. To combat those concerns, the Executive Order established specific targets to reduce GHG emissions statewide to the level of year 2000 emissions by 2010, to 1990 levels by 2020, and to 80% below the 1990 level by 2050.

Assembly Bill 32, the California Global Warming Solutions Act of 2006

In September 2006, Governor Arnold Schwarzenegger signed Assembly Bill (AB) 32, the California Global Warming Solutions Act of 2006, which set the 2020 GHG emissions reduction goal into law. AB 32 finds and declares that "Global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California." AB 32 requires that statewide GHG emissions be reduced to 1990 levels by 2020, and establishes regulatory reporting, voluntary and market-based mechanisms to achieve quantifiable reductions in GHG emissions to meet the statewide goal.

In December of 2008, ARB adopted its *Climate Change Scoping Plan (Scoping Plan)*, which is the State's plan to achieve GHG reductions in California, as required by AB 32⁹. The Scoping Plan contains strategies California will implement to reduce GHG emissions to 1990 levels by 2020. This will require a reduction of 80 million metric tons (MMT) CO₂e emissions, an approximate 16% reduction from the state's projected 2020 emission level of 507 MMT of CO₂e under a business-as-usual (BAU) scenario; this is a reduction of 33 MMT of CO₂e, or almost 7%, from 2008 GHG emissions. The AB 32 Scoping Plan is ARB's plan for meeting this mandate (ARB 2011). While the Scoping Plan does not specifically identify GHG emission reductions from the CEQA process for meeting AB 32 derived emission limits, the scoping plan acknowledges that "other strategies to mitigate climate change . . . should also be explored." The Scoping Plan also acknowledges that "Some of the measures in the plan may deliver more emission reductions than we expect; others less . . . and new ideas and strategies will emerge." In addition, climate change is considered a significant environmental issue and, therefore, warrants consideration under CEQA.

⁷ CO₂e, or Carbon Dioxide equivalent is a metric measure used to compare the emissions from various greenhouse gases based upon their global warming potential (GWP). The carbon dioxide equivalent for a gas is derived by multiplying the tons of the gas by the associated GWP.

⁸ United Nations Framework Convention on Climate Change. 2011. Essential Background > Basic Facts & Figures. Available: http://unfccc.int/essential_background/basic_facts_figures/items/6246.php. Accessed December 1, 2011.

⁹ California Air Resources Board. 2008 (December). Climate Change Scoping Plan. Sacramento, CA. Available: <http://www.arb.ca.gov/cc/scopingplan/document/scopingplandocument.htm>. Accessed December 1, 2011.

The AB 32 Scoping Plan establishes the policy intent to control numerous GHG sources through regulatory, incentive and market-based means. CEQA is an important and supporting tool in achieving the required GHG reductions; local adoption of GHG emission thresholds of significance for stationary sources (industrial) and land use development projects (residential and commercial) is important in assisting that effort.

Senate Bill 97

SB 97, signed in August 2007, represents the State Legislature's confirmation of this fact by directing the Governor's Office of Planning and Research (OPR) to develop CEQA Guidelines for evaluation of GHG emissions impacts and recommend mitigation strategies. In response, OPR released the *Technical Advisory: CEQA and Climate Change* (OPR 2008), and proposed revisions to the State CEQA guidelines (April 14, 2009) for consideration of GHG emissions. The California Natural Resources Agency adopted the proposed State CEQA Guidelines revisions on December 30, 2009 and the revisions were effective beginning March 18, 2010. These changes to the Guidelines were adopted in recognition of the need for new land use development to contribute its fair share toward achieving AB 32 goals, or, at a minimum, not hinder the State's progress toward the mandated emission reductions. Even in the absence of clearly defined thresholds for GHG emissions, the SB 97 requires that such emissions from CEQA projects must be disclosed and mitigated to the extent feasible whenever the lead agency determines that the project contributes to a significant, cumulative climate change impact.¹⁰

Senate Bill 375

Senate Bill (SB) 375, signed in September 2008, aligns regional transportation planning efforts, regional GHG reduction targets, and land use and housing allocation. SB 375 requires Metropolitan Planning Organizations (MPOs) to adopt a Sustainable Communities Strategy (SCS), or Alternative Planning Strategy (APS), that prescribes how land use will be allocated in their Regional Transportation Plan (RTP). ARB, in consultation with MPOs, has provided each affected region with reduction targets for GHGs emitted by passenger cars and light trucks in the region for the years 2020 and 2035. These reduction targets will be updated every eight years, but can be updated every four years if advancements in emission technologies affect the reduction strategies to achieve the targets. ARB is also charged with reviewing each MPO's SCS or APS for consistency with its assigned targets. If an MPO does not meet their GHG reduction targets, its transportation projects would not be eligible for State funding programmed after January 1, 2012. New provisions of CEQA incentivize qualified projects that are consistent with an approved SCS or APS, categorized as "transit priority projects."

The proposed revisions to the APCD CEQA Air Quality Handbook include methodology consistent with the recently updated State CEQA Guidelines, which provides that certain residential and

¹⁰ Office of Planning and Research, Technical Advisory. 2008. "CEQA and Climate Change: Addressing Climate Change Through California Environmental Quality Act." Available: <http://opr.ca.gov/docs/june08-ceqa.pdf>. Accessed: November 15, 2011.

mixed use projects, and transit priority projects consistent with an applicable SCS or APS, need not analyze GHG impacts from cars and light-duty trucks.

2.2 SUBSTANTIAL EVIDENCE SUPPORTING PROJECT LEVEL GHG THRESHOLDS

There are several types of thresholds that can be supported by substantial evidence and be consistent with existing California legislation and policy to reduce statewide GHG emissions. In determining which thresholds to recommend, staff studied numerous options, relying on reasonable, environmentally conservative assumptions on growth in the land use sector, predicted emissions reductions from statewide regulatory measures and resulting emissions inventories, and the effectiveness of GHG mitigation measures.

Staff recommends setting GHG significance thresholds based on AB 32 GHG emission reduction goals after taking into account the emission reductions expected from the strategies outlined in ARB's Scoping Plan. The GHG CEQA significance thresholds recommended in this document were based on substantial technical analysis and provide a quantitative and/or qualitative approach for GHG evaluation. Until AB 32 has been fully implemented in terms of adopted regulations, incentives, and programs, and until SB 375 required plans have been fully adopted, or the California Air Resources Board (ARB) adopts a recommended threshold, the APCD recommends that local agencies throughout SLO County apply the GHG thresholds set forth herein.

The following sections provide the detailed description of the thresholds being proposed. Different thresholds have been developed to accommodate various development types and patterns. Three options are recommended for residential / commercial development:

- 1) Qualitative Reduction Strategies (e.g., Climate Action Plans): a qualitative threshold that is consistent with AB 32 Scoping Plan measures and goals;
- 2) Bright-Line Threshold: numerical value to determine the significance of a project's annual GHG emissions;
- 3) Efficiency-Based Threshold: assesses the GHG efficiency of a project on a per capita basis.

Residential and commercial projects may use any of the three options above to determine the significance of a project's GHG emission impact to a level of certainty for lead agencies. In addition to the residential/commercial threshold, one threshold is also proposed for stationary source (industrial) projects.

2.2.1 Qualified GHG Reduction Strategies

Many local agencies have already undergone or plan to undergo efforts to create or update general plans or other plans consistent with AB 32 goals. The Air District encourages such planning efforts and recognizes that careful upfront planning by local agencies is invaluable to achieving the state's GHG reduction goals. If a project is consistent with an adopted Qualified Greenhouse Gas Reduction

Strategy (e.g. Climate Action Plan) that addresses the project's GHG emissions, it can be presumed that the project will not have significant GHG emission impacts and the project would be considered less than significant. This approach is consistent with CEQA Guidelines Sections 15064(h)¹¹ and 15183.5(b), which provides that 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."

A Qualified Greenhouse Gas Reduction Strategy (or similar adopted policies, ordinances and programs) is one that is consistent with all of the AB 32 Scoping Plan measures and goals. The Greenhouse Gas Reduction Strategy should identify a land use design, transportation network, goals, policies and implementation measures that would achieve AB 32 goals. Strategies with horizon years beyond 2020 should consider continuing the downward reduction path set by AB 32 and move toward climate stabilization goals established in Executive Order S-3-05.

A Qualified Greenhouse Gas Reduction Strategy adopted by a local jurisdiction should include the following elements as stated in the State CEQA Guidelines Section 15183.5:

- (A) Quantify greenhouse gas emissions, both existing and projected over a specified time period, resulting from activities within a defined geographic area;
- (B) Establish a level, based on substantial evidence, below which the contribution to greenhouse gas emissions from activities covered by the plan would not be cumulatively considerable;
- (C) Identify and analyze the greenhouse gas emissions resulting from specific actions or categories of actions anticipated within the geographic area;
- (D) Specify measures or a group of measures, including performance standards, that substantial evidence demonstrates, if implemented on a project-by-project basis, would collectively achieve the specified emissions level;
- (E) Establish a mechanism to monitor the plan's progress toward achieving the level and to require amendment if the plan is not achieving specified levels;
- (F) Be adopted in a public process following environmental review.

The District's revised CEQA Handbook will include detailed methodology to determine if a Greenhouse Gas Reduction Strategy meets these requirements. In addition, the APCD has developed more specific guidance intended to assist local governments in developing community scale Climate Action Plans. The guidance emphasizes the need for GHG inventories to be comprehensive and based on valid, well documented methodologies; the reduction strategies developed as part of the Climate Action Plans should rely on mandatory measures that address both new and existing development. Please refer to Attachment 1 for the complete guidance document.

¹¹ California Air Resources Board. 2010 (December). California Greenhouse Gas Inventory for 2000-2008-by IPCC Category. Sacramento, CA. Available: http://arb.ca.gov/cc/inventory/data/tables/ghg_inventory_ipcc_00-08_all_2010-05-12.pdf. Accessed December 1, 2011.

