Socioeconomic Report 2012

Air Quality Management Plan

December 2012

South Coast Air Quality Management District
Cleaning the air that we breathe...
AQMD

FINAL SOCIOECONOMIC REPORT FOR THE FINAL 2012 AQMP

December 2012

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SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

FINAL SOCIOECONOMIC REPORT FOR THE FINAL 2012 AQMP

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The Southern California Association of Governments provided technical assistance relative to the cost and benefit of transportation projects and baseline economic forecasts associated with the 2012 Regional Transportation Plan.

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PREFACE

Since the release of the Draft Socioeconomic Report in September 2012, the AQMD has added two scenarios on transportation control measures (TCMs) in the 2012 Regional Transportation Plan (RTP) that are committed to the 2012 AQMP. The congestion relief benefit analysis beyond 2014 in the Draft Socioeconomic Report was based on all TCMs in the 2012 RTP. The two scenarios focus on only those committed to the 2012 AQMP. The No TCM Scenario in Appendix G shows costs of TCMs and their associated job impacts by industry separately from other control measures; and removes the congestion relief benefit from the analysis. The TCM Benefit at 2014 Level Scenario in Appendix H assumes that the congestion relief benefit would stay constant at the 2014 level.

Appendix I is added to facilitate approximation of 2005 constant dollars to various other years' dollars. Responses to comments on the Draft Socioeconomic Report received after its release have been incorporated into the Responses to Comments to the 2012 AQMP.

Due to the exclusion of Control Measure CTS-04 (Further VOC Reductions from Consumer Products) from the Final AQMP, the cost of the 2012 AQMP would be less than that estimated in the Final Socioeconomic Report. The exclusion of Control Measure CTS-04 does not change the overall conclusion of the Report.

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

As Southern Californians seek to fulfill our legal duties under the Clean Air Act, and to meet standards for air that is healthful to breathe, we are challenged by the need to consider social, economic, and environmental factors while also complying with federal attainment requirements. The socioeconomic impact assessment is designed to help decision-makers and stakeholders arrive at a clean air blueprint that lays out a strong path toward reduced public health damage while at the same time maintaining economic strength, social fairness, and long-term sustainability.

The Socioeconomic Report for the 2012 Air Quality Management Plan (AQMP or Plan) is a rigorous application of statistical analysis and computer modeling to assess the aggregate potential impacts of the overall suite of control measures. Competitiveness of individual businesses will be analyzed in detail during ensuing rulemaking processes. The Report has undergone external peer-review (See Appendix F for a list of peer-review economists) to improve information for the 2012 AQMP and seek suggestions for enhancement of future analysis.

The $7.7 billion congestion benefit in the September 2012 release of the Draft Socioeconomic Report is for all TCM-type projects in the 2012 Regional Transportation Plan (RTP). The benefit for the SIP-committed TCMs, which is comprised of the first two years of TCM-type projects in the 2012 RTP, is estimated to be $519 million (See Appendix H).

Overall, there are two main conclusions in the Report:

- The 2012 AQMP is not expected to result in dramatic impacts on the region's competitiveness as measured by share of national jobs, cost of production, relative delivered prices, and exports and imports.

- The estimated $10.7 billion quantifiable benefits—including congestion relief benefits for all the TCMs—(21 percent of which are health benefits) of the 2012 AQMP are greater than the estimated $448 million in average annual costs. Still there is a net modest job gain due to cleaner air.

The 2012 AQMP has been prepared to meet the challenge of achieving healthful air quality in the South Coast Air Basin (Basin) and the Coachella Valley. This report accompanies the 2012 AQMP and presents the potential socioeconomic impacts resulting from implementation of this Plan. The information contained herein is considered by the South Coast Air Quality Management District (District) Governing Board when taking action on the Plan.

$PM_{2.5}$ levels have improved dramatically over the past two decades. In 2011, both the annual $PM_{2.5}$ standard and the 24-hour $PM_{2.5}$ standard were exceeded at only one air monitoring station, Mira Loma, in northwestern Riverside County. The primary focus of this 2012 AQMP is to bring the Basin into attainment with the 24-hour $PM_{2.5}$ standard.

The 2012 AQMP control strategy is comprised of a traditional command-and-control approach, voluntary/incentive programs, and advanced technologies. Short- and near-term control strategies are proposed and will be implemented by the District, local and regional governments

(e.g., transportation control measures provided in the 2012 Regional Transportation Plan), and the California Air Resources Board (CARB). These strategies include basin-wide short-term $PM_{2.5}$ measures, episodic control measures for high $PM_{2.5}$ days, measures to partially implement the Section 182(e)(5) commitment in the 2007 ozone SIP toward meeting the 8-hour ozone standard by 2024, and transportation control measures (TCM) adopted by the Southern California Association of Governments (SCAG). Many of the measures require behavioral changes and voluntary participation through outreach, incentive, and education. Implementation of these control strategies has potential effects on the region's economy.

The District relies on a number of methods, tools, and data sources to assess the impact of proposed control strategies on the economy. The involved applications include: integration of air quality data and concentration-response relationships to estimate benefits of clean air; capital, operating and maintenance expenditures on control devices and emission reductions to assess the cost of the Plan; and REMI (Regional Economic Models, Inc.) model to assess potential employment and other socioeconomic impacts (e.g., population and competitiveness). The Socioeconomic Report attempts to answer the following important questions.

What Is the Total Implementation Cost of the 2012 AQMP?

The projected annual average implementation cost of the Plan is $448 million annually, on average, between 2013 and 2035 to correspond to SCAG's long-term projection period. The PM2.5 strategy, including transportation control measures (TCM) proposed by the Southern California Association of Governments (SCAG), is projected to cost $326.6 million. The cost of TCMs alone is $326.4 million. The projected cost for all the ozone measures is approximately $122 million annually, of which $40 million is attributable to stationary source controls.

Technological advancements may reduce costs over time. However, actual costs could be higher than projected costs. Compliance costs will be further refined at individual facilities and evaluated during rulemaking.

What Are the Benefits of the 2012 AQMP?

Over the years, there has been an overall trend of steady improvement in air quality in the Basin. Additional emission reductions are still needed in order to bring the Basin into compliance with the federal 24-hour $PM_{2.5}$ standard. Complying with the air quality standard would allow the District to avoid potential sanctions that could increase offset ratios for major sources and result in suspension of highway transportation funding. The benefits of better air quality through implementation of the 2012 AQMP include reductions in morbidity and mortality, visibility improvements, reduced expenditures on refurbishing building surfaces, and reduced traffic congestion.

The Draft 2012 Plan is projected to comply with the federal $PM_{2.5}$ standard with an average annual benefit of $10.7 billion between 2014 and 2035. The $10.7 billion includes approximately $7.7 billion for congestion relief for all TCMs in the 2012 RTP, $2.2 billion for averted illness and higher survival rates, $696 million for visibility improvements, and $14 million for reduced damage to materials.

Not all of the benefits associated with the implementation of the Plan can be quantified. For example, the quantified health benefits only account for reduced exposure from $PM_{2.5}$, while those from decreased exposure to ozone and nitrogen dioxides are not included. In addition, reductions in vehicle hours traveled for personal trips and damage to plants, livestock, and forests have not been quantified. Further research is needed before these benefits can be quantified.

What Are the Costs of the 2012 AQMP Compared to the Benefits?

The analysis contained herein estimates that the benefits for the Plan significantly outweigh the anticipated costs. The measurement of clean air benefits is performed indirectly since clean air is not a commodity purchased or sold in a market. This often results in incomplete and underestimated benefits. The benefits of clean air (based on the total emission reductions required for attainment) for which a monetary figure can be applied are estimated to be $10.7 billion (including congestion relief benefits for all the TCMs) as compared to the estimated costs of $448 million on an average annual basis. There are, however, many benefits which are still unaccounted for, such as reductions in chronic illness and lung function impairment in human beings, reduced damage to livestock and plant life, erosion of building materials, and the value of reduced vehicle hours traveled for personal trips.

What Potential Effects Will the Plan Have on Employment?

Both control costs and clean air benefits impact regional employment. The employment impact analysis was performed separately for $PM_{2.5}$ and ozone control measures, clean air benefits, and a combination of the two resulting from the attainment of air quality standards. Clean air benefits, including congestion relief benefits for all the TCMs, are projected to result in a gain of 42,174 jobs annually over the period of 2014-2035. Conversely, implementation of control measures would result in 3,257 jobs forgone annually. Clean air benefits and control measures would result in a gain of 37,043 jobs annually.

Many industries would experience additional jobs created due to cleaner air based on the assumptions in the REMI model that the amenity resulting from cleaner air would attract in-migration and increase business competitiveness. The sectors that are projected to have relatively large shares of jobs created are accommodation and food services, government, retail trade, and real estate/rental/leasing. The retail trade sector and government would experience larger shares of jobs forgone from implementation of control measures. The District recognizes that every actual job is important.

The socioeconomic analysis herein is designed to identify operations and sectors that are subject to control measures and assess their impacts on these sectors. The Plan can affect small businesses as they spread in every sector of the economy. The potential small business impacts of individual control measures will be further examined in the rule development process when specific elements of these measures are developed. In addition, as measures are developed into rules, their potential employment impacts will be specifically assessed.

What Are the Potential Impacts on Socioeconomic Groups and Local Communities?

The Plan is designed to bring northwest Riverside (the Mira Loma area), the only area in exceedance of the federal $PM_{2.5}$ standard, into attainment. However, $PM_{2.5}$ air quality benefits occur throughout the Basin. The San Fernando Valley, southern Los Angeles County, and the northwest Riverside County would experience the highest shares of air quality benefits. The western portions of Los Angeles and Orange Counties and the eastern and northern portions of San Bernardino County are projected to have the highest shares of health benefits.

Implementation of PM2.5 and ozone measures would impose costs on various communities. The sub-regions with the highest costs are the central, southeast, and San Fernando areas of Los Angeles County. These three areas are projected to have the highest cost shares from SCAG TCMs and relative higher cost shares from ozone measures.

All sub-regions are projected to have additional jobs created from cleaner air. The eastern, southern, and San Fernando sub-regions in Los Angeles County and Riverside County are projected to have more jobs created than other sub-regions resulting from clean air benefits. Implementation of quantified control measures would result in jobs forgone between 2013 and 2035. Orange County is projected to have the highest share of jobs forgone from implementation of control measures. This is because the majority of SCAG transportation control measures (TCM) in Orange County would be financed by development fees, which would have a heavy burden on one single sector of the economy—the construction sector. For the entire Plan, all sub-regions would show positive job impacts as the four-county area becomes more competitive and attractive with the progress in clean air.

Job gains from cleaner air would benefit all wage groups. Conversely, all five groups would experience jobs forgone from control measures. However, there is no significant difference in impacts expected for high- versus low-paying jobs. The same is observed for impacts on the price of consumption goods from one income group to another. These findings will be further evaluated during individual rule development.

What Potential Effect Will the Plan Have on Competitiveness of Local Industries?

The Socioeconomic Report examines competitiveness of local industries in four areas: the Basin's share of national jobs, cost of production, relative delivered prices, and exports and imports. The quantified measures and benefits of the 2012 AQMP are not expected to result in discernible differences in the four-county region’s share of national jobs. The impacts on product prices of nearly all the sectors are projected to be less than one percent of their respective baseline indices. The impacts on imports and exports are relatively small as well.

The competitiveness analysis of the Plan focuses on its impact on various sectors of the local economy. Individual control measures could obviously result in impacts on individual companies. Competitiveness at the company level will be analyzed during individual rule development efforts to the extent feasible.

The actual effects of the 2012 AQMP on regional competitiveness could vary from the projected effects. First, the analysis assumes that all control costs are "extra" costs when compared to air pollution control costs in other regions. This ignores the fact that some competing regions tend to follow the District's lead and adopt control measures with objectives similar to those proposed in the District or at a minimum have some level of control with its consequent costs. For example, a number of eastern states have adopted the California vehicle exhaust standards. The Socioeconomic Report underestimates the benefits from clean air that would increase regional attractiveness.

Does This Analysis Affect the Selection of Possible Alternatives to the 2012 AQMP?

It may. The Socioeconomic Report can affect the selection of alternatives to the proposed Plan as identified in the Environmental Assessment for the 2012 AQMP. In considering whether to adopt the Plan or one of the alternatives, the District Governing Board will seek the best balance of greatest socioeconomic and environmental benefits and least adverse environmental and socioeconomic impacts, while ensuring compliance with all legal requirements and attainment as expeditiously as practicable.

The No Project Alternative, which is the 2007 AQMP, cannot be meaningfully compared with the Plan since the No Project Alternative would not comply with the 24-hour PM2.5 standard until 2019, which is not the earliest practicable date, while the Plan would comply with the 24-hour $PM_{2.5}$ standard in 2014 and implement part of the 2007 ozone SIP 'black box' commitment [Clean Air Act Section 182(e)(5) measures].

The Plan has a higher cost than the $PM_{2.5}$ Strategy Only Alternative but would achieve ozone benefits and also higher $PM_{2.5}$ air quality benefits due to the co-benefit from ozone measures. The Localized PM Control Alternative is projected to have lower air quality benefits than the 2012 AQMP and the Greater Reliance on NOx Reductions Alternative. Both the Localized PM Control and Greater Reliance on NOx Reductions Alternatives would not meet the federal $PM_{2.5}$ standard until 2017. The Greater Reliance on NOx Reductions Alternative would benefit broader areas than the Plan as NOx is more prevalent than $PM_{2.5}$. Therefore, the Greater Reliance on NOx Reductions Alternative has the highest clean air benefits among all the alternatives.

What Are the Key Areas of Uncertainty and Caveats in This Assessment?

As with any complex analysis, some uncertainty is inherent in the methodology employed. Consequently, caveats need to be applied in interpreting the results. The key areas of uncertainty and caveats in this socioeconomic assessment are described as follows:

- Air Quality Change: Air quality modeling used the most current estimates of emissions, prognostic meteorological models, multilayered dispersion platforms (i.e., CMAQ), and sophisticated chemistry modules. The key areas of uncertainty impacting the estimation of future year health benefits arise from emission estimates, model layer structure, boundary specifications, and dispersion assumptions.

- Exposure Estimates: Exposure estimates are based on extrapolations to census boundaries. There is uncertainty in how well this captures actual population exposure.

- Health Impact Functions: There are several health effect estimates of dose-response functions in the literature for a given health effect. There are uncertainties and variability in these estimates. For example, the premature mortality estimate used in this analysis was taken from a study conducted in Southern California. Using the mortality function from this study gives estimates of premature mortality that are somewhat higher than those based on national multi-city studies.

- Health Benefits: The health benefit analysis in this report is limited by the availability of health studies that quantify health effects associated with exposure to various pollutants and their economic valuation. Not all the known adverse health effects caused by air pollution have been quantified. Similarly, not all other clean air benefits such as congestion relief related to personal trips are quantifiable at this time.

- Socioeconomic Model: The REMI model, which was used to analyze the impacts of the 2012 AQMP, projects possible impacts on jobs, distribution of jobs, income, cost of production, relative delivered prices, exports, and imports based upon cost data for control measures and the benefit data for each effect of clean air. The projections are based on national and local statistics for a cluster of economic actors such as industries and population by age and cohort. These statistics reflect the net changes of all the events on these actors and cannot be segregated into gross changes of individual events.

What Efforts Will Be Taken to Refine the District's Socioeconomic Report?

Previous AQMPs have identified actions that would further enhance the ability to quantify and evaluate the benefits and costs of the proposed Plan. This Socioeconomic Report has accomplished several of these actions and identified others for still future assessment. Enhancements to this Socioeconomic Report include finer geography for more detailed assessments of distributional impacts, incorporation of new concentration and response health functions for a range of health effects, and greater use of the American Community Survey (ACS) 5-year estimates from the U.S. Census Bureau.

The following enhancements are recommended for future AQMPs:

- Conduct a review of the District's socioeconomic analysisto update methods and approaches, as appropriate;

- Quantification of uncertainty through sensitivity analysis and/or probabilistic confidence intervals;

- Include the value of a statistical life (VSL) related to health risks in future years of an individual's life and illness-specific VSLs;

- Incorporate health benefits resulting from reductions in air toxic pollutants such as diesel particulates;

- Expand sub-regional analyses to include environmental justice (EJ) areas. These areas may be classified by income or race;

- Evaluate potential social ramifications of migration and job losses;

- Analyze the impact of highly polluted areas on property values and rents and the ensuing impacts on the concentration of lower-income households;

- Perform a periodic assessment of projections relative to reality to track the performance of various models that are used for socioeconomic analyses; and

- Explore scenarios where other regions may adopt controls similar to AQMD's for the competitive analysis.

Future enhancements on health benefit assessments would also include the impact of exposure to pollutants on life expectancy, differential impacts on various segments of the population, and identification of significant pollutant thresholds.

The socioeconomic analysis will continue to evolve to reflect changes in regulatory structure such as greater reliance on incentive programs and public financing strategy. Building a time series database would enhance the assessment of specific segments of an industry, facilitate the alignment with published governmental statistics, and enhance the analysis of competitiveness impacts. The effort would include the use of different databases to track existing facilities and new facilities, review of inspectors' reports for annotated information on firm turnover and closure, and identification of start-up companies in high tech disciplines with the assistance of the District's Technology Advancement Office.

Responses to comments on the Draft Socioeconomic Report for the Draft 2012 AQMP can be found in the Responses to Comments to the 2012 AQMP.

CHAPTER 1

INTRODUCTION

Introduction

2012 AQMP

Legal Requirements

2012 AQMP Socioeconomic Issues

Assessment Methodology

INTRODUCTION

The 2012 Air Quality Management Plan (AQMP or Plan) is designed to meet the challenge of achieving clean air in southern California. The Plan proposes strategies and programs aimed at both a healthy environment and economy. The projected costs of implementing the Plan and the associated benefits of achieving clean air standards are the subject of this report. The purpose of this assessment is to define and present the potential socioeconomic impacts related to the 2012 AQMP.

2012 AQMP

The 2012 AQMP is a plan designed to achieve the federal 2006 24-hour $PM_{2.5}$ standard by 2014 and partially implement commitment in the 2007 ozone State Implementation Plan (SIP) for the 1997 8-hour ozone standard by 2024 for the South Coast Air Basin (Basin) and those portions of the Salton Sea Air Basin that are under the District's jurisdiction (namely the Coachella Valley). This revision began with the remaining control strategies in the 2007 State Implementation Plan (SIP) approved by U. S. EPA in 2011, and was then expanded to include new strategies. These new control strategies focus on reducing emissions from directly emitted $PM_{2.5,}$ ammonia and $PM_{2.5}$ precursors—NOx and VOC.[1]

The 2012 AQMP is comprised of a traditional command-and-control approach, voluntary/incentive programs, and advanced technologies. Short- and near-term control strategies are proposed and will be implemented by the District, local and regional governments (e.g., transportation control measures provided in the 2012 Regional Transportation Plan), and the California Air Resources Board (CARB). These strategies include basin-wide short-term $PM_{2.5}$ measures, episodic control measures for high PM2.5 days, measures to partially implement Section 182(e)(5) commitment in the 2007 ozone SIP toward meeting the 8-hour ozone standard by 2024, and transportation control measures (TCM) proposed by the Southern California Association of Governments (SCAG). Many of the measures require behavioral changes and voluntary participation through outreach, incentive, and education.

As with the previous AQMPs, the District has proposed to expand its control program for mobile sources by proposing additional mobile source control strategies to supplement CARB's existing mobile source regulations. All the proposed District mobile source measures would require public funding assistance to achieve NOx reductions through accelerated fleet turnover or the use of the cleanest off-road engine standards.

The implementation of short- and near-term measures will produce both direct and secondary impacts on the community and economy of the 21 sub-county regions. Direct impacts include costs such as expenditures on pollution control equipment, transportation infrastructure, and reformulated products. Direct impacts also include benefits such as decreased medical costs due to better air quality and reduced repainting and resurfacing costs on building materials. Secondary impacts are the spillover impacts of direct costs and benefits as a result of interactions between industries and consumers in the 21 sub-county regions.

[1] The majority of $PM_{2.5}$ emissions in the Basin are secondarily formed.

LEGAL REQUIREMENTS

The District's socioeconomic analyses of air quality rules are subject to two types of requirements. One is District Governing Board's resolutions and the other is the California Health and Safety Code. Both apply to future rulemaking for control measures that are included in an approved AQMP. As part of the 1989 AQMP approval, the District Governing Board passed a resolution that called for District staff to prepare an economic analysis of emission reduction rules proposed for adoption or amendment. Elements to be included in the analysis include identification of affected industries, cost effectiveness of control, and public health benefits.

In addition, Health and Safety Code Section 40440.8, which took effect on January 1, 1991, requires a socioeconomic analysis of each District rule that has significant emission reduction potential. In addition to the elements required under the District's resolution, Section 40440.8 requires the District to estimate employment impacts and to perform socioeconomic analyses of the project alternatives developed pursuant to the California Environmental Quality Act (CEQA).

Health and Safety Code Section 40728.5 requires that the Governing Board actively consider any socioeconomic impacts in its rule adoption proceedings. Health and Safety Code Section 39616 requires the District to ensure that any market incentive strategies it adopts result in lower or equivalent overall costs and job impacts, (i.e., no significant shift from high-paying to low-paying jobs), when compared with command-and-control regulations. Health and Safety Code Section 40920.6, which became effective on January 1, 1996, requires that incremental cost effectiveness (difference in costs divided by difference in emission reductions) be performed whenever more than one control option is feasible to meet control requirements.

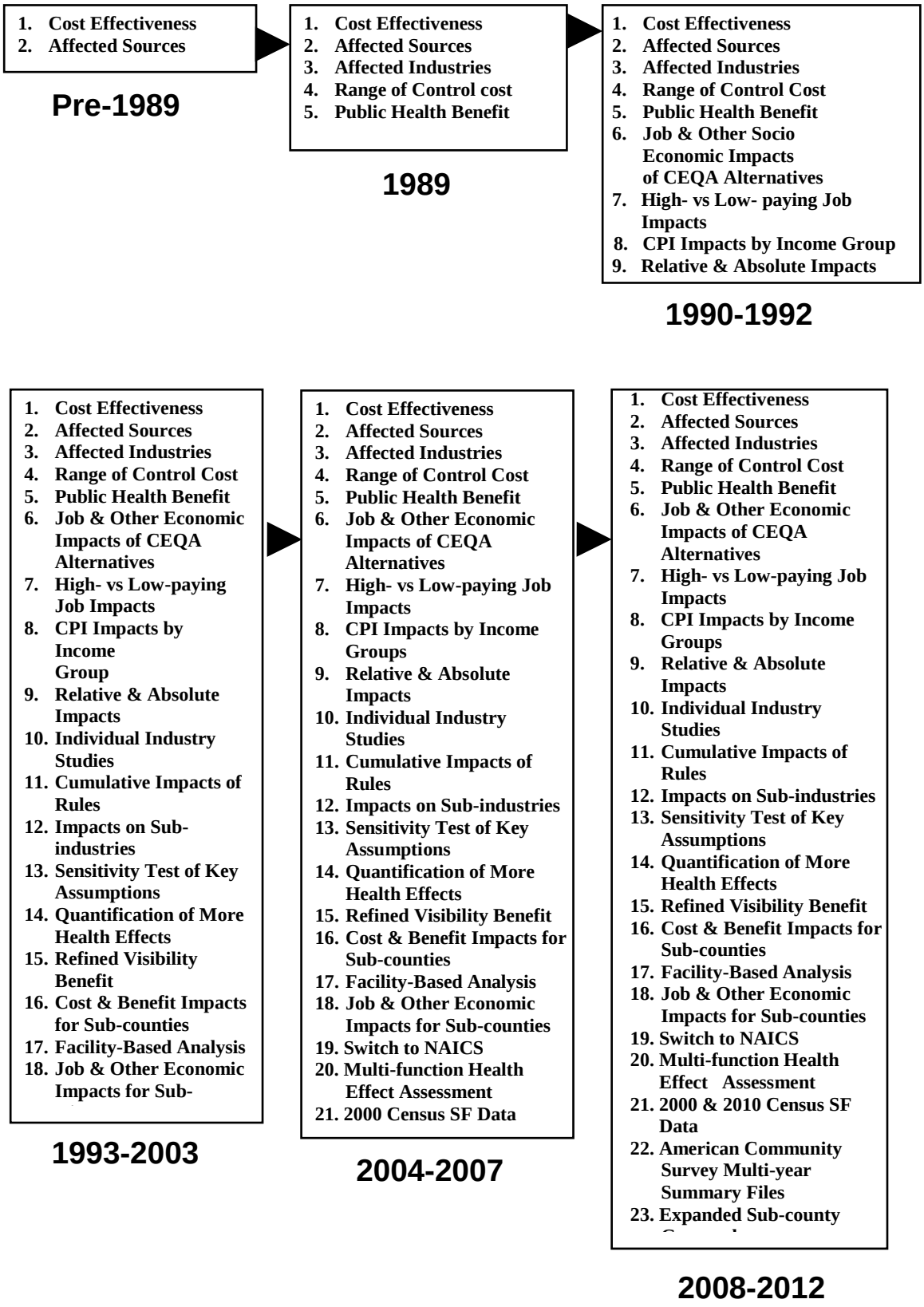
None of these requirements apply to the preparation of the AQMP. However, the District staff performs a socioeconomic analysis of the Plan in order to further inform public discussions and the decision making process of the Plan.

Current Socioeconomic Analysis Program

District staff continually seeks to improve its analysis of socioeconomic impacts by expanding its methods and tools. Over the years, the District's socioeconomic analyses have diversified and evolved as shown in Figure 1-1. The District relies on both quantitative and qualitative analyses, describes impacts in absolute and relative terms, and has continually refined its analysis to a more detailed level. In addition, the District has used facility-based and sub-industry data to better identify the underlying socioeconomic characteristics of various sizes of affected industries. Such analysis becomes an important analytic tool in situations where proposed regulations disproportionately impact small or minority owned businesses.

The Massachusetts Institute of Technology (MIT) conducted an audit of the District's socioeconomic impact analysis program (Polenske et al., 1992). This audit found that the District surpassed most other agencies in analytical methods. The audit did, however, recommend that the District use alternative approaches and work with the regulated community and socioeconomic experts to refine its socioeconomic assessments. The AQMP Advisory

FIGURE 1-1
Evolution of Socioeconomic Analysis



Group, Scientific, Technical and Modeling Peer Review Advisory Group (STMPRAG), the Ethnic Community Advisory Group (ECAG) and the Local Government, and Small Business Assistance Advisory Group (LGSBAAG) have been involved in providing input and refinements to the socioeconomic assessments. STMPRAG is composed of leading experts in the socioeconomic and air quality modeling fields, representatives from the regulated community, and participants from public interest groups. ECAG, the predecessor of the Environmental Justice Advisory Group, consists of representatives from community groups, small businesses, and grass roots organizations who work extensively with their communities. LGSBAAG is made up of representatives from local governments and small businesses.

In 1998, the District co-funded a visibility study with the most recent property sales data and census data for the four-county area (Beron et al., 2001). Results indicated that a strong relationship existed between the marginal willingness to pay for improved visibility (price of visibility) and educational level and household net income.

In 2000, towards the goal of expanding its analysis tools, District staff commissioned BBC Research and Consulting to examine approaches to assessing impacts of proposed regulations on a spectrum of facilities and to evaluating impacts of rules after their adoption. The study results indicated the need to employ a variety of external data sources, construct internal time series data, and explore data sharing opportunities with other governmental agencies.

Beginning in 2000, published economic statistics at the industry level have moved away from the Standard Industrial Classification (SIC) system to the North American Industrial Classification System (NAICS) to include new and emerging industries such as information technologies, among others. In 2006, all the potentially affected point source facilities in the 2002 emission inventory were re-designated with appropriate NAICS codes.

Since 2007, the District has been using a U. S. EPA approved health benefit assessment model—BenMAP—to assess health benefits associated with reductions in exposure to criteria pollutants. BenMAP is a GIS-based system and integrates epidemiological studies with air quality and demographic data, as well as economic valuation methodologies to quantify health effects associated with pollutant concentration and economic values associated with these effects. The District also uses the model to conduct sensitivity analyses on several issues related to the health benefit assessment; and the allocation of costs of individual control measures to sub-county areas.

The American Community Survey (ACS) continuously samples population to provide up-to-date demographic statistics to supplement information not provided by decennial censuses. There are ACS 1-year, 3-year, and 5-year estimates for various purposes. The 2006-2008 estimate was used to expand the four-county geography to 21 sub-regions from the previous 19 regions. The 2005-2009 and 2006-2010 estimates that provided 60 months of collected data at the census tract level were used to compile statistics on age cohorts, race, ethnicity, housing, and household characteristics to support the assessments of health, visibility, and material benefits.

In preparation for work for the 2012 AQMP, District staff has consulted with the AQMP Advisory Group, STMPRAG, and independent consultants to discuss possible and future refinements to data collection, modeling, and socioeconomic processes

2012 AQMP SOCIOECONOMIC ISSUES

In addition to covering all the topics listed under the legal mandates for rulemaking that were previously described, this assessment addresses the following issues and provide estimates of:

- ACS 5-year estimates on race and ethnicity distribution of population;
- Benefits of the 2012 AQMP;
- Total implementation cost of the 2012 AQMP;
- Cost of the 2012 AQMP as compared to the benefits;
- Effect of quantifiable measures and benefits of the Plan on employment;
- Potential impacts on sub-county areas and socioeconomic groups;
- Effect of the Plan on industrial competitiveness;
- Potential economic effects of the CEQA alternatives to the 2012 AQMP; and
- Key areas of uncertainty in this assessment.