APCD staff recognizes some communities in SLO County have been proactive in planning for climate change but have not yet developed a stand-alone Greenhouse Gas Reduction Strategy that meets the above criteria. Nonetheless, some jurisdictions have adopted climate action policies, ordinances and programs that may, in fact, achieve the goals of AB 32 and a Qualified Greenhouse Gas Reduction Strategy. If a local jurisdiction can demonstrate its collective set of climate action policies, ordinances and other programs is consistent with AB 32 and State CEQA Guidelines Section 15183.5, and includes requirements or feasible measures to reduce its GHG emissions to 1990 levels or 15% below 2008 emission levels, staff recommends the AB 32 consistency demonstration be considered equivalent to a Qualified Greenhouse Gas Reduction Strategy.

Qualified Greenhouse Gas Reduction Strategies that are tied to the AB 32 reduction goals would promote reductions on a plan level without impeding the implementation of GHG-efficient development, and would recognize the initiative of many SLO County communities who have already developed or are in the process of developing a GHG Reduction Plan. Compliance with a Qualified Greenhouse Gas Reduction Strategy (or equitably similar adopted policies, ordinances and programs) would provide the evidentiary basis for making CEQA findings that development consistent with the plan may normally be considered to have a less than significant GHG emissions impact. Therefore, projects approved under qualified Greenhouse Gas Reduction Strategies or equivalent demonstrations would achieve their fair share of GHG emission reductions in meeting AB 32 goals.

2.2.2 Land Use Projects Bright-Line Threshold

The methodology used in developing the Bright-Line Threshold is intended to help reach the AB 32 emission reduction targets by attributing an appropriate share of the GHG reductions needed from new land use development projects subject to CEQA in the SLO County region. This approach is referred to as the “gap-based approach.” This approach is a conservative method that focuses on a limited set of state mandates that are currently expected to have the greatest potential to reduce land use development-related GHG emissions. This approach is predicated on the premise that there is a shortfall, or “gap” between the current emissions trajectory (projected emissions with existing control measures) and the desired emissions trajectory needed to reach a defined emissions level at a point in time—the target year. Figure 1 is a graphic representation of the gap-based approach concept.

Figure 1

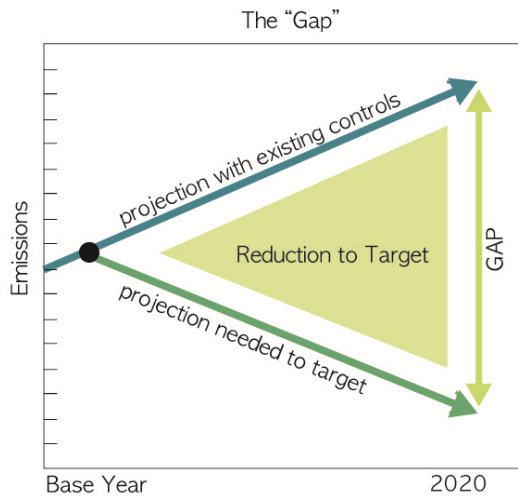


Figure 1: The gap is the amount of GHG emissions reductions that are needed beyond existing controls to meet the reduction target. The recommended threshold will close the gap between the projection with existing controls and the projection needed to reach the target emissions inventory.

The threshold of significance derived from the gap-based approach is assumed to reduce a certain level of emissions from each new land use project expected to be built by the target year (2020). Thus the threshold of significance defines the level of a project's emissions that, under CEQA, would require the project to include emission reduction measures (mitigation) to lessen the project's significance. The appropriate threshold level is found when the total reductions from all new land use projects achieves the level of emission reductions needed to close the gap and alleviate the predicted shortfall.

Preparing the Gap Analysis entailed estimating the statewide growth in emissions between 1990 and 2020 attributable to the land use-driven sectors of the GHG emissions inventory. The emission inventories for 1990 and 2020 were used because AB 32 requires that GHG emissions projected to occur in 2020 under existing conditions be reduced to 1990 emissions level by 2020. This data was used in the Gap Analysis to assess the overall level of emission reductions needed to close the gap (target year shortfall). Only the land use-driven emission sectors (emission sources affected by land use) were considered because the Bright-Line Threshold will apply only to future land use projects. The emission inventory sectors related to land use include On-Road and Off-Road Passenger Vehicles, Electricity and Cogeneration, Residential and Commercial Fuel Use, Landfills, Domestic Wastewater Treatment, Wineries, and Lawn and Off-Road Equipment (i.e. construction vehicles).

GHG reductions expected from a few Scoping Plan measures have not yet been accounted for in ARB's 2020 GHG emissions inventory forecasts (i.e., business as usual). An adjustment was made (credit given) to include those reductions that are also associated with key Scoping Plan measures affecting the land use-driven sectors, such as the Low Carbon Fuel Standard (LCFS), Senate Bill 375 (SB 375), and improvements in energy efficiency. Factoring in these reductions (subtracting from the overall gap referred to above) provided the net residual reduction needed from future regional land use projects.

If all areas of the state reduced their new land use emissions by the percentage reduction derived above, the statewide shortfall (gap) from the land use sector would be eliminated; the percentage reduction needed statewide is each region's fair share of the statewide reduction goal. Thus, the percentage of the statewide reduction needed, or gap, was applied to the SLO County regional land use sector GHG emissions inventory to derive the total aggregate annual mass emission reductions

needed to provide our fair share of reductions from all new regional land use projects anticipated through 2020.

In order to determine the types, sizes and number of future land use projects from which to realize these reductions, development trends in the SLO County region over the past ten years were analyzed. For each future project a baseline, unmitigated emissions level (i.e. assuming all projects were built in conformance with currently adopted building codes) was calculated using computer modeling. In an iterative process referred to as a “threshold sensitivity analysis,” various threshold levels and mitigation effectiveness options were analyzed. Each future project with emissions greater than a potential threshold level was assumed to mitigate down to the threshold level or, if unable to feasibly reduce emissions to the threshold level, was assumed to reduce emissions by a given percentage of their total emissions (mitigation effectiveness). Through this iterative analytical process, a threshold level was found that achieved sufficient mass reductions from all future projects to equal the predicted regional 2020 gap, or shortfall.

Development of the Bright-Line Threshold approach involved comprehensive evaluation and analyses through a well-defined eight step process, which is summarized below:

Step 1 Estimate Overall Statewide Growth in GHG Emissions

Using ARB’s statewide GHG emissions,¹² estimate the growth in emissions between 1990¹³ and 2020¹⁴ that can be attributed to “land use-driven” sectors of the emission inventory. Land use-driven emission sectors include the following categories; Transportation (On-Road Passenger Vehicles; On-Road Heavy Duty), Electric Power (Electricity; Cogeneration), Commercial and Residential (Residential Fuel Use; Commercial Fuel Use), Recycling and Waste (Landfills; Domestic Waste Water Treatment), Agriculture/Farming (Winery), and Off-road Equipment (Lawn and Garden, Entertainment Equipment, Recreational Equipment, Pleasure Craft, Light Commercial Equipment, Construction and Mining Equipment).

¹² California Air Resources Board. 2007 (November). California Greenhouse Gas Inventory (millions of metric tonnes of CO₂ equivalent)-By IPCC Category. Sacramento, CA. Available: http://www.arb.ca.gov/cc/inventory/archive/tables/ghg_inventory_ipcc_90-04_all_2007-11-19.pdf. Accessed December 1, 2011.

¹³ California Air Resources Board. 2010 (December). California Greenhouse Gas Inventory for 2000-2008-by IPCC Category. Sacramento, CA. Available: http://arb.ca.gov/cc/inventory/data/tables/ghg_inventory_ipcc_00-08_all_2010-05-12.pdf. Accessed December 1, 2011.

¹⁴ California Air Resources Board. 2010 (October). Greenhouse Gas Inventory – 2020 Emissions Forecast. Sacramento, CA. Available: <http://www.arb.ca.gov/cc/inventory/data/forecast.htm>. Accessed December 1, 2011.

Methodology: The 2020 projected GHG emissions for land use sectors were developed using growth factors computed from historic trend data that best matched the prospective growth for each sector analyzed. Some examples include:

- a. Electricity Usage and On-Road Passenger Vehicles: The predicted 2020 GHG emissions associated with SLO County electricity and passenger vehicle usage was estimated from the average growth factor associated with the SLO County population from 2000 to 2010 as reported by the Federal Reserve, which used Federal Census data.
- b. Lawn & Garden Equipment: The predicted 2020 GHG emissions for this sector was based on an annual average growth in all SLO County dwelling units based on the number of units in the 2010 Census compared to the San Luis Obispo Council of Government's projected number of units for 2020.
- c. On-Road Heavy Duty Trucks and Commercial Fuel Use: The predicted 2020 GHG emissions for these sectors were based on a projected SLO County economic trend using 2000 to 2010 countywide employment data from the California Employment Development Department (EDD) as the indicator. The 2000 to 2010 trend slope was then extrapolated to 2020 to determine the projected GHG emissions for that year.

Result: As shown in Table 1, California's 1990 land use-driven GHG emissions were estimated at 308.35 MMT CO₂e/yr,¹⁵ while the 2020 business-as-usual land use GHG emissions are projected to be 343.06 MMT CO₂e/yr. Thus a **10.12 % reduction** from projected 2020 land use-driven GHG emissions would be necessary statewide to meet the AB 32 goal of returning to 1990 emission levels by 2020.

¹⁵ California Air Resources Board. 2007(November). California Greenhouse Gas Inventory-Summary by Economic Sector. Sacramento, CA. Available: www.arb.ca.gov/cc/inventory/archive/tables/ghg_inventory_sector_90-04_sum_2007-11-19.pdf. Accessed December 1, 2011.

Table 1

California 1990, 2008, and 2020 Land Use Sector GHG Emissions (MMT CO ₂ e/yr)				
Sector	1990 Emissions	2008 Emissions Projections	2020 BAU Emissions Projections	% of 2020 Total
Transportation	137.99	162.80	168.10	49.00%
On-Road Passenger Vehicles	108.95	128.00	127.00	37.02%
On- Road Heavy Duty	29.05	34.80	41.20	12.01%
Electric Power	110.63	117.20	107.60	31.37%
Electricity	95.39	103.00	91.10	26.56%
Cogen	15.20	14.20	16.50	4.81%
Commercial and Residential	44.08	43.10	45.30	13.20%
Residential Fuel Use	29.66	28.40	31.00	9.04%
Commercial Fuel Use	14.43	14.70	13.90	4.05%
Recycling and Waste	9.09	8.68	10.45	3.05%
Landfill	6.26	6.71	8.50	2.48%
Domestic Waste Water Treatment	2.83	1.97	1.95	0.57%
Agriculture/Farming	0.20	0.25	0.31	0.09%
Winery	0.20	0.25	0.31	0.09%
Off-road Equipment	6.36	9.21	11.29	3.29%
Lawn and Garden Equipment Subtotal	0.43	0.56	0.65	0.19%
Recreational & Pleasurecraft	1.23	1.73	2.55	0.74%
Light Commercial Equipment Subtotal	0.91	1.00	1.04	0.30%
Construction & Mining Equipment Subtotal	3.78	5.92	7.05	2.06%
TOTAL GROSS EMISSIONS	308.35	341.24	343.06	100%
*MMT CO ₂ e/yr. = Million Metric Tons Carbon Dioxide Equivalent per year			Calculation: 1 - (308.35 / 343.06) = 0.1012	
% Reduction Goal from Statewide Land Use Driven Sectors			10.12%	

Table 1: Land use sector GHG emissions were quantified for the years 1990, 2008, and 2020. Based on comparison to the reduction goals set by the State, a **10.12%** reduction in overall emissions would be needed to reach the 2020 goal.

Step 2 Estimate Statewide “Off-Inventory” GHG Reductions

Estimate the anticipated GHG emission reductions affecting the same land use-driven emissions inventory sectors associated with statewide measures identified in the AB 32 Scoping Plan not yet incorporated into ARB’s GHG emissions inventory (i.e. “off-inventory” reductions). These measures, as described in the Scoping Plan, include:

Low Carbon Fuel Standard (LCFS)

According to the staff report for the adopted LCFS rule (CARB, April 2009), the LCFS is expected to result in an approximate 10% reduction in the carbon intensity of transportation fuels. This will result in GHG emission reductions in both the transportation fuel production process and in the mobile-sources burning the lower carbon fuels. Based on CARB’s estimate of 15 MMT reductions in on-road emissions from implementation of the LCFS and comparison to the statewide on-

road emissions sector, the LCFS is estimated to result in a 4.6% reduction in SLO County's on-road transportation sector.

SB 375 (Sustainable Communities and Climate Protection Act)

The Scoping Plan used 5.0 MMT CO₂e as a placeholder for potential GHG reductions that could be achieved by the Sustainable Communities and Climate Protection Act of 2008 (SB 375) through sustainable regional transportation and land use planning strategies. The SB 375 Staff Report lowered that estimate to 3.0 MMT CO₂e, which is the aggregate reductions expected from the regional passenger vehicle GHG reduction targets established for the 18 Metropolitan Planning Organizations approved in 2010. For SLO County, SB 375 is projected to achieve GHG reductions of approximately one percent from on-road transportation.

Energy Efficiency and Solar Roof

Energy efficiency and renewable energy measures from the Scoping Plan were also included in the Gap Analysis. The Scoping Plan estimates that energy efficiency gains with periodic improvement in building and appliance energy standards and incentives will reach 6% for natural gas and 13% electricity statewide. The final state measure included in this Gap Analysis is the solar roof initiative, which is estimated to result in reduction of the overall electricity inventory of 1.2%.

Since the GHG reductions expected from these Scoping Plan measures were not accounted for in ARB's or APCD's 2020 GHG emissions inventory forecasts (i.e., business as usual), an adjustment (credit given) was made to include reductions associated with these key Scoping Plan measures for the land use-driven sectors.

Methodology: This step estimates the anticipated reductions in the 2020 GHG emissions inventory that will occur from Scoping Plan measures that ARB has not yet incorporated into the statewide GHG emissions inventory.

- a. Estimate the total statewide 2020 emissions reduction for that portion of the off-inventory source category affected by land use development.
- b. Determine the portion of the regional end use inventory sector (e.g. On-Road Transportation, Natural Gas) affected by the statewide reduction for each Scoping Plan measure.
- c. Calculate the scaled percentage of the regional inventory reduction for each regional end use sector affected by land use development.

Result: As shown in Table 2, an estimated **9.57%** reduction can be expected in the land use-driven GHG emissions inventory from adopted Scoping Plan regulations, including Low Carbon Fuel Standards, Sustainable Community Strategies, Energy-Efficiency Measures, and Solar Roofs.

Table 2

2020 Land Use Sector GHG Emission Reductions from State Regulations & AB 32 Measures				
Affected Emissions Source	California Legislation/AB32 Measure	% Reduction from Statewide 2020 LU GHG Inventory	End Use Sector	Scaled % Emissions Reduction of SLO Area LU Sector (Credit to Overall Statewide LU Gap)
Mobile	LCFS* (On road only)	7.9%	On road transportation (Pass, LD*) (46%)	3.6%
	LCFS* (On road only)	9.7%	On road transportation (HD*/MD*) (10%)	1.0%
	SB 375	2.4%	On road transportation (Pass, LD) (46%)	1.1%
Area	Energy Efficiency - Gas	6.0%	Natural gas (Residential) (12%)	0.8%
			Natural gas (Commercial) (4%)	0.2%
	Energy Efficiency - Electricity	13.1%	Electricity (20%)	2.6%
Indirect	Solar Roof	1.2%	Electricity (exclude Cogen) (19%)	0.2%
Total credits given land use-driven emission inventory sectors from Scoping Plan Measures				9.57%
*LCFS = Low Carbon Fuel Standard			*MD = Medium Density	
*LD = Low Density			*HD = High Density	

Table 2: Based on land use sector GHG emission reductions from statewide regulations and AB 32 measures not included in the inventory prepared by ARB, a reduction of **9.57%** in GHG emissions from this sector is expected to occur by 2020. This value is used to calculate the remaining gap.

Step 3 Calculate the Statewide GHG Emission Gap

Determine any short fall or “gap” between the 2020 statewide emission inventory estimates and the anticipated emission reductions from adopted Scoping Plan regulations. This “gap” represents additional GHG emission reductions needed statewide from the land use-driven emissions inventory sectors, which represents new land use development’s fair share of the emission reductions needed to meet statewide GHG emission reduction goals.

Methodology: This estimates the additional regional emission reductions needed from the projected regional 2020 projected inventory.

- Divide the 1990 statewide land use sector emissions inventory (308.35 MMT CO₂e/yr.) by the projected 2020 emissions inventory (343.06 MMT CO₂e/yr.); this shows a **10.12%** percent difference (gap) in GHG emissions between 1990 and 2020.
- Subtract the statewide off-inventory reductions calculated in Step 2 above (**9.57%**) from the total estimated statewide reduction gap (**10.12%**) to determine the additional land use sector reductions needed to achieve AB 32 goals (**0.55%**).

Result: The statewide “gap” (emission reductions from the 2020 land use sector inventory needed to reach the statewide 1990 land use inventory goal) was calculated to be a **10.12%** reduction. With the **9.57%** reductions from AB 32 off-inventory Scoping Plan Measures calculated in Step 2 above, there is a “gap” of **0.55%** in necessary additional GHG emissions reductions to meet AB 32 goals of a **10.12%** reduction from statewide land use-driven GHG emissions to return to 1990 levels in 2020.

Table 3

Calculating the Gap	
% Reduction Goal from Statewide Land Use Driven Sectors	10.12%
Total credits given land use-driven emission inventory sectors from Scoping Plan Measures	9.57%
Statewide CEQA Gap (Statewide Reductions Needed Beyond Scoping Plan Measures)	0.55%

Table 3: The statewide land use emissions “gap” between projections with existing control and the reduction goals set by AB-32 is **0.55%**, after factoring in the off-inventory land use credits that will be applied from Scoping Plan measures.

Step 4 Apply the Statewide Gap to SLO County Regional Land Use Emissions GHG Inventory

Determine the percent reduction this “gap” represents in the land use-driven emissions inventory sectors from the SLO County Regional 2020 GHG emissions inventory. Identify total emission reductions needed in SLO County to fill the gap from land use-driven emissions inventory sectors¹⁶.

Methodology: The total estimated additional regional reductions needed was calculated by multiplying the total projected land use sector emissions for 2020 (2,506,983 MT CO₂e/yr.) by the remaining gap of **0.55%**.

Result: As shown in Table 4 below, 2008 land use-driven GHG emissions in the SLO County Region were estimated at 2,304,333 MT CO₂e/yr, with 2020 emission projected at 2,506,983 MT CO₂e/yr under business-as-usual conditions. The 2008 land use driven GHG emissions were the baseline use to perform the 2020 projections. Multiplying the projected 2020 SLO County GHG emissions of 2,506,983 MT CO₂e/yr by the **0.55%** reduction gap determined in Step 3 above results in an estimated **13,788** MT CO₂e/yr. of reductions needed from projected new development projects in SLO County to contribute our fair share toward achieving the statewide 2020 GHG reduction targets in AB 32.

¹⁶ San Luis Obispo County Air Pollution Control District. “trklst08.xls.” 2011 (June). *Microsoft Excel*. file.