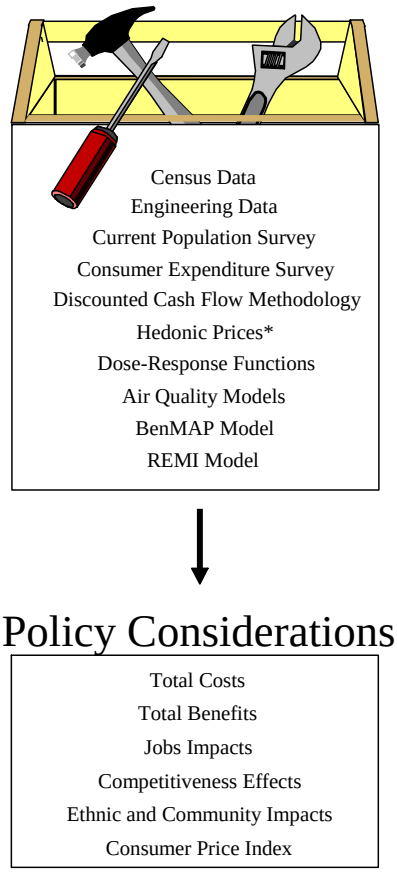
ASSESSMENT METHODOLOGY

To assess the socioeconomic impacts of the 2012 Plan, District staff has relied on a variety of data sources, methods, and tools (Figure 1-2). The analysis is divided into a number of segments whose interrelationship is shown in Figure 1-3. The analysis is performed at the sub-county level by grouping contiguous census tracts that have similar political, geographical, and social characteristics. Los Angeles County is sub-divided into 11 regions, Orange County into four regions, and Riverside and San Bernardino Counties into three regions each.

The socioeconomic analysis period from 2013 to 2035 is used to address various implementation dates of control measures and the resulting air quality benefits. The socioeconomic impacts of the 2012 AQMP are evaluated with respect to a baseline condition, which assumed that the four-county region would continue receiving federal highway funding to make the necessary infrastructure investments for implementation of the 2012 Regional Transportation Plan (RTP) in order to keep the region competitive nationally and globally. However, the funding hinges on achieving the air quality standard that is the primary goal of the 2012 AQMP. For this reason, the baseline forecast provided by SCAG

FIGURE 1-2

Assessment Tool Kit



*See Glossary

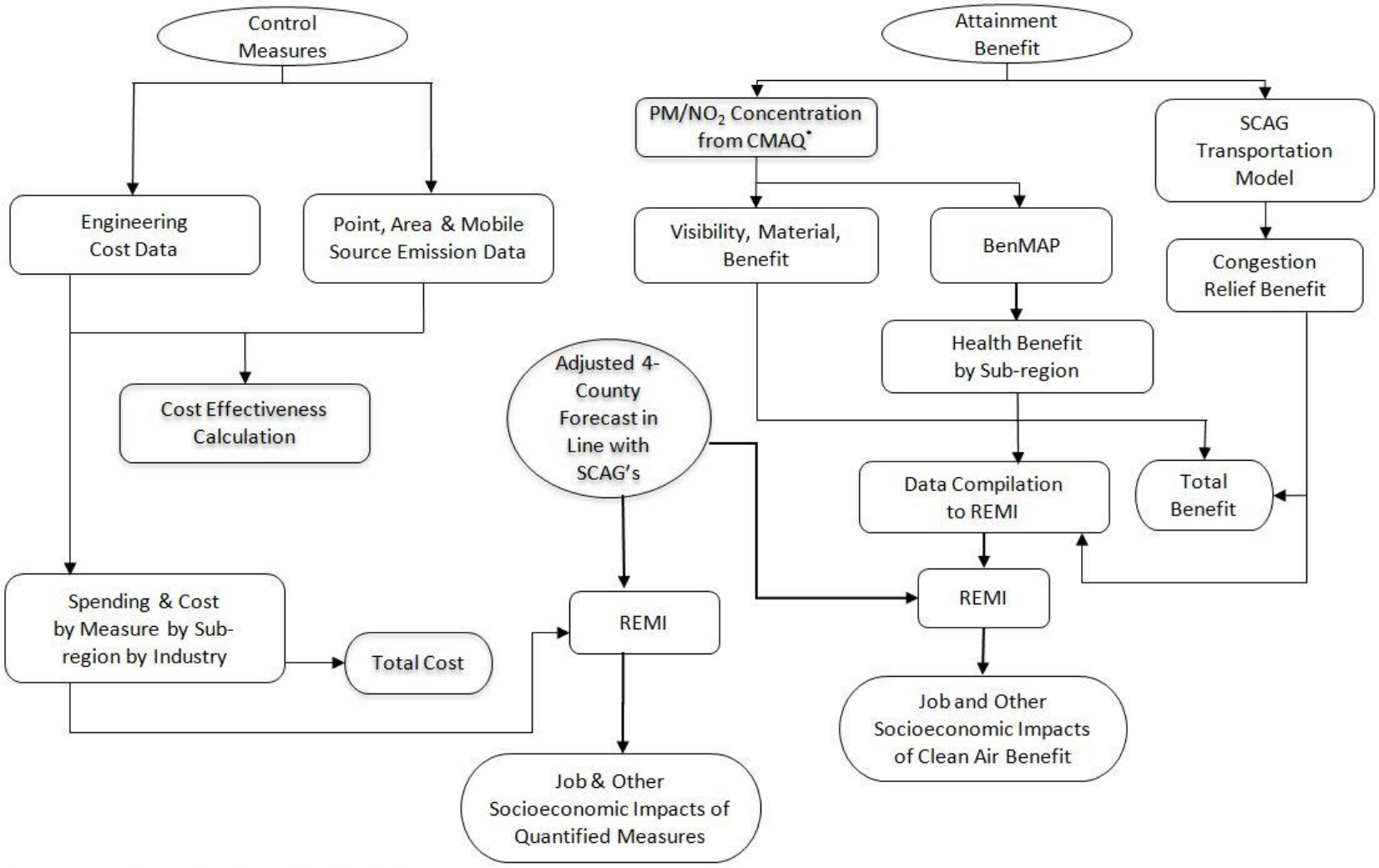
includes the 2012 RTP. The socioeconomic analysis herein attempts to address any deviations from the baseline as the 2012 AQMP is fully implemented in terms of benefits of cleaner air, costs of control measures, and spillover impacts of direct benefits and costs. These deviations represent the impact of the 2012 AQMP.

Benefit Analysis

A two-step process is utilized to estimate the benefits expected from attaining the federal $PM_{2.5}$ standard. The first step involves translating the improvements in air quality expected to result from the Plan into dollar values. Benefit categories with quantified relationships with air quality include improved human health, the public's willingness to pay for improved visibility, reduced damage to building materials, and reduced vehicle miles and vehicle hours traveled.

Established concentration-response relationships from recent research and air quality data from different air quality models are used to assess the benefits. The second step involves

FIGURE 1-3
AQMP Socioeconomic Analysis



*CMAQ = Community Multiscale Air Quality Model

qualitatively describing the remaining types of benefits that would result from implementing the Plan, but for which monetary benefit estimates are unavailable.

Cost Analysis

A two-step process is also employed to estimate the costs of the Plan. The first step involves the quantification of each control measure based on engineering cost estimates that can be developed at this time and identification of directly affected entities. Based on the proportions of emission reductions, the second step was to allocate the total cost of each control measure to affected sub-county regions. For stationary sources, facility emission reductions are aggregated by sub-region and industry according to the location of facilities. For area and mobile sources, emission reductions are assigned to air quality modeling grids with various surrogates. For example, population was used for VOC reductions from reformulated consumer products and housing units were used for VOC reductions from reformulated architectural coatings. For the mobile sources, emission factors from the ARB EMFAC 2011 as well as Vehicle Miles Traveled (VMT) from SCAG's transportation model were used. These emission reductions are then aggregated to 21 sub-regions according to the correspondence between grid cells and sub-regions. Population at census tracts from the 2010 Census is used to split a grid cell that may be divided into more than one sub-region.

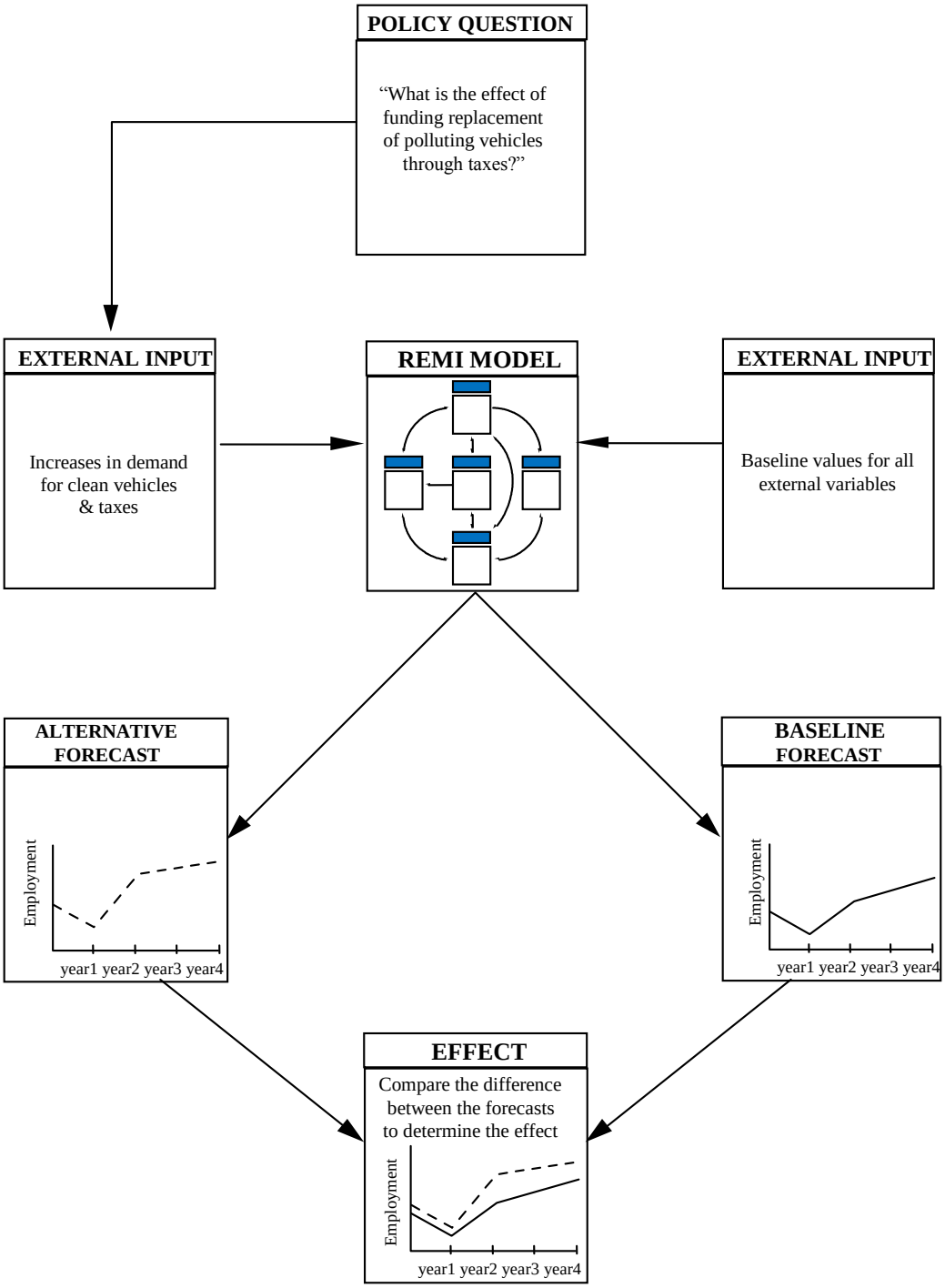
Job and Other Socioeconomic Impact Analysis

To estimate job impacts and other socioeconomic impacts that may result from the quantifiable measures and clean air benefits, the REMI (Regional Economic Models, Inc.) 18-region 70-sector model is utilized. The REMI model incorporates state-of-the-art modeling techniques and the most recent economic data. The MIT report conducted on the District's socioeconomic assessments found that the REMI model is "technically sound." Figure 1-4 shows an example of how the REMI model can be used to assess the socioeconomic impact of a policy. Both the cost and benefit impacts are developed outside of the REMI model and are used as input to the REMI model.

To assess the impacts on socioeconomic groups, the impacts on product prices from the REMI model are overlaid on consumption patterns of various income groups to examine the changes in consumer price indices of these income groups. The data on consumption patterns are from the Bureau of Labor Statistics' Consumer Expenditure Survey.

To assess the impacts on competitiveness of the four-county area, the following were considered: the region's share of national jobs in those industries whose products are also sold in the national market; the impacts of the Plan on product prices by industry; and the changes in imports and exports as a result of implementing the Plan's control measures. These factors are selected based on a review of effects of past public policies on a region's competitiveness.

FIGURE 1-4
Use of the REMI Model



CHAPTER 2

ECONOMY AND AIR QUALITY

Introduction

Demographics

Four-County Economy

Other Economies

Air Quality and Economy

Future Growth

INTRODUCTION

Los Angeles, Orange, Riverside, and San Bernardino Counties collectively constitute one of the largest regional economies in the United States. The jurisdiction of the SCAQMD includes all or the majority of the populated portions of these four countries. In 2010, the four-county area's gross domestic product (GDP) was $768 billion (2005 dollars), which was 5.9 percent of the US GDP and 45 percent of the California GDP (U. S. BEA, 2012). These counties had 17.1 million people in 2010, which was 45.8 percent of California's total population or 5.5 percent of the U.S. population. In addition, there were 6.3 million wage and salary workers in the four-county area in 2011, a 44 percent share of the state's total wage and salary workforce (EDD, 2012b).

The South Coast Air Basin (SCAB), which is part of the four-county area, has the worst ozone in the nation along with San Joaquin Valley and Houston, and is classified as an extreme non-attainment area for the 8-hour federal ozone standard. The SCAB is also in nonattainment for the 24-hour $PM_{2.5}$ Standard. As such, stringent control measures have to be proposed in order to meet the standard. The four-county area has the most diversified economy in the nation, and the business community has expressed concerns about the impact of air quality regulations on the local economy, in particular, on the manufacturing sector. In what follows, characteristics of the local economy are presented and compared to other local economies.

DEMOGRAPHICS

Population of the four-county area is expected to grow from its 2008 level of 16.9 million to 18.6 million in 2020, and 20.9 million in 2035 (REMI, 2011). This represents an annual population growth rate of 0.79 percent over the 2008-2035 period and between 2020 and 2035.

According to the 2010 census, 45 percent of the 17.1 million residents in the four-county area were Hispanic, followed by 33 percent White, 12 percent Asian, seven percent African American, and three percent were of other races or multiple races. Hispanics are people of Hispanic origins regardless of their races. Los Angeles County was the most racially and ethnically diverse county in the region with 28 percent Whites and 48 percent Hispanics. Los Angeles and Orange Counties had the highest percentage of Asians. Orange and Riverside Counties had the highest percentage of Whites. In all four counties, Whites and Hispanics were the two largest ethnic groups. Table 2-1 shows the ethnic distribution of population by county.

TABLE 2-1
Distribution of Race and Ethnicity in Four Counties

County	Hispanic	White	Asian	African-American	Other
Los Angeles	48%	28%	14%	8%	3%
Orange	34%	44%	18%	1%	3%
Riverside	45%	40%	6%	6%	3%
San Bernardino	49%	33%	6%	8%	3%
Total	45%	33%	12%	7%	3%

Sources: U.S. Census Bureau. 2010 SF1 100% Data [Data Files QT-P3 and QT-P4]. Retrieved June 2012 from http://factfinder2.census.gov/faces/nav/jsf/pages/searchresults.xhtml?ref=geo&refresh=t

Based on census tract boundaries with consideration of topographical features and city boundaries, the four-county area was divided into 21 sub-regions. The counties of Riverside and San Bernardino were divided into three sub-regions each: two more urbanized areas and a more sparsely populated area. Los Angeles County was divided into 11 sub-regions and Orange County was divided into four sub-regions. Figures 2-1 shows the ethnic distribution of population in each of these sub-regions, respectively, based on the 2010 census.