Table 4

SLO County Regional Land Use 2008, 2020 GHG Emissions Inventories and Projections (MT CO₂e/yr)*			
Sector	2008 Emissions (MT CO₂e/yr)*	2020 Forecast w/ Annual Compounding	% of Total
Transportation	1,310,997.19	1,419,690.39	57%
On-Road Passenger Vehicles	1,065,344.33	1,159,744.28	46%
On-Road Heavy Duty	245,652.86	259,946.11	10%
Off-road Res. and Light Commercial	78,398.29	97,974.75	4%
Lawn and Garden Equipment	7,198.11	7,474.11	
Recreational & Pleasure craft	20,317.46	30,814.53	
Light Commercial Equipment	9,514.12	10,548.88	
Construction & Mining Equipment	41,368.59	49,137.23	
Electric Power	456,766.12	497,240.07	20%
Electricity	445,563.64	485,044.94	19%
Cogen	11,202.48	12,195.13	0%
Commercial and Residential	376,539.30	403,504.57	16%
Residential Fuel Use	291,353.48	313,362.23	12%
Commercial Fuel Use - Non-Permitted	85,185.82	90,142.34	4%
Recycling and Waste	72,023.60	78,405.60	3%
Landfill Combustion Sources	22,295.09	24,270.65	
Landfill Fugitive Sources	48,063.01	52,321.87	
Domestic Waste Water Treatment	1,665.51	1,813.09	
Agricultural/Farming	9,608.53	10,167.60	0.4%
Wineries	9,608.53	10,167.60	
Total Sectoral Emissions (MT CO₂e/yr)	2,304,333.03	2,506,982.99	100%
Statewide Gap (Applied to Regional Emissions Inventory)			0.55%
Calculation: 2,506,982.99 * 0.0055% = 13,788			
*MT CO ₂ e/yr. = Metric Tons Carbon Dioxide equivalent per year			
SLO County Regional Mass Emission Reductions Needed (MT CO₂e/yr)*			13,788

Table 4: The statewide gap of **0.55%** is multiplied by the regional GHG emission projections for 2020 (i.e. 2,506,982.99 MT CO₂e/yr.), leaving a total of **13,788** MT CO₂e/yr., which will need to be achieved locally from future land use projects to meet the emission reduction goals set by the state.

Step 5 Evaluate Historical Land Use Development Trends in SLO County to Estimate Potential Future Development

Assess SLO County's historical permit database for residential and nonresidential projects (2001-2010) and determine the frequency and distribution trends of project sizes and types that have been subject to CEQA over the past several years.

Methodology: By acquiring historical permit data from local governments and SLOCOG, historical patterns of residential and nonresidential development were determined by evaluating various parameters for each land use development type (e.g. - number of

persons per household; average square footage and number of employees per 1000 sf of commercial development, etc.). Permits were first categorized into individual projects, and then summarized by land use type. The results were then used to calculate typical historical project emissions for each type of land use using CalEEMod. The average project for each land use type was modeled to determine GHG emissions, amortizing construction emissions and adding them to the operational emissions. These emission calculations are used in Step 6 below to distribute anticipated SLO County growth among different future project types and sizes.

Result: The historical trend analysis found that, between 2001-2010, over 2,400 projects were approved to be built, with estimated emissions of more than 22,400 metric tons of CO₂e per year. Table 5 below provides a summary of the historical land use development in the SLO County region. Appendix 2 includes a detailed report of this summary.

Table 5

Historical SLO County Regional Land Use Projects & Emissions 2001-2010				
Land Use Type	Total LU Projects (2001-2010)	LU Projects Per Year (2001-2010)	Emissions from LU (2001-2010) MT CO₂e	Average Annual LU Emissions per year (2001-2010) MT CO₂e/yr
Residential	1,934	193	42,674	4,267
Non Residential	469	47	181,589	18,159
Total	2,403	240	224,263	22,426

Table 5: Between the years 2001 and 2010 there were 2,403 residential or nonresidential projects approved, equating to 240 projects per year. These projects resulted in emitting more than 22,400 MT CO₂e/yr.

Step 6 Project the Level of New Development Expected in SLO County By 2020

Forecast new land use development trends for SLO County through 2020 based on historical and recent trends. Translate the land use development projections into land use categories consistent with those contained in the California Emissions Estimator Model (CalEEMod).

Methodology: SLO County APCD recognized the continuing economic downturn needed to be factored into any estimates of future growth in land uses where projections are based on historical trends. Thus, this step used more conservative recent historical data (2000 and later) and future regional demographic information to define the growth factors needed to distribute the anticipated growth across the land use types and sizes used in the historical trend analysis in Step 5. The demographic information selected to define future growth rates for specific land use types included

SLO County population, employment, and dwelling units, with the data obtained from federal, state, and local sources. APCD staff specified the demographic parameter that seemed most applicable to each land use sector where future growth was to be determined for the gap analysis (Table 6).

For land use sectors where the growth factor is best represented by population, historical annual (2000 to 2010) SLO County population data was used to define the average annual population growth rate (0.7100%)¹⁷. For those land use sectors where an economic growth factor seemed most applicable, employment in SLO County was used as a surrogate using historic values over the years 2000 to 2010 to define the future economic growth rate (0.4724%)¹⁸. The future emissions from lawn and garden equipment associated with land uses was determined with a growth factor based on all dwelling units. The APCD used a conservative approach to predict the future growth rate (.3892%)¹⁹ of SLO County dwelling units using the 2010 U.S. census value²⁰ for this demographic as well as SLOCOG's dwelling unit predictions for 2015 and 2020¹⁸. Future land use emissions from related off-road recreational equipment and pleasure craft, and from residential fuel use, were estimated using a growth factor for occupied dwelling units. The APCD used a conservative approach to predict the future growth rate (0.6087%) of SLO County occupied dwelling units using census values for this parameter for 2000 and 2010¹⁹ and predicted occupied dwelling units for 2015 and 2020 based on SLOCOG's dwelling unit values for these years, minus the vacant properties for those years (determined using the average vacancy rate between 1990 and 2010¹⁹). For the Construction & Mining Equipment activities associated with future

¹⁷ Federal Reserve Bank of St. Lewis. US Department of Commerce: Census Bureau. 2011. Resident Population in San Luis Obispo County, CA. Available: <http://research.stlouisfed.org/fred2/series/CASANL9POP?cid=27561>. Accessed January 17, 2012.

¹⁸ California Employment Development Department. September 16, 2011. San Luis Obispo–Paso Robles Metropolitan Statistical Area 1990 to 2010 Annual Average Industrial Employment Data Available: [www.calmis.ca.gov/file/indhist/slo\\$haw.xls](http://www.calmis.ca.gov/file/indhist/slo$haw.xls) accessed on: <http://www.calmis.ca.gov/htmlfile/county/slo.htm> . Accessed January 17, 2012.

¹⁹ San Luis Obispo County Council of Governments. 2010. 2040 Regional Growth Forecast. Available: http://library.slocog.org/PDFs/SpecialProjects/SLOCounty2040RegionalGrowthForecast_aug2011.pdf. Accessed December 1, 2011.

²⁰ U.S. Census “Total Housing Units” for SLO County for 2010, “Occupied Housing Units” for SLO County for 2000 and 2010, and “Vacant Housing Units” for SLO County for 1990, 2000, and 2010. Available: http://factfinder.census.gov/servlet/QTable?_bm=y&-context=qt&-qr_name=DEC_1990_STF1_DP1&-ds_name=DEC_1990_STF1_-CONTEXT=qt&-tree_id=403&-redoLog=false&-all_geo_types=N&-geo_id=05000US06079&-search_results=01000US&-format=&-_lang=en. Accessed January 17, 2012.

land use, 2020 emissions were directly estimated using ARB’s 2007 Off-road model²¹, therefore a growth factor was not necessary.

The total forecasted emissions for each land use type were combined to determine total emissions for all land use projects anticipated to occur in SLO County through 2020.

Result: Based on population and employment projections and the trend analysis from Step 5 above, approximately 1,142 new development projects were forecasted to occur in SLO County through 2020, averaging about 114 projects per year during that period.

Table 6

Summary of Average Annual Future Growth Rates Used for Defining Future GHG Emissions From Land Use Sectors		
Land Use Sector	Growth Factor	Average Annual Future Growth Rate
Transportation		
On-Road Passenger Vehicles	Population	0.7100%
On-Road Heavy Duty	Economic	0.4724%
Off-road Res. and Light Commercial		
Lawn and Garden Equipment	All Dwelling Units	0.3892%
Recreational & Pleasure craft	Occupied Dwelling Units	0.6087%
Light Commercial Equipment	Economic	0.4724%
Construction & Mining Equipment	N/A	N/A
Electric Power		
Electricity	Population	0.7100%
Cogen	Population	0.7100%
Commercial and Residential		
Residential Fuel Use	Occupied Dwelling Units	0.6087%
Commercial Fuel Use - Non-Permitted	Economic	0.4724%
Recycling and Waste		
Landfill Combustion Sources	Population	0.7100%
Landfill Fugitive Sources	Population	0.7100%
Domestic Waste Water Treatment	Population	0.7100%
Agricultural/Farming		
Wineries	Economic	0.4724%

Table 6: Future GHG emissions associated with land-uses were determined using historic trends to define applicable growth rates. APCD staff specified the type of growth factor that seemed most applicable to each land use sector. Table 6 summarizes the average annual growth factors used in this GHG forecasting and describes the methods used to define each growth factor.

²¹ California Air Resources Board. 2007. Off-road model. Available: www.arb.ca.gov/msei/offroad/offroad.htm. Accessed December 1, 2011.

Step 7 GHG Emissions Reductions Needed from Future Development in SLO County

Estimate the amount of GHG emissions from SLO County land use development through 2020 using CalEEMod. Determine the amount of GHG emissions that can reasonably and feasibly be reduced through currently available mitigation measures (“mitigation effectiveness”) for future land use development projects subject to CEQA (based on land use development projections and frequency distribution from Step 6 above).

Methodology: The amount of annual GHG emissions from each projected land use development average project type and size was estimated using CalEEMod and combined to determine the total annual emissions based on unmitigated modeling scenarios. Next, modeling was performed for various land use types and sizes using all reasonable feasible and available mitigation measures to determine the feasible mitigation effectiveness factor; examples of potential mitigation measures used in this analysis are shown in Appendix 3, Tables A-2 and B-2.

Result: Total emissions from new land use in SLO County region through 2020 are estimated to be approximately 114,969 MT CO₂e/yr. (18,068 MT CO₂e/yr. Residential; 96,901 MT CO₂e/yr. Nonresidential). Table 7 below provides a summary of projected land use development in the SLO County region.

Based on the mitigation measure information available and sample CalEEMod calculations, staff found mitigation effectiveness between 23 and 25 percent is feasible.

Table 7

Forecast for SLO County Regional Land Use Projects & Emissions to 2020				
Land Use Type	Total New LU* Projects (2011-2020)	New LU Projects/yr. (2011-2020)	New Emissions from LU (2011-2020) MTCO ₂ e	Average Annual LU Emissions per year (2011-2020) MTCO ₂ e/yr.
Residential	979	98	180,677	18,068
Non Residential	164	16	969,015	96,902
Total	1,142	114	1,149,692	114,969

*LU = Land Use

Table 7: New emissions from land use are forecasted to total 1,149,692 metric tons CO₂e between the years 2011 and 2020. These emissions are associated with an expected 1,142 new land use projects from the same years.

Step 8 Determine Threshold Level Needed to Close the Regional Gap of 13,788 MTCO₂e/yr.

Conduct a sensitivity analysis of the numeric GHG mass emissions threshold needed to achieve the 2020 emission reductions from the land use-driven emission sectors to meet SLO County's fair share of the statewide "gap", as determined in Step 4.

Methodology: The sensitivity analysis is an iterative process using the following steps:

1. The emissions above various potential threshold levels were calculated for each projected land use project (e.g. 900 MT, 1,000 MT, 1,200 MT, etc.); only those projects above a given threshold option were included in the analysis.
2. The remaining emissions for each project were then subjected to various mitigation effectiveness scenarios (e.g. 25%, 30% and 35%).
3. Mitigated emissions for each project were compared to a given threshold under iterative mitigation scenarios until the threshold level was achieved (CEQA only requires mitigation down to the threshold).
4. The final step in the process identified a threshold level (1,150 MT CO₂e/yr.) and mitigation effectiveness level (23 to 25 percent) that could achieve the total emission reductions needed from all future projects to close the regional "gap" of **13,788** MT CO₂e/yr identified in Step 4, above. Examples of how this analysis was performed are shown in Appendix 3.

Result: Projects with unmitigated emissions (i.e. assuming all projects were built in conformance with currently adopted building codes) greater than the recommended threshold would be required to mitigate to the threshold level, or assumed to reduce project emissions by a percentage (mitigation effectiveness) deemed feasible based on currently available mitigation measures. The base year condition is defined by an equivalent size and type of project with annual emissions using the defaults in CalEEMod (unmitigated project emissions). By this method, land use project mitigations resulting from application of the CEQA GHG thresholds would help close the "gap" remaining after implementation of the key regulations and measures noted above.

The results of the sensitivity analysis conducted in Step 8 found that reductions of about **13,788** MT CO₂e/yr. were achievable and feasible (see Table 8). A mass emissions threshold of **1,150** MT of CO₂e/yr. is estimated to result in approximately 5% of all future projects being above the significance threshold and required to implement feasible mitigation measures through CEQA. This threshold level is approximately equivalent to the operational GHG emissions associated with a 70- unit residential subdivision in an urban setting (49- unit rural development) or a 40,000 sq. ft. strip mall in an urban setting. With 23 to 25 percent mitigation effectiveness, staff estimates the **1,150** MT CO₂e threshold would achieve approximately 13,800-14,200 MT CO₂e/yr. in GHG emissions reductions from new development subject to CEQA from now through 2020. The Bright-Line Threshold of **1,150** MT CO₂e/yr. is expected to capture a total of **56 projects** over the next 10 years; 26 residential projects and 30 non-residential projects.

Table 8

GHG Threshold Sensitivity Analysis						
Threshold Option (MT/Yr)*	No. of Projected New LU* Projects Over Threshold	Percent of Projects Over Threshold (Project Capture)	Percent of Emissions Over Threshold (Emissions Capture)	Overall Mitigation Program Effectiveness	Actual Mitigation Effectiveness	Emissions Reduced (MT/Yr)*
1100	56	5%	22%	25%	19.1%	16,508
				30%	20.5%	17,720
				35%	21.9%	18,933
1150	56	5%	19%	25%	16.4%	14,158
				30%	17.8%	15,370
				35%	19.2%	16,583
1175	56	5%	18%	25%	15.0%	12,983
				30%	16.4%	14,195
				35%	17.8%	15,408
*MT/Yr.= Metric Tons Per Year			*LU= Land Use			

Table 8: The Bright-Line Threshold of **1150** MT CO₂e is expected to capture a total of 56 projects (or approximately 5% of total projects) over the next ten years.

Summary of the Bright-Line Threshold

Conducting the 8 Step Gap Analysis described above was a substantial undertaking requiring considerable data review and a variety of technical analyses. Based on the results of that effort, staff recommends a GHG emissions significance threshold of **1,150** MT CO₂e per year to achieve the aggregate emission reductions of **13,788** MT CO₂e/yr. needed in SLO County Region by 2020 to meet AB 32 reduction targets. As shown in Table 8, about 5% of all future projects would exceed that threshold and have to implement feasible mitigation measures to meet their CEQA obligations. These projects would account for approximately 19% of all GHG emissions anticipated to occur between now and 2020 from new land use development in SLO County.

The APCD recommends that project applicants and lead agencies use CalEEMod to estimate a project’s GHG emissions, based on project specific attributes, to determine if they are above or below the Bright-Line Threshold. After incorporating all emission-reducing features of a proposed project, those still exceeding the threshold would have to reduce their emissions below that level to be considered less than significant.

Establishing a “Bright-Line” to determine the significance of a project’s GHG emissions impact provides a level of certainty to lead agencies in determining when an EIR is required, and whether or not GHG mitigation is needed. If additional regulations and legislation aimed at reducing GHG emissions from land use-related sectors are adopted in the future, the **13,788** MT CO₂e/yr. GHG emissions reduction goal may be revisited and recalculated by APCD.

2.2.3 Efficiency-Based Threshold for Land Use Projects

GHG efficiency metrics can also be utilized as significance thresholds to assess the GHG efficiency of a project on a per capita basis (residential only projects) or on a “service population” basis (the sum of the number of jobs and the number of residents provided by a mixed-use project). GHG Efficiency

Thresholds can be determined by dividing the statewide GHG emissions inventory goal (allowable emissions) by the estimated statewide 2020 population and employment. This method allows highly efficient projects (e.g. compact and mixed use development) with higher mass emissions to meet the overall GHG reduction goals of AB 32.

Staff believes it most appropriate to base the land use Efficiency Threshold on the service population metric for the land use-driven emission inventory. This approach allows the threshold to be applied evenly to all project types (residential, commercial/retail and mixed use) and uses an emissions inventory comprised only of emission sources from land-use related sectors. The efficiency-based threshold encourages infill and transit-oriented development and puts highly auto-dependent suburban and rural development at a severe disadvantage.

Staff proposes a project-level Efficiency Threshold of **4.9** MT CO₂e/SP/yr.; the derivation of this is shown in Table 9. This efficiency-based threshold would accommodate larger, very GHG-efficient projects that would otherwise significantly exceed the bright-line threshold. As stated previously and below, staff anticipates these significance thresholds will function on an interim basis until adequate programmatic approaches are in place at the city, county, and regional level that can allow CEQA streamlining for individual projects. (See State CEQA Guidelines §15183.5 ["Tiering and Streamlining the Analysis of Greenhouse Gas Emissions"]).

To calculate the efficiency of an individual project for comparison to the efficiency threshold, one can use CalEEMod to estimate the annual CO₂e emissions (MT CO₂e/yr.); this value is then divided by the project's service population (population + employment). For projects where the employment is unknown, please refer to Attachment 4, "Employees per 1000sf" to estimate the number of employees associated with any project.

Table 9

Efficiency Threshold	
California 2020 Emissions, Population, Employment	
(Metric Tons CO ₂ e)	
Land Use Sectors Greenhouse Gas Emissions Target	308,349,358
Population	44,135,923
Employment	18,226,478
California Service Population (Population + Employment)	62,362,401
Project Level Efficiency Threshold	
Allowable GHG Emissions per Service Population (MT CO₂e/SP/Yr)*	4.9
*MT CO ₂ e/SP/Yr.= Metric Tons Carbon Dioxide equivalent per service population per year	

Table 9: With the Efficiency Threshold, a project can demonstrate compliance by being extremely efficient on a per-capita (service population) basis. Efficiency is calculated by dividing the emissions per year by the service population (residents plus employees). This threshold is a viable option for large, infill, transit-oriented projects that may exceed the Bright-Line Threshold, but are still extremely efficient.

2.2.4 Stationary Source GHG Threshold

Staff's recommended significance threshold for stationary source GHG emissions to be evaluated under CEQA uses the Governor's Executive Order S-3-05 emission reduction goals as its basis. To avoid hindering attainment of these goals, new or modified stationary source projects above the threshold will need to be analyzed under CEQA and mitigated to the maximum extent feasible. The proposed level for requiring that analysis and potential mitigation is based on capturing at least 90% of the GHG emissions from all new or modified stationary source projects. This means at least 90% of total emissions from all new or modified stationary source projects would be subject to a CEQA analysis, including a negative declaration, a mitigated negative declaration, or an environmental impact report, which includes analyzing feasible alternatives and imposing feasible mitigation measures.

A 90% minimum emission capture rate results in an emission threshold low enough to capture a substantial fraction of future stationary source projects that will be constructed to accommodate future population and economic growth, yet high enough to exclude small projects that will in aggregate contribute a relatively small fraction of the cumulative statewide GHG emissions. These small sources are already subject to Best Available Control Technology requirements for other pollutants and are more likely to be single-permit facilities, which limit the opportunities readily available to reduce GHG emissions from other parts of their facility.

The recommended GHG significance threshold to capture at least 90% of GHG emissions from new or modified stationary sources was derived using the SLO APCD 2009 GHG emissions inventory for combustion sources from all permitted facilities. This analysis is based on combustion emissions because that covers the vast majority of GHG emissions from stationary sources in the SLO County; all fuel types are included in the estimates. Emission values are actual and do not account for any offsets (i.e., Emission Reduction Credits) applied. It should also be noted this analysis did not include other possible GHG pollutants such as methane or nitrous oxide, nor GHG emissions from mobile sources or indirect electricity consumption.