Socioeconomic characteristics of the sub-regions were compiled using the 2010 Census data. These data were aggregated to the sub-region level by apportioning census tracts to the appropriate sub-region. Spatial allocation of census tracts were assigned to sub-regions using ArcGIS. The 21 sub-regions showed considerable variation as measured by several socioeconomic indices (Table 2-2).

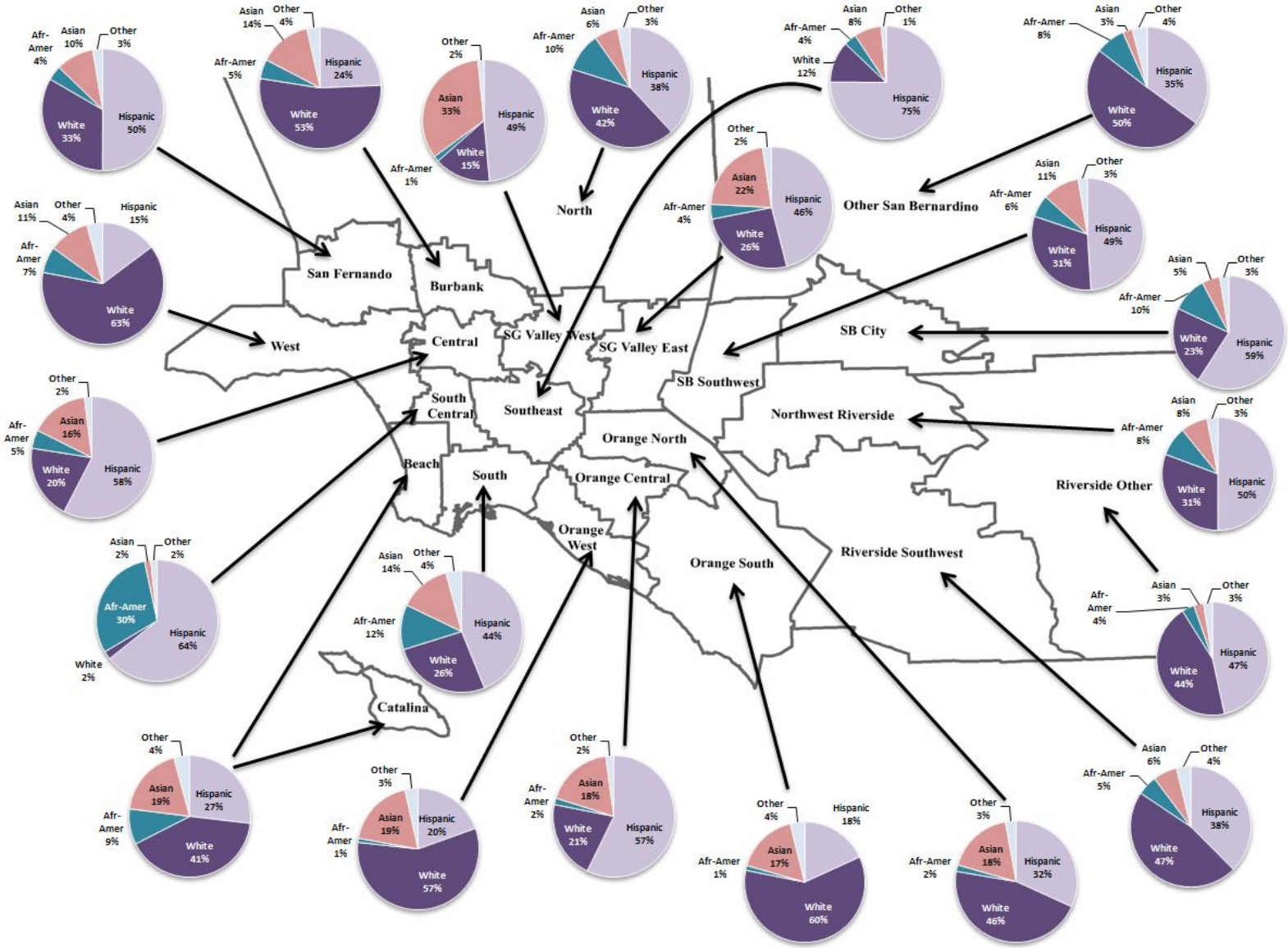
Sub-regions in Riverside and San Bernardino Counties had relatively higher share of youth population while the western area of Los Angeles County had the lowest percentage of youth among all sub-regions. The non-urbanized portion of Riverside County had the highest percentage of elderly population. Newly developed sub-regions and those in urban centers had the lowest share of the elderly. The poverty rates ranged from a low of seven percent in the southern part of Orange County to 29 percent in the south central area of Los Angeles County according to the 2006-2010 American Community Survey.

TABLE 2-2
Socioeconomic Characteristics of County Sub-areas

Sub-area	Population (thousands)	Percent (%)		
		Poverty[1]	Youth[2]	Elderly[3]
LA Beach & Catalina	583	9%	24%	13%
LA Burbank	579	11%	21%	14%
LA Central	1,203	23%	23%	10%
LA North	663	14%	31%	8%
LA San Fernando	1,294	14%	26%	11%
LA San Gabriel Valley East	640	10%	26%	12%
LA San Gabriel Valley West	943	13%	26%	13%
LA South	865	16%	27%	10%
LA South Central	1,020	29%	33%	8%
LA Southeast	1,174	14%	30%	10%
LA West	855	10%	17%	14%
Orange Central	1,021	15%	29%	9%
Orange North	426	8%	26%	12%
Orange South	899	7%	25%	12%
Orange West	664	9%	22%	15%
Northwest Riverside	863	13%	31%	8%
Riverside Other	722	16%	27%	18%
Riverside Southwest	605	11%	32%	10%
Other San Bernardino	585	18%	30%	11%
San Bernardino City	841	18%	33%	8%
San Bernardino Southwest	609	8%	29%	8%
Total Four Counties	17,054	14%	27%	11%

[1]Poverty data are based on the U.S. Census Bureau's 2006-2010 American Community Survey. For 2010, the federal poverty threshold for a family of four is $22,314 (Census, 2012).
[2]Youth = 18 years old or younger.
[3]Elderly = 65 years old or above.

FIGURE 2-1
2010 Census: Ethnic Distribution of Population



FOUR-COUNTY ECONOMY

The four-county region is built around the nation's largest port complex and entertainment and tourism sectors; and has a diversified manufacturing center. The ports of Los Angeles and Long Beach have the highest container traffic (a combined total of more than 14 million TEUs in 2011) among all U.S. ports.

The four-county economy has a strong and well diversified economic base. Of the total $768 billion GDP in 2010 in the four-county area, the sector of real estate, rental, and leasing had the biggest share (19 percent), followed by manufacturing (10 percent), and government and information (nine percent each). The manufacturing share of GDP had been between nine and 10 percent of the local economy since 2001; in the recessionary year 2008, its share went up to 11 percent. Contribution of the information sector had risen from seven percent of GDP in 2001 to nine percent in 2010.

More than 8.9 million jobs supported the $768 billion GDP in 2010. The sectors that had the highest shares of jobs were government (12 percent), retail trade (10 percent), health care and social assistance (10 percent), professional, scientific, and technical services (8 percent), manufacturing (7 percent), accommodation and food services (7 percent), and administrative and waste management services (7 percent). Table 2-3 shows the contribution of top 10 major sectors in terms of GDP and jobs in 2010, respectively. Figure 2-2 shows the manufacturing trend from 2001 to 2010 in terms of GDP and jobs in the four-county region, which was commensurate with the national trend. In 2010, the U.S. manufacturing sector produced $100 billion more of goods than China but used only one-tenth the labor due to increases in productivity through automation. Goods that required 1,000 workers to produce in 1950 need only 177 workers today (WSJ, 2012).[1]

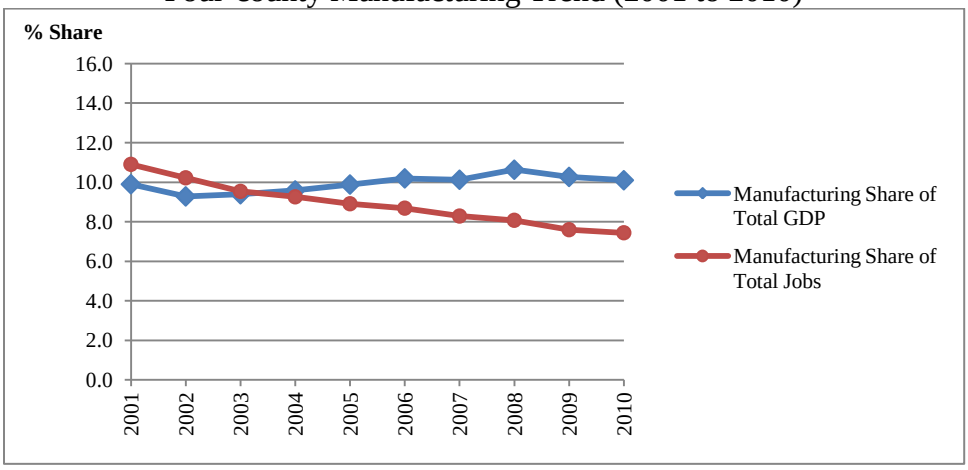
TABLE 2-3
Percentage Contribution to South Coast Economy by Sector in 2010

Industry	Share of Jobs	Share of GDP
Government	12%	9%
Retail Trade	10%	6%
Health Care and Social Assistance	10%	6%
Professional, Scientific and Technical Services	8%	8%
Accommodation and Food Services	7%	2%
Administrative and Waste Management Services	7%	3%
Other Services	7%	2%
Manufacturing	7%	10%
Finance and Insurance	5%	6%
Real Estate, Rental and Leasing	5%	19%
Wholesale Trade	5%	8%
Information	3%	9%

Industries are based on the NAICS codes.

[1] "Notable & Quotable." (WSJ) Wall Street Journal. February 1, 2012. sec A, p. A14.

FIGURE 2-2
Four-county Manufacturing Trend (2001 to 2010)



Over the 2001-2010 period, shares of the retail trade sector in the total jobs had remained at 10 percent while the sector's GDP shares had declined slowly from seven to six percent. There had been a slight increase in shares of the real estate, rental, and leasing sector in the total jobs (four to five percent) commensurate with its slight increase in the GDP shares (18 to 19 percent). The government sector had been slightly trending up in recent years in terms of job shares (11 to 12 percent), while trending down in terms of GDP shares (10 to nine percent). Job shares of the information sector had gone down from four to three percent. However, its GDP shares had been trending up from seven to nine percent.

Because the four-county economy is made up of four counties, strengths of economies in separate counties will differ from one another and from the overall four-county economy.

Green Jobs

Based on a survey conducted by the California Labor Market Information Division, green jobs (as defined in the footnote below) spread across nearly all industries (EDD, 2010).[2] The four-county region had 41.3 percent of the total 432,840 green jobs in California. Approximately 2.9 percent of the total jobs in southern California were green jobs. Among all the regions in California, northern California had the highest share of green jobs in its total jobs (8.1 percent). Green jobs in southern California were concentrated in existing materials recycling (29 percent), all phases of energy efficient products from construction to maintenance (26 percent), and natural and sustainable product manufacturing (20 percent).

Three industries had the highest share of all green jobs in California: manufacturing (20.5 percent), construction (14.2 percent), and professional, scientific, and technical services (9.7 percent). The share of green jobs as a percentage of all jobs was the highest in utilities (27.8 percent), followed by mining, quarrying, and oil and gas extraction (18.3 percent), and

[2]As detailed in the EDD survey summary, green jobs herein are defined as those workers engaging in generating and storing renewable energy; recycling existing materials; constructing, producing, installing, and maintaining energy efficient products; educating and complying with green business practices; and manufacturing natural and sustainable products.

construction (11 percent). Many occupations have benefited from green jobs. The top green job occupations were carpenters, hazardous materials removal workers, and sustainable farmers and farm workers.

Over the years, the AQMD has been in partnership with private entities to provide funding to businesses that promote commercialization of and demonstrate the successful use of clean fuels and technologies. For every dollar that the AQMD contributes, there is, on average, a $3 investment by the AQMD partners. Many of these projects result in creation of green jobs. In 2011, approximately $200 million funding (from Proposition 1B, the Carl Moyer Program, the Clean Fuel Program, and earmarked U.S. EPA and DOE funds) was provided by the AQMD.

Occupational Wage and Employment

Based on the May 2010 occupational employment and wage estimates for the four-county area, 29 percent of 6.3 million wage and salary jobs were in sales, office, and administrative support occupations with average annual wages between $37,000 and $40,000. Except for management positions, higher wage occupations included legal, engineering, computer, healthcare, and other highly skilled profession. Los Angeles and Orange Counties paid higher wages in almost all occupations but community and social services, and transportation and material moving occupations. Table 2-4 has the number of jobs and mean annual wage by occupation in the four-county area. Many of the top-paying occupations are skilled positions in the scientific, technical, and professional fields. Goods movement related jobs are not separately tracked, but are spread among all occupations.

TABLE 2-4
Number of Jobs and Mean Annual Wage by Occupation

Occupation Title	Jobs*		Mean Annual Wage	
	LA-OR	RS-SB	LA-OR	RS-SB
All Occupations	5,191,880	1,140,830	$ 50,120	$ 42,930
Legal Occupations	49,080	4,510	$ 125,370	$ 95,900
Management Occupations	292,740	46,910	$ 121,360	$ 99,950
Architecture and Engineering Occupations	101,760	11,800	$ 87,290	$ 76,850
Computer and Mathematical Occupations	128,130	13,020	$ 80,810	$ 69,640
Healthcare Practitioners and Technical Occupations	246,150	59,190	$ 80,580	$ 80,090
Business and Financial Operations Occupations	282,600	38,750	$ 73,010	$ 63,880
Arts, Design, Entertainment, Sports, and Media Occupations	153,530	9,480	$ 71,030	$ 47,690
Life, Physical, and Social Science Occupations	40,980	8,930	$ 70,110	$ 64,150
Education, Training, and Library Occupations	326,810	91,760	$ 59,170	$ 58,990
Protective Service Occupations	134,030	34,730	$ 51,040	$ 48,770
Community and Social Service Occupations	70,550	16,150	$ 50,700	$ 51,450
Construction and Extraction Occupations	155,260	51,850	$ 50,160	$ 48,720
Installation, Maintenance, and Repair Occupations	157,800	42,230	$ 46,990	$ 45,660
Sales and Related Occupations	534,950	121,510	$ 40,120	$ 32,860
Office and Administrative Support Occupations	976,450	195,850	$ 36,840	$ 33,900
Transportation and Material Moving Occupations	340,440	108,130	$ 32,310	$ 32,400
Production Occupations	354,410	66,260	$ 31,480	$ 31,280
Healthcare Support Occupations	138,950	31,190	$ 29,140	$ 28,320
Building and Grounds Cleaning and Maintenance Occupations	146,980	40,100	$ 26,680	$ 26,560
Personal Care and Service Occupations	118,780	31,190	$ 26,090	$ 24,370
Farming, Fishing, and Forestry Occupations	4,550	5,840	$ 23,870	$ 21,400
Food Preparation and Serving Related Occupations	436,980	111,450	$ 21,540	$ 21,310

*Exclude self-employed.
Bureau of Labor Statistics, Department of Labor, May 2010 Metropolitan and Nonmetropolitan Area Occupational Employment and Wage Estimates [Data File], http://www.bls.gov/oes/2010/may/oessrcma.htm.

OTHER ECONOMIES

Due to its air quality status, the four-county region has a complex air quality program which has included various local and state regulations over decades. Although air quality control programs alone do not define the underlying economy, they are an integral part of the general environment under which people live and businesses operate. The section below examines other regions where air quality problems are less severe to ascertain whether their economic profiles are different from the four-county area.

The Bay Area is an anchor to the northern California economy. The San Diego economy is ranked fourth in California, following the Los Angeles-Long Beach-Santa Ana, San Francisco-Oakland-Fremont, and San Jose-Sunnyvale-Santa Clara metropolitan statistical areas (MSA). The Houston-Sugar Land-Baytown MSA, of which the Houston-Galveston-Brazoria area is a part, is the fifth largest MSA in the nation in terms of GDP in 2010. The Bay Area AQMD (BAAQMD), San Diego Air Pollution Control District (SDAPCD), and

the Houston-Galveston-Brazoria area are in compliance with the PM2.5 standard. The BAAQMD and SDAPCD have also attained the federal 8-hour ozone standard. Not only do the strengths of these economies differ from the South Coast economy, but their air quality status is also dissimilar to that of the South Coast economy.

The BAAQMD had 7.2 million people in 2010 and is comprised of nine counties, Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma. The BAAQMD economy had over 4.3 million jobs.[3] Three sectors had the largest share of jobs: professional, scientific, and technical services (12.5 percent), government (11 percent), and healthcare and social assistance (9.4 percent). The share of manufacturing workforce in the BAAQMD economy was 7.6 percent in 2010, a decline from 10.6 percent in 2001. Table 2-5 shows the contribution of the top 10 major sectors in terms of jobs in 2010.

TABLE 2-5
Percentage Contribution to Bay Area Economy
by Sector in 2010

Industry	Share of Jobs
Professional, Scientific, and Technical Services	12.50%
Government	11.00%
Health Care and Social Assistance	9.40%
Retail trade	8.90%
Manufacturing	7.60%
Accommodation and food services	7.00%
Administrative and waste management services	6.00%
Other services	5.40%
Construction	4.50%
Wholesale trade	3.20%

San Diego had 3.1 million people in 2010. The total GDP of the San Diego economy was $15.5 billion (in 2005 dollars) in 2010, which was dominated by the real estate/rental/leasing sector (19.8 percent), followed by the government (16.7 percent), professional, scientific, and technical services (9.8 percent), as well as manufacturing (9.4 percent) sectors. The share of manufacturing in the San Diego economy had been on the rise over the years from 7 percent in 2001 to 9.4 percent in 2010. In 2010 the San Diego economy supported 1.8 million jobs, most of which were in the sectors of government (18.8 percent), professional, scientific, and technical services (10.3 percent), retail trade (9.1 percent), and health care and social assistance (8.3 percent). Manufacturing jobs were 5.7 percent of the total San Diego jobs in 2010, a steady decline from 7.4 percent in 2001. Table 2-6 shows the contribution of the top 10 major sectors in terms of GDP and jobs in 2010, respectively.

[3] GDP data is available for states and metropolitan statistical areas (MSA); however, it is not available at the county level. Both the BAAQMD and Houston-Galveston-Brazoria areas have geography which includes portions of MSAs; published GDP data cannot be readily constructed for these areas.

TABLE 2-6
Percentage Contribution to San Diego Economy by Sector in 2010

Industry	Share of Jobs	Share of GDP
Government	18.8%	16.7%
Professional, Scientific, and Technical Services	10.3%	9.8%
Retail Trade	9.1%	5.8%
Health Care and Social Assistance	8.3%	5.4%
Accommodation and Food Services	7.7%	3.00%
Administrative and Waste Management Services	6.1%	2.70%
Other Services	5.8%	2.10%
Manufacturing	5.7%	9.4%
Real Estate and Rental and Leasing	5.4%	19.8%
Finance and insurance	4.9%	4.7%
Construction	4.5%	3.4%
Wholesale Trade	2.8%	4.7%
Information	1.7%	6.6%

The Houston-Galveston-Brazoria area (hereafter Houston economy) is comprised of eight counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, and Waller. In 2010, the Houston economy had over 5.9 million people. Its 3.4 million jobs were dominated by the following sectors: government (11.2 percent), retail trade (9.4 percent), and health care and social assistance (9 percent). The manufacturing sector had declined to 6.7 percent of the total jobs in 2010 from 8.5 percent in 2001. The construction sector's employment continued to decline from its height in 2007. Table 2-7 shows the contribution of the top 10 major sectors in terms of jobs in 2010.

TABLE 2-7
Percentage Contribution to Houston Economy
by Sector in 2010

Industry	Share of Jobs
Government	11.20%
Retail trade	9.40%
Health Care and Social Assistance	8.90%
Professional, Scientific, and Technical Services	8.10%
Construction	7.50%
Administrative and Waste Management Services	7.40%
Manufacturing	6.70%
Accommodation and Food Services	6.70%
Other services	5.80%
Finance and insurance	5.50%

As with the South Coast economy, the economies in the Bay Area AQMD, San Diego Air Pollution Control District, and Houston-Galveston-Brazoria area had shown a decline of the share of manufacturing jobs over the years and the government sector is the highest share of

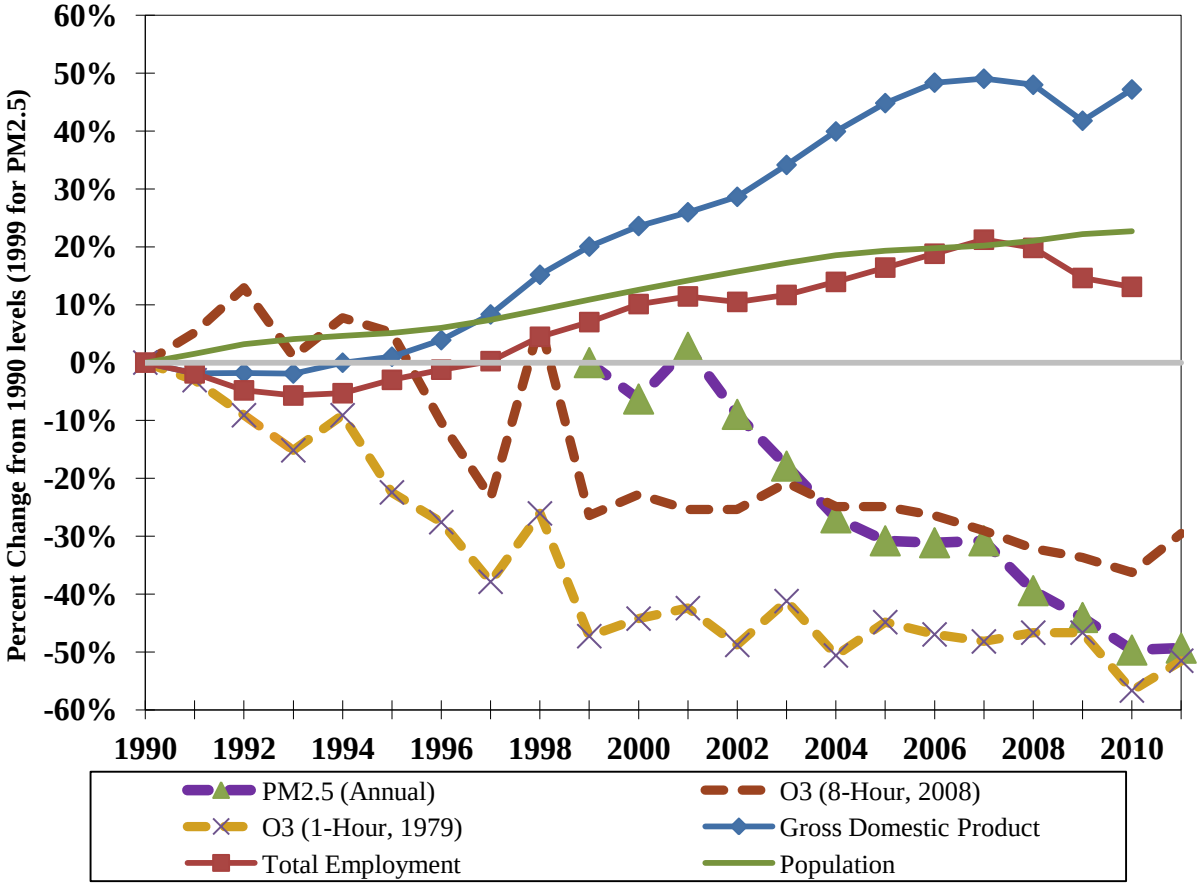
total local jobs. On the air quality front, population, industry makeup, emission profile, transportation, weather, and geography as a whole have made southern California more susceptible to air quality problems than San Diego, the Bay Area, and Houston.

AIR QUALITY AND ECONOMY

Growth is a potential impediment to progress in air quality. As such, improvements in air quality must be sufficiently large to offset increases in population and economic activities in order to achieve air quality standards.

The South Coast Air Basin (SCAB) is close to meeting the federal annual standard for PM2.5, 15 micrograms per cubic meter ($\mu g/m^3$). As of the end of 2011, the AQMD had been experiencing an annual reduction of 6.8 percent in PM2.5 concentration since its 2001 peak. The AQMD still has the most number of days exceeding the federal 8-hour ozone standard despite a downward trend. During 2001-2010, the number of days exceeding the federal 8-hour ozone standard was reduced at an annual rate of 2.82 percent. There had been significant improvements in air quality within the SCAB despite significant growth in GDP, employment, and population, as shown in Figure 2-3. In fact, economic growth is needed to support investment in cleaning the air. The business community has made great stride in complying with some of the most stringent controls in the nation while remaining competitive. The South Coast economy was hit hard during the 2007-2009 Great Recession and the 1990-1991 recession, and experienced a slowdown during the early 2000s. However, air quality continued to show steady progress.

FIGURE 2-3
Air Quality, Economic and Demographic Trends in South Coast*



*Economic and demographic data was from REMI Insight®. 18 Area Model for the South Coast Economy, Version 1.3.13, 2011.

Future Growth (Baseline Forecast)

The recent Great Recession ended in the second quarter of 2009, according to the Business Cycle Dating Committee of National Bureau of Economic Research (NBER). Since then the South Coast economy has been on a slow recovery. As with any other recovery after a recession, job recovery often lags. However, the lag is more pronounced and protracted at this time due to a slumping housing market.

According to the California State University, Long Beach, short-term forecast, the four-county region's jobs would grow by one and one-half percent in 2012 from 2011. Job growth in a number of sectors would exceed two percent. The leisure & hospitality services sector is expected to add jobs at a pace of 3.1 percent in 2012 after a 2.1 percent gain in 2011, reflecting growing demand in the restaurant, hotel and amusement sectors. The professional & business services sector that includes accounting, management consulting and computer systems design is expected to experience job growth of 2.9 percent in 2012. The retail trade sector would add jobs at a pace of 2.3 percent. Anticipated job growth for 2012 in the health and private education sector is 2.2 percent. In 2012, both the durable and

nondurable manufacturing sectors would likely have small, but positive, job growth. Most of this growth is likely to occur in Riverside, San Bernardino and Orange Counties. Government employment is expected to decline in both federal and state and local government employment (CSULB, 2012).

Los Angeles County from 2012 to 2014 is forecasted to grow one and one-half percent in non-farm payroll jobs. Riverside and San Bernardino Counties are expected to experience job growth similar to that of Los Angeles County from 2012 to 2014. Employment in Orange County is projected to grow in the range of two percent over the same period (CSULB, 2012).

Projections by the REMI (Regional Economic Models, Inc.) model that were modified to reflect SCAG projections indicate that from 2008 to 2035 the four-county region is expected to gain 2.03 million jobs at an annual growth rate of 0.72 percent (REMI, 2012). There are small differences in the job forecast methodology and U.S. projections between REMI and SCAG forecasts. However, these differences do not affect the results reported herein as the REMI forecast was adjusted to reflect the growth rates in the SCAG regional growth forecast (See Appendix C for details).

SCAG projections (which form the baseline projections for the 2012 AQMP) assumed continuation of federal highway funding that would be necessary for the four-county area to make the infrastructure investments for implementation of the 2012 RTP in order to keep the region competitive nationally and globally. For this reason, SCAG projections reflect the full implementation of the 2012 RTP. The highway funding hinges on the Basin's compliance with the federal Clean Air Act (CAA). In other words, the baseline forecast does not include the potential consequences of not meeting the federal air quality standard (e.g., 2 to 1 offset ratio for new and modified major sources and withheld highway funding under the CAA).

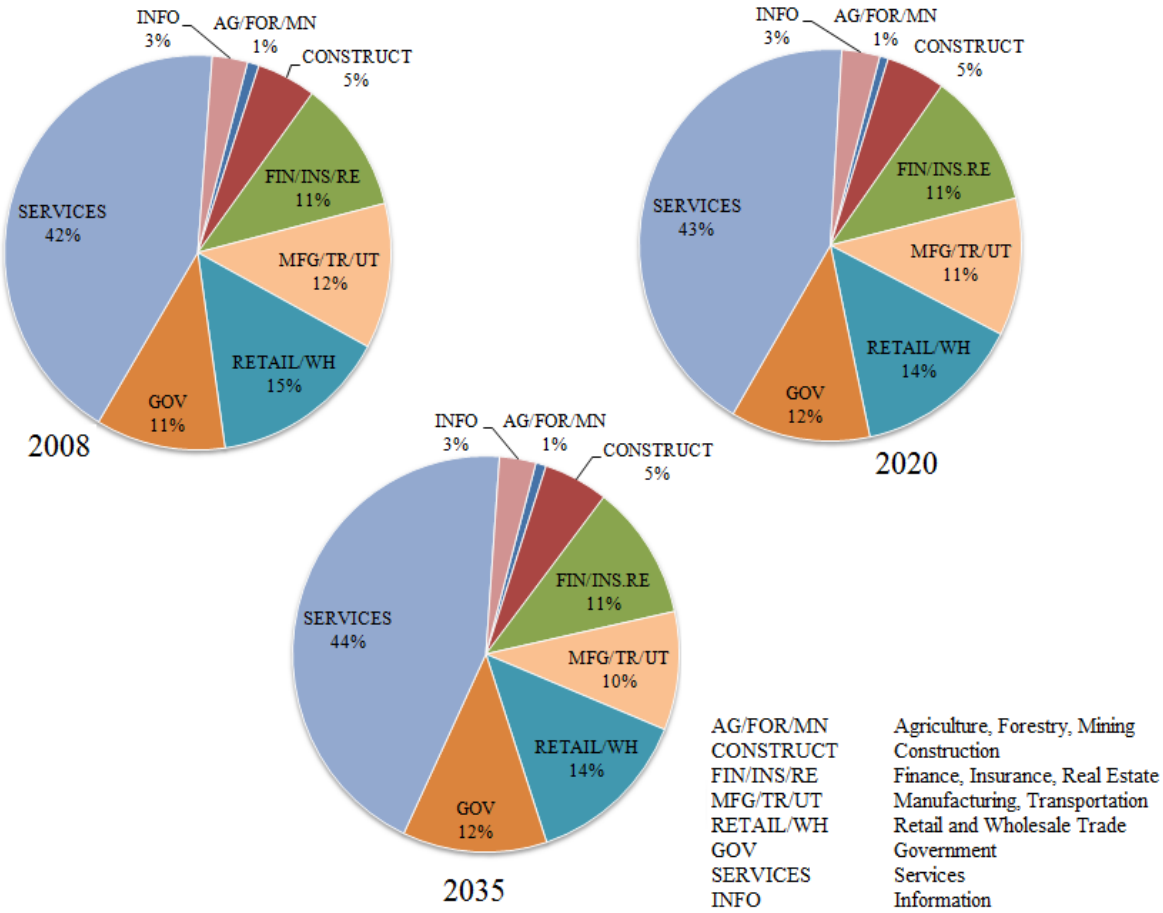
Total employment in Los Angeles County is projected to increase by 0.68 million jobs at a 0.41 percent annual growth rate, while Orange County is projected to increase by 0.18 million jobs at a 0.31 percent annual growth rate. Similar to population growth, total employment in Riverside County is projected to increase by 0.73 million jobs at a 2.31 percent annual growth rate, and San Bernardino County is projected to increase by 0.44 million jobs at a 1.53 percent annual growth rate.