Conducting the analysis described above showed facilities with CO₂e emissions above 10,000 metric tons accounted for 94% of all combustion-related CO₂e emissions in 2009, generating 356,000 tons CO₂e compared to a countywide total of 377,000 tons CO₂e from all combustion sources. For comparison purposes, 10,000 MT CO₂e/yr. would be equivalent to an industrial boiler with a rating of approximately 27 million British thermal units per hour (mmBtu/hour) of heat input, operating at an 80% capacity factor.

The South Coast Air Quality Management District (SCAQMD) and Bay Area Air Quality Management District (BAAQMD) have already adopted a 10,000 metric tons of CO₂ equivalent (MT CO₂e) per year CEQA significance threshold for stationary sources with the goal of achieving emission capture rates between 90 to 95 percent; Sacramento Metropolitan AQMD and Santa Barbara County are also considering a 10,000 MT CO₂e per year threshold for stationary sources. The threshold analyses conducted by these other districts were very similar to ours and also focused on CO₂e emissions from stationary combustion sources subject to district permit requirements.

Based on these findings, staff recommends a stationary source GHG emissions significance threshold level of 10,000 metric tons of CO₂e per year to capture at least 90% of the GHG emissions from new stationary sources in San Luis Obispo County. This threshold level is consistent

with precedence established throughout the state and would focus only on the larger, most significant GHG sources and not expose the smaller sources to unnecessary requirements. This would be considered an interim threshold that Air District staff will reevaluate as AB 32 Scoping Plan measures are more fully developed and implemented at the state level.

2.2.5 Summary of Recommended GHG Thresholds

Table 10 below summarizes the GHG emission thresholds recommended in this document:

Table 10

GHG Emissions Threshold Summary	
Residential and Commercial Projects	Compliance with Qualified GHG Reduction Strategy OR Bright-Line Threshold of 1,150 MT of CO₂e/yr. OR Efficiency Threshold of 4.9 MT CO₂e/SP*/yr.
Industrial (Stationary Sources)	10,000 MT of CO₂e/yr.

*SP = Service Population (residents+employees)

Table 10: For projects other than stationary sources, compliance with either a Qualified Greenhouse Gas Reduction Strategy, or with the Bright-Line (1,150 CO₂e/ yr.) or Efficiency Threshold (4.9 MT CO₂e/SP/yr.) would result in an insignificant determination, and in compliance with the goals of AB 32. The construction emissions of projects will be amortized over the life of a project and added to the operational emissions. Emissions from construction-only projects (e.g. roadways, pipelines, etc.) will be amortized over the life of the project and compared to an adopted GHG Reduction Strategy or the Bright-Line Threshold only.

The Bright-Line numeric threshold of 1,150 MT CO₂e/yr. represents an emissions level below which a project's contribution to global climate change would be deemed less than "cumulatively considerable." This threshold is equivalent to a project size of approximately 70 single-family dwelling units, or a 70,000sf office building; it is anticipated to capture approximately 5% of all future projects, which equates to approximately 19% of future unmitigated emission.

Emissions from projects that exceed the **1,150** MT CO₂e/yr. Bright-Line Threshold could still be found less than cumulatively significant if the project as a whole would result in a GHG efficiency of **4.9** MT CO₂e per service population per year. If projects as proposed exceed both thresholds, they would be required to implement mitigation measures to bring them below the **1,150** MT CO₂e/yr. Bright-Line Threshold or within the **4.9** MT CO₂e Service Population Efficiency Threshold. If required mitigation could not bring a project below either threshold requirement, the project would be found cumulatively significant and could be approved only with a Statement of Overriding Considerations and a showing that all feasible mitigation measures have been implemented. A project's GHG emissions could also be found less than significant if they comply with a Qualified Greenhouse Gas Reduction Strategy.

If the land use projects expected in SLO County between now and 2020 are built in compliance with these thresholds, their resulting GHG emissions would be approximately **0.55%** below projected 2020 business as usual emissions and would achieve an aggregate reduction of approximately **13,788** MTCO₂e/yr. This is the level of reductions needed from land-use sector emissions to provide our fair share toward meeting the AB 32 statewide reduction goals, per ARB's Scoping Plan as discussed above. Although the emissions from such projects would add an incremental amount to the overall greenhouse gas emissions that cause global climate change impacts, emissions from projects consistent with these thresholds would not be a "cumulatively considerable" contribution under CEQA (see CEQA Guidelines §15064(h)(1)).

Building all new projects expected in SLO County between now and 2020 in accordance with the proposed GHG significance thresholds will achieve the appropriate overall share of GHG reductions for our land use sector. Further, each local project will achieve its respective portion of the GHG reductions needed to accomplish the overall statewide AB 32 reduction targets. Even though these local projects will add an incremental amount of GHG emissions, their incremental contribution will be less than "cumulatively considerable" because they are helping to achieve the cumulative solution, not hindering it. Such projects will therefore not be "significant" for purposes of CEQA (see CEQA Guidelines §15064(h)(1)). This idea of a project's relative insignificance is also supported by CEQA Guidelines §15030(a)(3), which provides that a project's contribution to a cumulative problem can be 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."

It is also worth noting that this "fair share" approach is flexible and will allow a project's significance to be determined by how well it is designed from a greenhouse gas efficiency standpoint, not just by the project size. For example, a large high-density infill project whose GHG emissions might otherwise be found cumulatively significant could be found to have insignificant GHG emissions if located in an urban core near public transit and/or other alternative transportation options, and built using state-of-the-art energy efficiency methods and improvements such as solar panels, as well as all other feasible mitigation measures. Projects such as this hypothetical development with low greenhouse gas emissions per service population are what California will need to accommodate future growth while doing its part in achieving a solution to the problem of global climate change. The determination of significance under CEQA will therefore need to take these factors into account to accomplish this important policy goal. In all, land use sector projects that comply with the GHG thresholds would not be "cumulatively considerable" because they would be helping to solve the cumulative problem as a part of the AB 32 process.

Likewise, new permit applications for industrial stationary sources that comply with the quantitative threshold of 10,000 MTCO₂e/yr. would not be "cumulatively considerable" because they would not hinder the State's ability to solve the cumulative greenhouse gas emissions problem pursuant to AB 32. While industrial stationary source projects will need to comply with the cap-and-trade program once it is enacted and reduce their emissions accordingly, the program will be phased in over time starting in 2012 and will initially apply only to the very largest GHG emission sources. Meanwhile, stationary source projects with large GHG emissions will still have a cumulatively considerable impact on climate change.



The proposed 10,000 MT CO₂e/yr. threshold would capture 90% or more of the stationary source sector GHG emissions in SLO County. Stationary source projects below the 10,000 MT CO₂e/yr. threshold account for only a small portion of SLO County's total GHG emissions from stationary sources. Such small sources will not significantly add to global climate change and will not hinder SLO County's ability to reach the AB 32 goal, even when considered cumulatively.

The proposed GHG CEQA significance thresholds are intended to serve as interim levels until AB 32 and SB 375 have been fully implemented through adopted regulations, incentives, plans and programs, or the California Air Resources Board (ARB) adopts a statewide GHG threshold. Compliance with such thresholds will be part of the solution to the cumulative GHG emissions problem and is essential for California to meet its statewide GHG reduction goals.

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Appendix 1

San Luis Obispo County Air Pollution Control District

Qualified GHG Plan Level Guidance

This guidance is intended to assist local governments in developing community scale Climate Action Plans. In drafting this guidance, the San Luis Obispo County Air Pollution Control District (APCD) has drawn from established methodologies and practices, rather than creating new protocols or quantification methods. This guidance should be interpreted as recommended approaches rather than a formal protocol. This guidance will be continually updated as new tools, methodologies and protocols are developed and refined.

Any Climate Action Plan (CAP) that aims to support tiering of future development projects for purposes of CEQA review of GHG impacts must include these standard elements.

- a) A community-wide GHG emissions inventory and "business-as-usual" forecast of year 2020 community-wide GHG emissions;
- b) GHG reduction targets consistent with AB 32;
- c) An analysis of local and state policies and actions that may impact GHG emissions within the jurisdiction;
- d) Quantification of GHG reduction measures demonstrating that, if fully implemented, the GHG reduction targets will be met;
- e) An implementation and monitoring strategy and timeline;
- f) An adequate environmental review of the proposed CAP.

Early consultation with APCD staff is essential; the importance of communicating with District staff early in the climate planning process cannot be overemphasized. District staff is available to meet with local government planners, review methodologies, discuss approaches and any other issues throughout the process of preparing the CAP.

An environmental document that relies on a greenhouse gas reduction plan for a cumulative impacts analysis must identify those requirements specified in the plan that apply to the project; if those requirements are not otherwise binding and enforceable, they must be incorporated as mitigation measures applicable to the project. If there is substantial evidence that the effects of a particular project may be cumulatively considerable, notwithstanding its compliance with the specified requirements in the plan for the reduction of greenhouse gas emissions, an EIR must be prepared for the project.

Qualitative Requirements for Qualified GHG Reduction Strategies

1) *The GHG emissions inventory should be complete and comprehensive*

Any GHG emissions source addressed in this guidance should be included in the GHG inventory and forecast for the local CAP. If an emissions source is not included (for example, direct access electricity use or wastewater treatment), it should be clearly explained why that source was omitted. District staff will review this explanation as part of the evaluation of the CAP.

2) *Calculations and assumptions should be transparent*

It is important to emphasize that all methodologies and assumptions should be documented and explained within the CAP document.

3) *GHG reduction strategies should rely primarily on mandatory measures*

To date, most CAPs have emphasized voluntary GHG reduction measures over mandatory measures, indicated with language like "should promote," and "will encourage," etc. However, because implementation of voluntary measures cannot be guaranteed, their contribution to meeting the GHG reduction target is more speculative than that of mandatory measures. Problems that may result from over-reliance on voluntary measures include the following:

- It could be very difficult for local jurisdictions to demonstrate that GHG reduction targets are being met through voluntary measures.
- This, in turn, will make it difficult for a local government to determine if a project is complying with the adopted CAP in order to appropriately tier off of the CAP CEQA document.
- If the local government cannot document that its CAP is on track to achieve the GHG reduction target, then the CAP may cease to comply with the "qualified" criteria. In this case subsequent projects would not be eligible to benefit from the tiering provisions of CEQA.