The fastest growth would occur in the construction (NAICS 23), services (NAICS 54-56, 61-62, 71-72, 81), and finance, insurance, and real estate (NAICS 52-53) sectors. The construction sector's jobs are anticipated to grow at 0.95 percent annually, followed by the services and finance, insurance, and real estate sectors at 0.84 percent each. Job growth in the retail and wholesale trade (NAICS 44-45, 42) sector is expected to reach an annual rate of 0.48 percent. In the manufacturing, transportation, and utilities (NAICS 31-33, 48-49, 22) sectors, employment is projected to decline at 0.01 percent annually over the 2008-2035 period.

Figure 2-4 shows historical (2008) and projected sectoral share of employment for 2020 and 2035. The four-county economy, which is composed of a large non-manufacturing sector, is becoming modestly more service-based. Shares of employment in the services (NAICS 54-

56, 61-62, 71-72, 81); finance, insurance, and real estate; construction; and government sectors are projected to increase over time between 2008 and 2035. Slightly smaller shares of total jobs in the four-county area are anticipated to occur in the information (NAICS 51), manufacturing, and retail and wholesale trade sectors in 2035 as these sectors become more productive.

FIGURE 2-4
Projected Sectoral Employment Share in the Four-County Economy



Source: REMI Insight®. 18 Area Model for the South Coast Economy, Version 1.3.13, 2011.

The baseline forecast is used as a benchmark against which the impacts of the 2012 AQMP are evaluated.

CHAPTER 3

COSTS AND BENEFITS

INTRODUCTION

Public policies are often examined relative to their overall costs and benefits, providing a general indication of the net economic impact of the policy. Applying that approach to the AQMP preferably would involve the full quantification of costs and benefits in monetary terms, i.e., dollars.[1] Equipment and materials which are required by control measures are purchased and sold in markets, and their prices can thus be used to measure the costs of implementing control measures. Cost quantification becomes more uncertain when control technologies cannot be specifically identified at the planning stage. Cheaper options may be deployed and marginal costs could be on the rise for the last few tons of emission reductions in order to reach attainment. On the other hand, the possibility of technology advancement and large-scale production due to regulatory requirements may drive down control costs.

There is no direct way to measure benefits of clean air because clean air is not a market commodity. Placing a monetary value on reduced incidence of illness or loss of life is also difficult and more subjective than determining control equipment costs. This often results in incomplete assessments and underestimation of benefits.

This chapter presents aggregate benefits and costs for either the four-county area or by county. Chapter 5 has more detailed results for 21 sub-regions.

COSTS

The cost of attaining clean air in the four-county area includes expenditures on control equipment, low-polluting materials, and infrastructure investments. To quantify these costs, the two-step methodology described in Chapter 1 was applied. The majority of these costs are estimated based on currently available technology.

For each point source control measure, cost data was developed for the entire District and then allocated to the industries and sub-regions to which the affected point sources belong based on the projected emission reductions in the 2012 AQMP and the 2008 emissions inventory data.[2] Figure 3-1 shows the distribution of point sources in the 2008 emission inventory. Point sources include stationary, identifiable sources of emissions that release over four tons or more of VOC, NOx, SOx, or PM or emitting more than 100 tons of CO per year. For area, on-road, and off-road sources, the cost for each measure was assessed for affected industries in the District and then allocated to the 21 sub-regions based on emission reductions at each air quality grid and the correspondence between grids and sub-regions.[3] The cost of each control measure is comprised of the annual operating and maintenance expenditure and capital expenditure annualized over

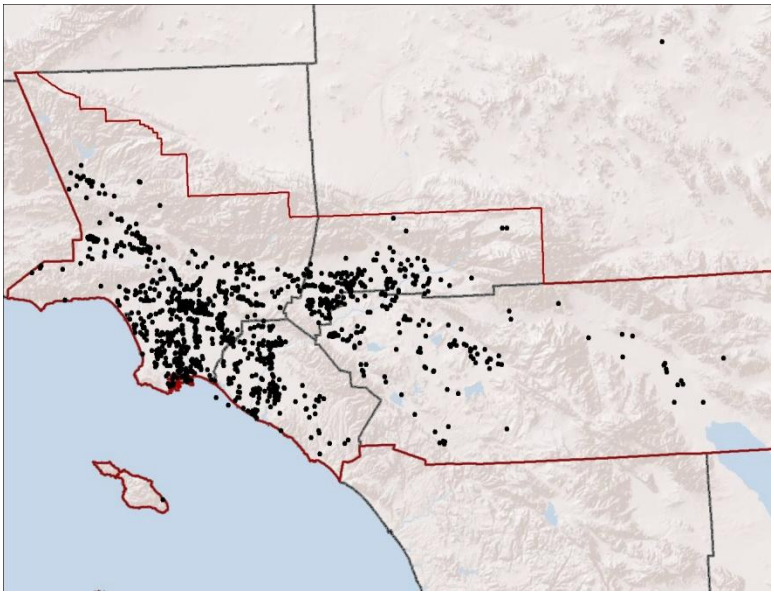
[1]All the dollars in this report are expressed in constant 2005 dollars, which removes the effects of general price changes. Changes in constant dollars over time reflect changes in quantity only, which is a better barometer of the standard of living. Currently, all federal statistics in constant dollars are denominated in 2005 dollars. Appendix I—CPI and Cost Indices—provides consumer price indices (CPIs) from 2005 to 2011 and the Marshall & Swift Equipment Cost Indices from 2005 to 2011.

[2]In cases where facilities are owned by companies headquartered elsewhere, costs may not be incurred in the four-county area. Therefore, the cost burden in the four-county area may be lessened.

[3]For area and off-road sources, emission reductions were distributed based on CARB's emission surrogate profiles at the gridded level. For on-road sources, information at the transportation zone level from SCAG was used to distribute emission reductions to grids.

the economic life of equipment at the 4-percent real interest rate. The cost of stationary source control measures does not include construction costs associated with the re-design of a facility to accommodate the new required device and permitting. The cost associated with these categories will be considered during the rulemaking process.

FIGURE 3-1
Point Source Location in the 2008 Emission Inventory



A total of 143 public and private projects with multiple implementation years associated with the SIP-committed TCMs in the 2012 AQMP were quantified. The SIP-Committed TCMs were derived from the first two years of the 2011 Federal Transportation Improvement Program (FTIP), which is a multimodal list of capital improvement projects to be implemented over a six-year period. TCMs provide mobility, increase efficiency and safety of the transportation system, and reduce transportation-related air pollution. TCMs are part of the 2012 RTP and have approximately a three-percent share of the total RTP cost. Appendix E has a list of TCMs along with funding sources, completion dates, and types of costs that were used for the analysis herein. Affected sub-regions are identified according to the description of each project. Annualized capital cost and annual operating and maintenance costs were calculated for each project within its implementation period and converted to 2005 constant dollars based on an annual inflation rate of 3.2 percent. SCAG also identified public funding sources for these public projects such as local sales tax, state or federal sales tax on gasoline sales, alternative fuel tax, and motor vehicle tax.[4] Private funding includes development fees. The cost burden was distributed to each sub-region according to the proportion of sub-region population in the county in most cases. Furthermore, it was assumed that engineering and right-of-way expenditures would occur immediately upon funding. Construction expenditures were allocated evenly from an initial funding year to the completion date of a project.

[4]Based on TCM data from SCAG, only 4.9 percent of TCM funding ($15.9 million annually) was assumed from federal sources.

The average annual control cost of all $PM_{2.5}$ and ozone control measures in the 2012 AQMP is projected to be approximately $448 million from 2013 to 2035, of which TCMs have an annualized cost of $326 million.[5] Table 3-1 in Appendix G—No TCM Benefit Scenario—shows costs by industry for TCMs and the District's portion of $PM_{2.5}$ strategy, respectively. Figure 3-2 shows the annual cost trend of these measures. The high costs in 2026 are from TCMs as public funding for two construction projects is unleashed at once. Table 3-1 shows the distribution of control costs for $PM_{2.5}$ measures (including TCMs), ozone measures, and the Plan, respectively, among various industries. Approximately, 84 percent of the TCM cost is borne by consumers, as shown at the end of Table 3-1. The $43 million cost borne by the construction sector under the $PM_{2.5}$ strategy is mainly due to the TCM development agreements. The government sector would incur a $10 million cost as its general funds are used to finance TCM projects. Of the total $122 million cost for the ozone strategy, sectors that are projected to bear the highest costs are consumers ($40 million), followed by petroleum and coal products where refineries belong ($12 million), construction ($8.3 million), and government, and truck and rail transportation (approximately $7 million each). Incentive funding from vehicle license fees that is assumed to partially finance the implementation of on-road measures and one off-road measure is allocated to consumers as a reduction in their expenditures. The $12 million cost borne by the refineries is mainly from Phase II NOx reductions of RECLAIM. The relatively high costs associated with the sectors of construction, government, and truck and rail transportation are mainly due to Control Measures ONRD-03 (Accelerated Penetration of Partial Zero-Emission and Zero-Emission Light-heavy- and Medium-heavy-duty Vehicles), ONRD-04 (Accelerated Retirement of Older On-road Heavy-duty Vehicles), or OFFRD-01 (Extension of the Surplus Off-road Opt-in for NOx Provision for Construction Industrial Equipment). All the sectoral costs are less than 0.32 percent (32 hundredths of one percent) of each sector's average annual output from 2013-2035.

[5] The cost assessment in the Socioeconomic Report includes Control Measure CTS-04—Further VOC Reductions from Consumer Products—which has been removed from the Plan.

Table 3-1
Average Annual Control Cost by Industry in Millions of 2005 Dollars (2013-2035)

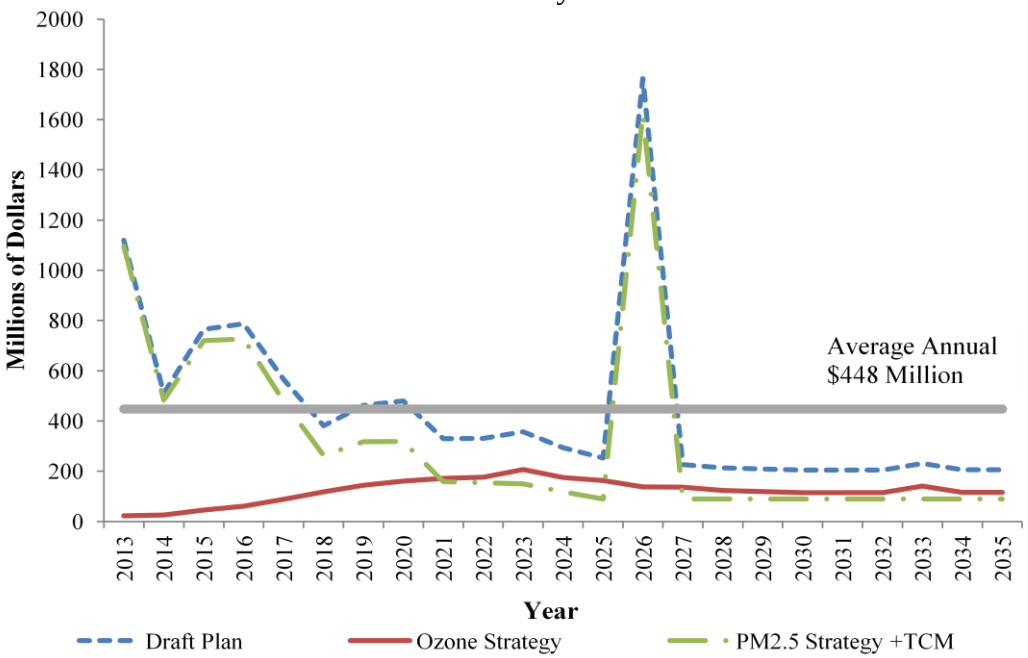
Industry	NAICS	$PM_{2.5}$	Ozone	Plan	Plan Cost as a % of Output*
Agriculture, Forestry, Fishing, and Hunting	113-115	$0.000	$0.160	$0.160	0.016%
Oil and Gas Extraction, Mining, and Support	211-213	0.000	0.454	0.455	0.002%
Utilities	22	-0.191	7.007	6.816	0.027%
Construction	23	43.192	8.268	51.460	0.081%
Wood Product Mfg.	321	0.013	0.004	0.017	0.000%
Nonmetallic Mineral Product Mfg.	327	-0.148	1.790	1.642	0.039%
Primary Metal Mfg.	331	0.004	0.008	0.012	0.000%
Fabricated Metal Product Mfg.	332	0.024	2.473	2.497	0.011%
Machinery Mfg.	333	-0.007	0.012	0.005	0.000%
Computer and Electronic Product Mfg.	334	0.004	0.241	0.245	0.000%
Electrical Equipment and Appliance Mfg.	335	0.011	0.006	0.017	0.000%
Motor vehicle and Transportation Equipment Mfg.	3361-3369	-0.004	1.211	1.207	0.004%
Furniture and Related Product Mfg.	337	0.000	0.010	0.010	0.000%
Miscellaneous Mfg.	339	0.000	0.043	0.044	0.000%
Food Mfg.	311	0.004	0.033	0.037	0.000%
Beverage and Tobacco Product Mfg.	312	0.000	0.012	0.012	0.000%
Textile and Textile Products Mills	313-314	0.008	0.004	0.012	0.000%
Apparel Mfg.	315	0.000	0.011	0.011	0.000%
Leather and Allied Product Mfg.	316	0.000	0.001	0.001	0.000%
Paper Mfg.	322	0.044	0.007	0.051	0.001%
Printing and Related Support Activities	323	0.004	0.008	0.013	0.000%
Petroleum and Coal Products Mfg.	324	0.200	11.991	12.191	0.034%
Chemical Mfg.	325	0.019	0.136	0.155	0.001%
Plastics and Rubber Products Mfg.	326	0.001	2.304	2.305	0.016%
Wholesale Trade	42	-0.003	0.439	0.435	0.000%
Retail Trade	44-45	0.000	1.101	1.101	0.001%
Air Transportation	481	0.010	0.009	0.019	0.000%
Rail Transportation	482	0.000	7.357	7.357	0.298%
Water Transportation	483	0.000	0.004	0.004	0.000%
Truck Transportation; Couriers and Messengers	484,492	0.000	7.764	7.764	0.030%
Transit and Ground Passenger Transportation	485	0.000	6.821	6.821	0.319%
Pipeline Transportation	486	0.006	0.136	0.142	0.022%
Scenic and Sightseeing Transportation	487-488	0.000	6.829	6.829	0.107%
Warehousing and Storage	493	0.000	1.349	1.349	0.039%
Publishing Industries, except Internet	511	0.000	0.020	0.019	0.000%
Motion Picture and Sound Recording Industries	512	0.000	0.073	0.073	0.000%
Internet Services and Data Processing	516,518,519	0.000	0.015	0.016	0.000%
Broadcasting, except Internet; Telecomm.	515,517	0.000	0.061	0.061	0.000%
Monetary Authorities	521,522,525	0.000	0.082	0.082	0.000%
Securities, Commodity Contracts, Investments	523	0.000	0.046	0.046	0.000%
Insurance Carriers and Related Activities	524	0.000	0.042	0.042	0.000%
Real Estate	531	0.001	0.257	0.258	0.000%
Rental and Leasing Services	532-533	0.000	0.679	0.679	0.002%
Professional and Technical Services	54	0.000	0.134	0.134	0.000%
Management of Companies and Enterprises	55	0.000	0.050	0.050	0.000%
Administrative and Support Services	561	0.002	1.519	1.522	0.003%
Waste Management and Remediation Services	562	0.000	2.395	2.395	0.041%

TABLE 3-1 (Continued)

Industry	NAICS	$PM_{2.5}$	Ozone	Plan	Plan Cost as a % of Output*
Educational Services	61	0.000	0.014	0.014	0.000%
Ambulatory Health Care Services	621	0.000	0.061	0.061	0.000%
Hospitals	622	0.000	0.035	0.035	0.000%
Nursing and Residential Care Facilities	623	0.000	0.009	0.009	0.000%
Social Assistance	624	0.000	0.006	0.006	0.000%
Performing Arts and Spectator Sports	711	0.000	0.022	0.022	0.000%
Museums, Historical Sites, Zoos, and Parks	712	0.000	0.003	0.003	0.001%
Amusement, Gambling, and Recreation	713	0.000	0.007	0.007	0.000%
Accommodation	721	0.001	0.011	0.012	0.000%
Food Services and Drinking Places	722	0.000	0.045	0.045	0.000%
Repair and Maintenance	811	0.000	0.017	0.017	0.000%
Personal and Laundry Services	812	0.016	0.012	0.028	0.000%
Membership Associations and Organizations	813	0.000	0.011	0.011	0.000%
Private Households	814	0.000	0.003	0.003	0.000%
Government	92	10.217	7.770	17.988	0.010%
Consumer		273.127	40.194	313.321	
Total		$326.558**	$121.597	$448.155**	

*Average output from 2013 to 2035 in 2005 dollars.
**$326.44 million are TCM costs.

FIGURE 3-2
Control Cost by Year*



*Seventy-three percent of the 2012 AQMP costs related to TCM implementation, including large infrastructure projects.

Cost by County

Table 3-2 shows how the potential control costs are distributed among the four counties for the quantifiable measures. Los Angeles County could incur an annual cost of about $328 million, or approximately 73 percent share of the total cost. This is because most of the affected emission sources are located in Los Angeles County.

TABLE 3-2
Average Annual Control Cost by County
(millions of 2005 dollars)

County	Control Cost	% Share
Los Angeles	$328	73%
Orange	72	16%
Riverside	24	5%
San Bernardino	23	5%
Total*	$448	100%

*The sum of individuals does not add to the total due to rounding.

BENEFITS

Despite the uncertainty of assigning dollar figures to the benefits of attaining the federal $PM_{2.5}$ standard in 2014, it is apparent that clean air will result in significant benefits to the four-county region. Partial assessments can be made for the impact of better air quality on mortality, morbidity, visibility, and materials. However, the full assessment of air quality benefits in dollar terms is not possible until advances occur in human health, physical science, and economic disciplines, which will allow monetary estimates to be made for currently unquantifiable areas.

Quantified Benefits

Air quality continues to improve due to previously adopted regulations and implementation of many control measures from the 2007 AQMP. Implementation of $PM_{2.5}$ measures would lead to attainment of the federal 24-hour $PM_{2.5}$ standard in 2014. Implementation of ozone measures would bring the Basin toward compliance with the federal ozone standard in 2023.

Although each attainment demonstration is performed with respect to the worst air quality site, the benefit assessment (except for the material benefit) herein is analyzed with respect to the changes in the projected year-long air quality concentrations between the expected control based on adopted regulatory programs and the 2012 AQMP for the benchmark years in each air quality modeling grid (4 kilometer by 4 kilometer). The total average annual quantifiable benefits associated with implementing the 2012 AQMP are projected to be $10.7 billion, which represents the currently quantifiable benefit of moving beyond today's regulations to the level needed to meet the federal $PM_{2.5}$ standards. A breakdown of these benefits is shown in Table 3-3. The benefit ranges from $14 million for reduced expenditures resulting from less damage to building materials and less frequent cleaning to $7.7 billion for reductions in congestion related to all the TCMs proposed by SCAG in its 2012 RTP, of which the corresponding benefit for the SIP-committed TCMs in the 2012 AQMP is estimated to be $519 million. It is appropriate to

consider the congestion relief benefit and SCAG TCMs because these measures are largely adopted for their congestion relief benefit as well as air quality improvements. Based on the $519 million benefit for the SIP-committed TCMs, the total quantifiable benefit for the 2012 AQMP is projected to be $3.5 billion, as shown in Appendix H—TCM Benefit at 2014 Level. The detailed components of each benefit category and related assumptions are discussed in the remaining pages of this chapter.

TABLE 3-3

Quantifiable Benefits of 2012 AQMP (millions of 2005 dollars)

Benefit	Average Annual (2014 to 2035)
Reduction in Morbidity	$23
Reduction in Mortality	2,225
Visibility Improvement	696
Reduced Materials Expenditures	14
Congestion Relief	7,712
Total	$10,670

Health Benefit

It is well-documented that smog can result in short-term and chronic illness. Figure 3-3 illustrates mostly short-term smog effects. Numerous studies have demonstrated an association between illness and ambient air pollutants. Since 2007 the Basin's residents have experienced significant health benefits due to improvements in $PM_{2.5}$ levels from continuous implementation of PM controls and slowdown in economy. In 2011, the federal PM2.5 standards were exceeded at only one air monitoring station. Based on published epidemiological studies, demographic and projected air quality data, and economic valuation of health effects, the quantifiable health benefits of achieving the federal $PM_{2.5}$ standard is estimated to be $4.1 billion in 2014. The proposed $PM_{2.5}$ strategy is also projected to result in co-benefits from reductions in exposure to NO_2, which is not included in the analysis due to resource constraints. Nor are co-benefits from ozone reductions because the ozone strategy in the Plan represents a partial implementation of the Black Box whose full implementation is needed for the ozone attainment. Health effects of $PM_{2.5}$ and other criteria pollutants are shown in Figure 3-4.

FIGURE 3-3
Effects of Smog

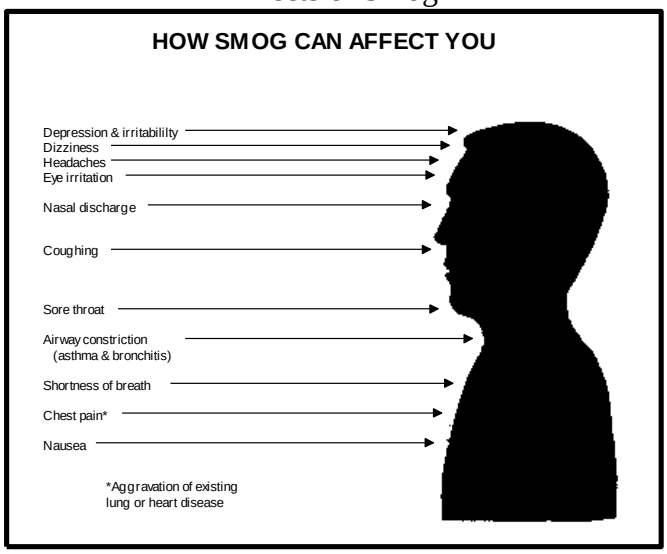
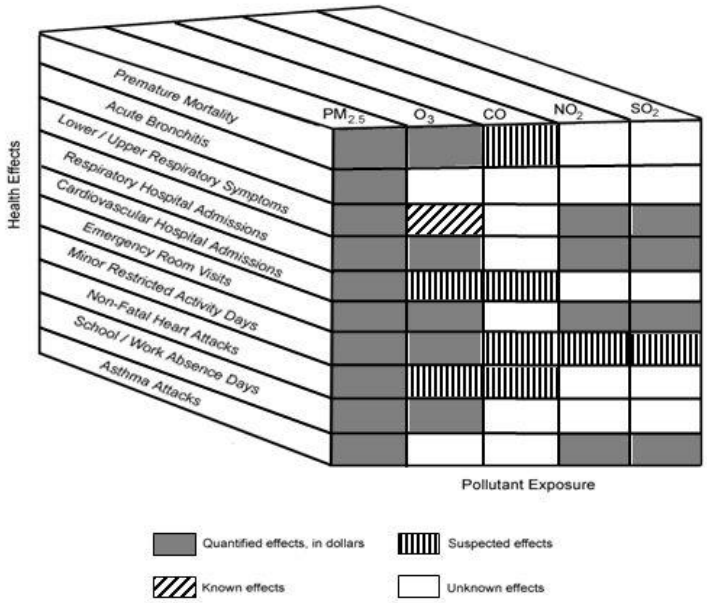


FIGURE 3-4
Health Effects of Criteria Pollutants



Quantification of health benefits requires the establishment of concentration-response functions for various symptoms and translation of health endpoints into dollar values. The latter step is needed in order to monetize known effects. Additional epidemiological studies are needed for unknown and suspected effects before developing concentration-response functions. Based on a thorough review of epidemiological literature, concentration-response functions for various health endpoints for $PM_{2.5}$ were selected. A health benefit model, BenMAP, was used to pool population, air quality data, and economic values of health effects for the health benefit analysis.

Air quality is expected to improve due to the implementation of the existing control strategy. The analysis herein focuses on the degree of improvement in future years due to the implementation of control measures in the 2012 AQMP by comparing the future baseline air quality (at the current level of regulations) to the future controlled air quality for the same year.

The majority of the region's population is currently exposed to unhealthful air. $PM_{2.5}$ causes effects as extreme as premature death, as well as increased respiratory infection, asthma attacks, and other related health effects. Groups that are most sensitive to the effects of $PM_{2.5}$ are children, the elderly, and people with certain respiratory and heart diseases. Assessments were made for reductions in premature deaths resulting from reductions in annual average $PM_{2.5}$ concentrations; and reductions in respiratory and cardiovascular hospital admissions, emergency room visits, asthma attacks, minor restricted activity days (MRAD) from acute respiratory symptoms, and non-fatal heart attacks from reductions in daily $PM_{2.5}$ concentration for the benchmark years 2014 and 2023.[6] The $PM_{2.5}$ benefit assessment herein has no threshold employed, i.e., it is assumed that there are health benefits for all reductions in emissions, even to levels below the current national ambient air quality standard (NAAQS).

Table 3-4 shows the number of avoided cases (or person-days) by health effect when the Basin attains the $PM_{2.5}$ standard in 2014 and in 2023. The mortality impact (premature deaths) was analyzed based on the kridging model for the Los Angeles Metro Area in the 2009 Krewski el al. study (with a relative risk factor of 1.17). The elderly are more susceptible to premature deaths than other age groups. Reductions in health effects are translated into monetary terms based on the cost of illness (medical costs and work loss) or willingness-to-pay associated with each effect. The unit value of each health effect may vary by age, year, symptom, and/or county. The willingness-to-pay amount for avoiding a premature death was based on the value of a statistical life (VSL) in Kochi et al. (2006) adjusted to 2005 dollars and 2010 real income. The range of $6.1 to $6.7 million reflects variations in real income across sub-regions. For non-fatal heart attacks, the lower end of the range represented the average of four newer studies (Zanobetti et al., 2009; Pope et al., 2006; Zanobetti and Schwartz, 2006; and Sullivan et al., 2005) from 2005 to 2009 and the higher end came from Peters et al. (2001).

A sensitivity analysis indicates that in 2014, eight percent of the adult (30 years old or above) avoided premature deaths would be attributed to evaluating the $PM_{2.5}$ mortality benefit only to the NAAQS. However, there is no clear $PM_{2.5}$ exposure threshold below which no adverse health effects are observed. In fact, California has lower $PM_{2.5}$ standards than the federal standards. Furthermore, the U.S. EPA is in the process of proposing a more stringent annual $PM_{2.5}$ standard based on several health studies (See Appendix I to the 2012 AQMP for more details). The estimates in Table 3-4 assumed no existence of any health threshold below which benefits would not occur.

[6] The health function was applied daily and aggregated to 365 days for each benchmark year.

TABLE 3-4
Changes in Number of Symptoms for Future Years*

Health Effect	Number of Avoided Cases 2014	2023	Unit Value
Mortality (Adult& Infant)	668	275	$6.1 - $6.7 million
Acute Bronchitis	597	186	$417
Non-Fatal Heart Attacks	29 - 261	12 - 106	$96,935 - $100,345
Lower & Upper Respiratory Symptoms**	18,384	5750	$18 - $29
Emergency Room Visits (Respiratory)	153	53	$356
Hospital Admissions	151	62	$30,596
Minor Restricted Activity Days (MRAD)**	287,447	95,093	$59
Work Loss Days	48,805	16,055	$154
Asthma Attacks**	26,910	3,628	$50

*Changes reflect differences in base and control cases for a given year. Positive numbers are reductions in symptoms due to the 2012 AQMP.
**Person-days.

Table 3-5 shows the quantifiable health benefit of improved air quality associated with the 2012 AQMP for $PM_{2.5}$ morbidity and mortality relative to air quality without the Plan. The total annual health benefit is projected to reach $1.7 billion in 2023. Assuming that the 2023 benefit continues into the future, the projected average annual health benefit from 2014 to 2035 is approximately $2.2 billion. Reductions in health expenditures may benefit low-income households more since they devote more of their out-of-pocket income to health expenditures than high-income households. Although the latter tend to consume more health care, the majority of their care expenses are paid for by private insurance under employer coverage (Holahan & Zedlewski, 1992).