If voluntary measures are included in the CAP, distinctions should be drawn between those that are more or less likely to result in full implementation. For example, incentive-based programs (like AB 811 programs) are usually more likely to achieve results than outreach-based programs. Some CAPs have taken a cautious approach and have not quantified GHG reductions from the latter type of measure, due to their highly speculative nature. The APCD recommends only mandatory measures and strong voluntary measures (such as incentive-based programs) be quantified as contributing toward the GHG reduction target.

4) *Build in a margin of safety*

Once the CAP enters the implementation phase it is possible that unforeseen issues or obstacles may arise that prevent full implementation of all CAP measures, or the emission reductions achieved for some measures may be less than anticipated. These risks may be

heightened by unforeseen economic or political developments that adversely affect implementation of the measures. Therefore, APCD recommends the CAP build in a margin of safety to ensure it can continue to serve as a defensible "Qualified GHG Reduction Strategy."

This can be accomplished by:

- Including more GHG mitigation measures than needed to meet the GHG reduction target, thus creating a "buffer" against lower than anticipated results;
- Emphasizing mandatory over voluntary measures;
- Including contingency measures (with quantified emission reduction estimates) that can be activated to fill any gap needed to maintain the expected rate of progress toward achieving the emissions reduction target.

5) *Measures should address existing as well as new development*

The AB 32 target of reducing GHG emissions to 1990 levels by 2020 represents an initial step toward achieving the longer term goal of Executive Order S-3-05, which calls for reducing GHG emissions to 80% below 1990 levels by 2050; this equates to less than 2 metric tons of GHGs per capita. Reducing GHG emissions from new development alone cannot provide sufficient GHG reductions to achieve this long-term target. Therefore, climate action plans should address energy use and emissions from existing development as well. In its review of climate action plans, the APCD recommends aggressive and innovative strategies to achieve emission reductions from existing as well as new development.

6) *Implementation and monitoring should be clearly defined*

The parameters for determining if the CAP is being fully implemented, and if development projects are consistent with the CAP, must be clearly laid out. If a local government plans to tier future projects off the environmental review performed on a CAP, the monitoring program should include the following elements:

- *Annual tracking/reporting on implementation of all CAP measures, including measures that address existing development.* The phasing-in of mitigation measures should be addressed (i.e. — have all the measures that were to have been adopted or expanded in the past year actually been adopted/expanded?).
- *Annual reporting of how new development projects have been implementing CAP measures.* Tracking individual project attributes and implementation of mitigation measures should be done on a project-by-project basis. This can be facilitated through the use of a compliance checklist for new development projects to demonstrate consistency with the plan (listing all mandatory and voluntary measures that apply to new development) and whether the project is implementing the measures; the District will request a copy of this checklist (or similar documentation) when reviewing projects for CEQA.

- *Annual review of the State's implementation of measures included in the CAP.* Are state-level policies achieving the reductions anticipated?
- *Periodic update of the GHG inventory.* The APCD recommends updating the community-wide GHG inventory at least once every 5 years. However, updating the inventory on a more frequent basis may improve the ability to monitor progress toward achieving the GHG reduction target in the CAP.
- *Analysis of whether the CAP is still a "qualified" plan for CEQA purposes.* The analysis should be based on level of implementation and effectiveness of measures.

Appendix 2

Historical Permit Data

Dev. Type	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total # of Projects (2001-2010)	Ave. Size (sf)	Average # of employees	Emissions per Project (CO ₂ e MT/yr)	Total Emissions per Land Use
NON-RESIDENTIAL															
Automobile Care Center															
# Projects per year	0	1	2	1	3	1	1	0	0	0					
Ave. Size per project		2,518	5,798	6,815	12,838	36,308	42,314			3,670	9	15,752	21	404	
Ave. # Employees per project		1	13	12	47	30	40			5					3,635
Bank (w/drive-through)															
# Projects per year	0	0	0	2	1	0	0	1	0	0					
Ave. Size per project				6,075	10,200			2,832			4	6,369	17	314	
Ave. # Employees per project				29	20			1							1,254
City Park															
# Projects per year	0	0	0	0	0	0	1	0	0	1					
Ave. Size per project							3,622			2,720	2	3,171	16	30	
Ave. # Employees per project							30			1					61
Convenience Market w/gas pumps															
# Projects per year	2	2	0	1	1	2	1	0	0	0					
Ave. Size per project	3,370	4,284		5,048	3,110	10,758	4,773				9	5,224	12	644	
Ave. # Employees per project	8	18		12	8	16	12								5,794
Day-Care Center															
# Projects per year	0	2	2	0	0	0	0	0	0	0					
Ave. Size per project		3,601	13,584								4	8,592	6	90	
Ave. # Employees per project		3	9												358
Elementary School															
# Projects per year	0	0	0	0	0	1	0	0	0	0					
Ave. Size per project						11,000					1	11,000	6	163	
Ave. # Employees per project						6									163
Fast Food Restaurant w/drive-thru															
# Projects per year	0	1	1	2	0	1	2	0	3	0					
Ave. Size per project		1,180	2,174	2,391		2,500	2,832		4,675		10	2,625	17	469	
Ave. # Employees per project		12	33	14		20	14		11						4,693
Fast Food Restaurant w/o drive-thru															
# Projects per year	0	0	0	0	1	2	0	0	0	0	3	4,997	9	1,355	
Ave. Size per project					3,634	6,359									4,064



Ave. # Employees per project											10					8
Gasoline/Service Station																
# Projects per year	0	0	1	1	0	1	0	0	1	1						
Ave. Size per project			2,546	2,742			3,992			4,715	0	5	2,799	5	240	
Ave. # Employees per project			9	3			5			5	4					
General Light Industry (<=20,000sf)																
# Projects per year	5	7	5	13	10	10	5	8	3	6						
Ave. Size per project	5,715	11,693	9,662	9,355	6,716	8,592	7,833	5,974	3,705	5,744	72	22,845	16	337		
Ave. # Employees per project	17	7	18	14	13	8	13	15	5	6						
General Light Industry (>20,000sf)																
# Projects per year	4	3	1	4	1	3	4	2	0	0						
Ave. Size per project	59,209	42,930	50,125	49,683	46,440	31,277	57,693	76,162			22	12,846	14	2,584		
Ave. # Employees per project	34	22	29	29	32	25	4	30								
General Office Building (<=20,000sf)																
# Projects per year	5	7	5	14	8	10	12	8	4	3						
Ave. Size per project	2,546	10,926	5,636	6,322	7,066	4,923	8,389	6,002	6,797	3,948	73	6,255	20	96		
Ave. # Employees per project	6	35	41	19	14	13	43	15	13	5						
Government Office Building (>20,000sf)																
# Projects per year	1	1	2	2	1	2	1	1	2	1						
Ave. Size per project	42,516	20,393	37,142	49,460	23,040	62,597	23,273	20,867	23,126	21,000	13	32,341	56	1,205		
Ave. # Employees per project	80	21	88	188	30	67	30	20	20	15						
Golf Course																
# Projects per year	0	0	0	1	0	0	0	0	0	0						
Ave. Size per project				6,767							1	6,767	5	150		
Ave. # Employees per project				5												
Government Office Building																
# Projects per year	0	1	2	0	0	2	0	0	1	0						
Ave. Size per project			2,470	3,794			10,960			6,341	6	5,891	21	215		
Ave. # Employees per project			25	22			33			5						
Hardware/Paint Store																
# Projects per year	0	1	0	1	0	0	0	1	0	0						
Ave. Size per project			12,150	34,775			4,320			3	17,082	24	605			
Ave. # Employees per project			10	28			35									
Health Club																
# Projects per year	0	0	1	1	1	1	1	1	2	0						
Ave. Size per project			5,475	5,555	4,320	31,710	36,600	39,000	33,206	8	22,267	54	650			
Ave. # Employees per project			5	30	35	25	94	15	177							
High Turnover (Sit Down Restaurant)																
# Projects per year	0	0	0	2	0	4	5	1	3	0						
Ave. Size per project				1,219			1,911	5,052	2,007	27,105	15	7,459	33	376		
Ave. # Employees per project				6			5	6	20	128						



Hospital														
# Projects per year	0	0	0	0	1	1	0	0	0	0				
Ave. Size per project					116,548	6,701					2	61,625	51	3,084
Ave. # Employees per project					100	1								6,169
Hotel														
# Projects per year	0	0	1	0	1	3	6	1	3	0				
Ave. Size per project			12,180		19,412	34,402	51,323	75,319	60,088		15	42,121	36	888
Ave. # Employees per project			24		40	28	34	51	38					13,322
Medical Office Building														
# Projects per year	1	1	2	1	1	0	1	1	0	2				
Ave. Size per project	1,440	2,184	2,815	3,372	5,086		7,765	12,166		27,351	10	7,772	21	250
Ave. # Employees per project	5	0	8	30	46		10	39		30				2,498
Motel														
# Projects per year	1	2	0	2	2	1	1	2	0	0				
Ave. Size per project	650	3,464		5,236	5,086	20,191	21,870	28,832			11	12,190	6	120
Ave. # Employees per project	1	0		7	5	15	8	6						1,323
Place of Worship														
# Projects per year	3	0	1	1	1	1	3	1	1	1				
Ave. Size per project	4,824		7,100	9,014	11,550	14,595	16,386	21,890	360	1,805	13	9,725	9	146
Ave. # Employees per project	2		5	1	3	16	10	16	2	30				1,904
Quality Restaurant (≤3,000sf)														
# Projects per year	0	0	0	2	2	2	3	4	5	4				
Ave. Size per project				1,083	2,011	1,524	1,534	1,824	1,659	2,025	22	2,005	6	175
Ave. # Employees per project				16	1	6	7	2	6	6				3,859
Quality Restaurant (>3,000sf)														
# Projects per year	0	0	0	0	1	1	2	4	4	0				
Ave. Size per project					8,527	3,178	4,706	8,889	7,871		12	6,634	6	641
Ave. # Employees per project					5	5	7	10	6					7,686
Refrigerated Warehouse-No Rail														
# Projects per year	0	0	0	0	2	1	8	5	9	1				
Ave. Size per project					3,683	53,700	7,755	12,831	8,537	10,407	26	16,152	12	466
Ave. # Employees per project					9	17	8	13	8	18				12,105
Regional Shopping Center														
# Projects per year	3	1	1	0	4	4	1	0	1	0				
Ave. Size per project	101,154	7,400	142,816		21,352	1,346	2,794		4,980		15	40,263	47	1,426
Ave. # Employees per project	135	1	150		24	5	3		12					21,388
Strip Mall (≤10,000sf)														
# Projects per year	1	1	12	4	2	7	8	3	3	0				
Ave. Size per project	3,359	8,500	3,820	2,605	2,402	3,907	4,082	3,574	4,719		41	4,107	17	101
Ave. # Employees per project	8	53	29	10	10	9	7	6	20					4,124
Strip Mall (>10,000sf)														
# Projects per year	2	0	0	2	3	1	4	4	0	2	18	22,232	46	528
														9,495



Ave. Size per project	39,717			14,536	27,560	14,565	16,975	16,231		26,042						
Ave. # Employees per project	58			38	58	41	49	36		40						
Unrefrigerated Warehouse-No Rail																
# Projects per year	3	3	2	5	2	1	1	1	4	2						
Ave. Size per project	48,700	27,031	6,416	9,474	2,486	9,360	4,957	10,500	21,201	3,848	24	14,397	12	408		
Ave. # Employees per project	56	4	3	15	2	17	11	5	6	3						9,796
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total # of Projects (2001-2010)	Ave. Size (sf)	Ave. # Units	Emissions per Project (CO ₂ e MT/yr)	Total Emissions per Land Use	
RESIDENTIAL																
Congregate Care/ Assisted Living																
# Projects per year	1	0	0	0	0	1	0	0	0	0						
Ave. number units per project	64					38					2	No Data	51	262		
Average size project (Sf)	ND					ND										523
Retirement Community																
# Projects per year	1	0	0	0	0	0	1	0	0	0						
Ave. number units per project	19						29				2	16,073	24	169		
Average size project (Sf)	17,690						14,456									339
Single Family Housing (1 Units)																
# Projects per year	134	103	106	118	97	120	103	83	49	39						
Ave. number units per project	1	1	1	1	1	1	1	1	1	1	952	2,371	1	20		
Average size project (Sf)	2,255	2,328	2,130	2,439	2,257	2,501	2,502	2,628	2,493	2,173						19,126
Single Family Housing (2-40 Units)																
# Projects per year	225	137	90	85	76	73	55	32	30	10						
Ave. number units per project	10	7	6	6	7	5	4	4	4	6	813	68,689	6	100		
Average size project (Sf)	2,321	2,213	2,435	4,370	3,856	9,250	16,483	47,858	97,928	500,174						80,950
Single Family Housing (41+ Units)																
# Projects per year	26	8	7	9	2	3	0	2	1	0						
Ave. number units per project	90	71	102	90	196	77		48	154		58	250,215	103	1,357		
Average size project (Sf)	244,523	232,349	312,740	222,107	460,240	169,119		82,670	277,975							78,706
Apartments Low Rise (1-100 units)																
# Projects per year	15	13	4	4	3	3	5	4	1	1						
Ave. number units per project	14	17	20	15	17	6	5	20	7	25	53	17,492	15	232		
Average size project (Sf)	17,771	20,157	18,864	25,279	15,170	9,620	6,267	18,406	6,638	36,750						12,281
Apartments Low Rise (101+ units)																
# Projects per year	0	0	0	1	0	1	0	0	0							
Ave. number units per project				212		232					2	158,606	222	1,955		
Average size project (Sf)				218,282		98,930										3,909
Condo/Townhouse																
# Projects per year	1	2	5	3	3	7	16	12	2	1						
Ave. number units per project	36	5	19	13	17	9	16	7	20	4	52	21,783	15	173		
Average size project (Sf)	66,020	8,841	31,177	18,905	15,228	14,134	20,206	7,959	29,073	6,288						9,015
TOTAL											2,403			22,426		437,586

Appendix 3

Example Projects

Example A:

As shown in Table A-1 below, a 100 unit single family housing development modeled for the year 2020 was calculated to have emissions of 1330.02 MT CO₂e/yr. By incorporating mitigation measures outlined in Table A-2 below, the project’s total annual emissions were reduced to 1101.72 MT CO₂e/yr.; therefore the project fell into compliance with the Bright-Line Threshold (1150MT CO₂e/yr.) with 16% mitigation effectiveness. With the same mitigation measures, this project also fell into compliance with the Efficiency Threshold (4.9MT CO₂e/SP/yr.) by achieving 4.7 MT CO₂e/SP/yr.

Table A-1

100 Unit, Single Family Housing Development	
Land Use	Size Metric
SFH	100 units
Service Population (Residents)	236 people
Annual Emissions (MTCO₂e/yr) without mitigation	1330.02
Annual Emissions (MTCO₂e/yr) with mitigation	1120.53
Per Capita Emissions (MTCO₂e/SP/yr) without mitigation	5.6
Per Capita Emissions (MTCO₂e/SP/yr) with mitigation	4.7

Table A-1: This single family housing development exceeded both the Bright-Line and efficiency thresholds before mitigation, but complies with both thresholds after incorporating mitigation.

Table A-2

Mitigation Measures	Applied Metric
Traffic	
Improve Destination Accessibility	0 miles to job center
Increase Transit Accessibility	0 miles to transit station
Integrate Below Market Rate Housing	10 number of units
Improve Pedestrian Network	Yes site, and connecting off-site
Provide Traffic Calming Measures	100 % streets with improvement
	100 % intersections with improvement
Area	
Uses Electric Landscape Equipment	75 % Electric
Energy	
Installs High Efficiency Lighting	30 % Energy Reduction
On Site Renewable Energy	25 % of Electricity Generated
Water	
Use Reclaimed Water	75 % outdoor use
Install Low-Flow Bathroom Faucet	32 % Reduction in flow
Install Low-Flow Kitchen Faucet	18 % Reduction in flow
Install Low-Flow Toilet	20 % Reduction in flow
Install Low-Flow Shower	20 % Reduction in flow
Turf Reduction	60 % Reduction
Use Water Efficient Irrigation Systems	6.1 % Reduction
Solid Waste	
Institute Recycling and Composting Services	50 % Reduction in Waste Disposed

Table A-2: By applying mitigation measures in Traffic, Area, Energy, Water, and Solid Waste categories this single family housing project reduced emissions by 16%.

Example B:

As shown in Table B-1 below, a commercial development with 3,000sf of quality restaurant, and a 45,000sf of strip mall modeled for the year 2020 was calculated to have emissions of 1465.34 MT CO₂e/yr. By incorporating the mitigation measures outlined in Table B-2 below, the project’s total annual emissions were reduced to 1141.21 MT CO₂e/yr.; therefore the project fell into compliance with the Bright-Line Threshold (1150MT CO₂e/yr.) with 22% mitigation effectiveness. No further action would be required.

Table B-1

Commercial Strip Mall and Restaurant	
Land Use	Size Metric
Quality Restaurant	3 1000sf
Strip Mall	45 1000sf
Parking Lot	100 Spaces
Service Population (population+employment)	111
Annual Emissions (MTCO₂e/yr) without mitigation	1465.34
Annual Emissions (MTCO₂e/yr) with mitigation	1141.21
Per Capita Emissions (MTCO₂e/yr/SP) without mitigation	13.2
Per Capita Emissions (MTCO₂e/yr/SP) with mitigation	10.3

Table B-1: This commercial development project exceeded both the Bright-Line and efficiency thresholds before mitigation, but complies with the Bright-Line threshold after incorporating mitigation.

Table B-2

<u>Mitigation Measures</u>	<u>Applied Metric</u>
Traffic	
Improve Pedestrian Network	Yes site, and connecting off-site
Limit Parking Supply	25 % with improvement
Energy	
Exceed Title 24	10 % Improvement
Installs High Efficiency Lighting	50 % Energy Reduction
On Site Renewable Energy	75 % of Electricity Generated
Water	
Water Conservation Strategy	15 % reduction outdoor water use
Install Low-Flow Bathroom Faucet	32 % Reduction in flow
Install Low-Flow Kitchen Faucet	18 % Reduction in flow
Install Low-Flow Toilet	20 % Reduction in flow
Solid Waste	
Institute Recycling and Composting Services	50 % Reduction in Waste Disposed

Table B-2: By applying mitigation measures in Traffic, Energy, Water, and Solid Waste categories this commercial development project reduced emissions by 22%.

Appendix 4

Employees per 1000sf, Based on Land Use

LAND USE	Employees per 1000sf
Automobile Care Center	2.47
Bank (w/drive-through)	1.59
City Park	0.23
Convenience Market w/gas pumps	2.50
Day-Care Center	1.01
Elementary School	0.55
Fast Food Restaurant w/drive-thru	6.22
Fast Food Restaurant w/o drive-thru	1.74
Gasoline/Service Station	2.22
General Light Industry	1.54
General Office Building	2.52
Golf Course	2.96
Government Office Building	3.63
Hardware/Paint Store	1.56
Health Club	2.47
High Turnover (Sit Down Restaurant)	1.97
Hospital	1.07
Hotel	0.64
Library	0.39
Medical Office Building	3.33
Motel	0.95
Place of Worship	0.80
Quality Restaurant	1.19
Refrigerated Warehouse-No Rail	0.66
Regional Shopping Center	1.39
Strip Mall	2.39
Unrefrigerated Warehouse-No Rail	0.84
Employees Per 1000sf developed from the historical trend analysis based on historical permit data from SLOCOG for the years 2001 to 2010	