TABLE 3-5
Clean Air Health Benefits
(millions of 2005 dollars)

Category	2014	2023	Average Annual (2014-2035)
$PM_{2.5}$ Morbidity	45	16	23
$PM_{2.5}$ Mortality	4,075	1,680	2,245
Total*	$4,120	$1,696	$2,247

$PM_{2.5}$ benchmark years are 2014 and 2023. Benefits for between 2014 and 2023 were linearly interpolated based on benchmark year estimates. Benefits beyond 2023 were assumed to be the same as those in 2023.
*The sum of individuals may not add to the total due to rounding.

Visibility Aesthetic Benefit

It has been shown that visibility—the ability to see distant vistas—has an impact on property values. To examine this relationship, researchers correlated sales prices of owner-occupied single-family homes between 1980 and 1995 with socioeconomic and housing characteristics of these homes and visibility data at the census tract level to arrive at a willingness-to-pay value

for visibility (Beron et al., 2001).[7] The research was performed for Los Angeles, Orange, Riverside, and San Bernardino Counties. Results indicated that the marginal willingness to pay for visibility (or price of visibility) was related to the percentage of college degrees for people 25 years or older, net income (household income minus housing cost), and visibility (in miles) at each location.[8]

Using visibility data for the benchmark years 2014, 2023, and 2030 and the projected net income and percentage of the college degree population (age 25 and above) at the sub-region level based on the growth rates between the 2005-2009 and 2006-2010 American Community Survey (ACS) estimates for these two variables, the average monetary value of visibility improvements per household from the 2012 AQMP was calculated for each sub-region.[9] These values were then annualized over a 50-year period at the four-percent real interest rate, which was then multiplied by the number of households to arrive at total values of visibility benefits. These totals were further adjusted downward by 55 percent to reflect visibility aesthetics only to avoid the potential aggregation of health and visibility embedded in the willingness to pay (Loehman et al., 1994).

The benefit for visibility improvements in 2035 was estimated using visibility data in 2030 and projected 2035 net income and percentage of the college degree population. Benefits for visibility improvements during non-benchmark years were linearly interpolated based on the benefits for benchmark years. The average annual visibility aesthetic benefit between 2014 and 2035 is projected to be $696 million. Table 3-6 shows the visibility aesthetic benefit by county.

TABLE 3-6
Visibility Aesthetic Benefit by County
(millions of 2005 dollars)

County	2014	2023	Average Annual (2014-2035)
Los Angeles	$671	$285	$341
Orange	247	158	147
Riverside	187	115	113
San Bernardino	168	91	97
Total*	$1,274	$649	$696

*The sum of individuals may not add to total due to rounding.

[7] Property prices were used as a conduit to arrive at the willingness to pay for improved visibility, which is a function of visibility, the percentage of college degree of people over 25 years old, and net income. The recent fluctuations in property prices may or may not change the relationship between these independent variables and the willingness-to-pay amount for visibility. Additional research is required to arrive at a definitive conclusion.

[8] The marginal willingness-to-pay (MWTP) equation used for this assessment is:

$$MWTP = 9032.42 + 0.09Y + 200.73\,(COLLEGE) - 425.33V$$

Where Y stands for net income, COLLEGE for percentage of population with a college degree, and V for visibility.

The total willingness-to-pay (TWTP) for a specific reading of visibility is arrived at by integrating the above equation with respect to V:

$$TWTP = 9032.43V + 0.09YV + 200.73\,(COLLEGE)V - (½)\,425.33V^2$$

[9] Adjustments of the growth rates to county averages were made in those sub-regions where growth rates of the ACS 5-year estimates were negative or unreasonably large.

Material Benefit

Total suspended particulate matter (TSP) causes accelerated wear and breakdown of painted wood and stucco surfaces of residential and commercial properties (Murray et al., 1985). In addition, TSP will lead to additional household cleaning costs (Cummings et al., 1985).

The annual average $PM_{2.5}$ concentrations at seven locations (three in Los Angeles County, two in Riverside County and one in each of the remaining two counties) were used to calculate the avoided household cleaning and damage to wood and stucco surfaces of residential properties that were projected to grow proportionately with the growth of housing units.[10] The avoided damage to commercial properties was assessed at three percent of that to residential properties. The 4.81 ratio of TSP to $PM_{2.5}$ was used to convert $PM_{2.5}$ to TSP, which was used in the original material benefit assessment (Murray et al., 1985). The analysis was performed at the county level for the benchmark years 2014, 2023, 2030, and 2035. The 2035 avoided damage was assessed based on the 2030 $PM_{2.5}$ data. The total avoided damage from all sources was linearly interpolated for interim years between 2014 and 2035 and allocated to each sub-region according to its proportion of households within a county in the 2006-2010 ACS.

The total benefit associated with the decrease in costs for repainting stucco and wood surfaces, and cleaning is projected to be $35 million in 2014 and $13 million in 2023. Table 3-7 shows material benefits by county for selected years.

TABLE 3-7
Material Benefit by County
(millions of 2000 dollars)

County	2014	2023	2030	Average Annual (2014-2035)
Los Angeles	$16.8	$6.3	$0.9	$6.5
Orange	9.2	1.8	0.3	2.9
Riverside	5.0	2.9	1.7	2.9
San Bernardino	4.0	1.9	1.0	2.0
Total	$35.0	$12.9	$3.9	$14.3

$PM_{2.5}$ benchmark years are 2014, 2023, and 2030. Benefits for non-benchmark years are linearly interpolated numbers based on benchmark year estimates.

Traffic Congestion Relief Benefit

Los Angeles is ranked as the most congested city in the nation. An estimated 62 percent of the lane miles are congested, resulting in the loss of fuel, time, and productivity (Texas Transportation Institute, 2011).

Traffic congestion relief benefits herein for 2014 were for the committed TCMs in the 2012 AQMP whereas the benefits for 2020 and 2035 in this section were for all the TCMs in the 2012 RTP. In order to analyze the benefit from the SIP-committed TCMs between 2014 and 2035 and

[10]The household cleaning coefficient was adjusted downward by multiplying the proportion of soiling in the total contingency valuation (0.088).

due to the data constraint, it was assumed that the congestion relief benefit would stay constant at the 2014 level. This estimate is conservative because

- Only those projects that will be operational in the first two years are included in the 2014 benefit, and
- Some of the SIP-committed TCM projects will not be fully completed and operational in the first two years.

The 2014 congestion relief benefit from the SIP-committed TCMs is estimated to be $519 million in 2014 and would continue from 2015 to 2035.

Implementation of SCAG transportation control measures (TCM) will reduce daily vehicle miles traveled (VMT) and daily vehicle hours traveled (VHT) in the four-county region, amounting to an average annual benefit of $7.7 billion from 2014 to 2035 (Tables 3-8 and 3-9). TCMs include a wide variety of transportation projects such as arterials, grade crossing improvements, high occupancy vehicle lanes, mixed flow lanes, hot lanes/toll ways, transit, intelligent transportation systems, truck lanes, commuter rail, high speed rail, and others. These projects have a combination of public and private funding.

Traffic congestion relief benefits were assessed for reductions in daily VMT for the period between 2014 and 2035. Reductions were calculated as the difference between baseline (without SCAG TCMs) and control (with SCAG TCMs) conditions for the benchmark years 2014, 2020, and 2035.[11] Reductions in VMT were distributed to the 4 kilometer x 4 kilometer grid cell level using brake and tire wear in grams per mile and then aggregated up to the sub-regions in the four-county area. Daily VMT reductions were converted to an annual reduction by multiplying by 250 working days per year.

Implementation of the TCMs is projected to reduce VMT by 3.3 million miles in 2014, 13.3 million miles in 2020, and 23 million miles in 2035. VMT changes were allocated to two types of vehicles: autos (93 percent) and trucks (seven percent) according to the 2008 base year VMT associated with each type of vehicle. VMT reductions (or increases) for each vehicle type were allocated to each sub-region, which was then multiplied by the operating and maintenance cost per mile of that vehicle type to arrive at the benefit of reduced travel. The operating and maintenance costs for passenger and light duty vehicles were assumed to be 19.6¢ per mile (AAA, 2012). Operating and maintenance costs for medium-duty and heavy-duty trucks were assumed to be 61¢ per mile (ATRI, 2011).

In the year 2014 an estimated $161 million of savings on vehicle operation and maintenance is expected, as shown in Table 3-8. By the year 2035, the estimated savings would rise to $739 million.

[11]Impacts on VMT and VHT from TCM were available only in 2014. For 2020 and 2035, TCM impacts on VMT and VHT were calculated by applying the ratio of TCM to RTP impacts in 2014 to 2020 and 2035 RTP impacts, respectively, since TCM is a subset of RTP.

TABLE 3-8
Reduced Vehicle Operating and Maintenance Costs by Type of Vehicle
(millions of 2005 dollars)

Type of Vehicle	2014	2020	2035	Average Annual (2014-2035)
Autos	$130	$523	$901	$598
Trucks	31	123	212	141
Total	$161	$646	$1,113	$739

Implementation of TCMs is projected to reduce VHT for business and commute trips by 123,000 hours in 2014 and over 4.7 million hours in 2035. For the purpose of this analysis, it was assumed that 81 percent of VHT reductions were for business and commute trips and 19 percent were for other trips (SCAG, 2012a). Only VHT reductions for business and commute trips were included in the benefit assessment. Of the 81 percent reductions in business and commute trips, it was further assumed that 8 percent was for business and 73 percent was for commute trips (SCAG, 2012a).

The benefit of VHT reductions for the sub-regions was calculated by multiplying the share of VHT within the sub-region by the appropriate hourly wage rate. Daily VHT reductions associated with commute trips were multiplied by an annual conversion rate of 250 and an hourly wage rate of $10.78, which is one-half of the average wage rate of all workers in Los Angeles County (EDD, 2012), to arrive at the annual benefit of spending less time on commuting. One-half of the average wage ($10.78) provides an estimate of the value of commuters' time consistent with recent research (Steimetz and Brownstone, 2005) involving Southern California transportation data and the average length of work-home trips in the four-county area (SCAG, 2012a). Daily VHT reductions from business trips were also multiplied by an annual conversion rate of 250 and an hourly wage rate of $21.84 for truck drivers (ATRI, 2011) to arrive at the annual benefit from VHT reductions for business trips. Savings from reduced travel time for business and commute trips is estimated at $358 million for 2014 and at $13.8 billion for 2035, respectively, as shown in Table 3-9.

TABLE 3-9
Savings from Reduced Travel Time by Trip Type
(millions of 2005 dollars)

Type of Trip	2014	2020	2035	Average Annual (2014-2035)
Business	$59	$657	$2,291	$1,156
Commute	299	3,305	11,529	5,817
Total	$358	$3,962	$13,820	$6,973

Unquantified Benefits

Areas in which benefits from improved air quality have been identified but not fully quantified include human health, building materials, plant life and livestock, and reductions in vehicle hours traveled for personal trips. Each of these areas is discussed below.

Health Benefit

The quantifiable health benefits associated with improved air quality were assessed relative to reduced morbidity and mortality from $PM_{2.5}$. The present state of knowledge does not allow all adverse health effects that have been identified to be measured and valued in dollars. It should be noted that many health effects cannot be valued in dollars mainly because sufficient data are not available to establish a quantitative relationship between pollutant level and health effect. Hence quantification of health effects may be underestimated.

Material Benefit

In addition to the quantifiable materials damage caused by ozone and $PM_{2.5}$, a link exists between several pollutants (ozone, sulfur dioxide, $PM_{2.5}$, and nitrogen oxides) and ferrous metal corrosion; erosion of cement, marble, brick, tile, and glass; and the fading of fabric and coated surfaces. The damage and conversely the potential benefits from reducing the exposure currently cannot be quantified and valued in dollars.

Traffic Congestion Relief Benefit

Implementation of TCMs is projected to reduce daily VHT by 28,833 hours in 2014 for personal trips, relative to the 2014 baseline projections for VHT. Savings resulting from reduced travel time for personal trips are difficult to quantify due to the variation of the value of time from one individual to another and were not included in this benefit calculation. Based on one-half of the average hourly wage rate ($10.78), savings from reduced travel time for personal trips is estimated at $78 million (2005 dollars) for the year 2014. This could bring the total traffic congestion relief benefit to approximately $597 million in 2014.

SUMMARY

The 2012 AQMP projects the attainment of the federal air quality standards of $PM_{2.5}$ in 2014 and implements progress toward the ozone standard via additional measures which reduce the remaining "black box" measures. The total quantified benefit in 2014 is estimated to be $948 million and increases to $9 billion in 2023 (Table 3-10). Based on the $519 million benefit for the SIP-committed TCMs, the total quantifiable benefit for the 2012 AQMP is projected to be $2.7 billion in 2023 and $3.5 billion annually, on average, from 2014 to 2035. The quantified health benefits have not accounted for the reduction in all adverse health effects due to the implementation of the 2012 AQMP. In addition, benefits have not been quantified for reductions in vehicle hours traveled for personal trips; and reductions in damage to plants, livestock, and forests as a result of implementing the 2012 AQMP. If all these factors were considered, the estimated benefits would be higher than the estimates presented in this analysis.

TABLE 3-10
Total Costs and Benefits of the Plan
(millions of 2005 dollars)

	2014	2023	Average Annual
Total Costs	$510	$357	$448
Total Benefits	$5,948	$9,031	$10,670

The total cost of the Plan is projected to be at $510 million in 2014 and decrease to $357 million in 2023. The cost of measures was based on the prices of equipment and materials that would be required for the implementation of these measures.

As the District comes closer to its attainment goals for various pollutants, the cost in achieving the final increment towards attainment might actually result in higher costs than projected. However, technological advancements may reduce costs over time. However, actual costs could be higher than projected costs if modifications to existing plant structure are required. Impacts on individual facilities or more refined socioeconomic impact analysis will be conducted during the AQMD future rulemaking when regulated requirements and affected facilities are more defined.

Further research is needed relative to quantifying the known health effects. Relative to costs, additional efforts will be made to work with the CARB and U. S. EPA to quantify the costs associated with long-term measures where technologies are better defined.

CHAPTER 4

EMPLOYMENT IMPACTS

INTRODUCTION

The employment impacts of control measures and clean air benefits were analyzed by utilizing the Regional Economic Model, Inc. (REMI) model. This model contains 18 sub-regions within the four-county area. Each sub-region is comprised of 70 public and private sectors. The structure of each sub-region's economy is represented through production, sales, and purchases between sectors; demand and supply of products in each sector; expenditures made by consumers, businesses, and governments; and product flows between one sub-region, the rest of the sub-regions, and the rest of the U.S.

The employment impact analysis was performed separately for control measures, clean air benefits, and both combined. The employment impacts in this chapter represent changes from the baseline regional jobs. The assessments herein for clean air benefits, and combined measures and benefits beyond 2014 were based on the congestion relief benefit for all the TCMs in the 2012 RTP. Employment impacts based on the corresponding congestion benefit for the SIP-committed TCMs ($519 million annually) are in Appendix H—TCM Benefit at 2014 Level.

JOB IMPACTS OF 2012 AQMP

Implementation of the 2012 AQMP will reduce morbidity and mortality; improve visibility; decrease expenditures on household cleaning and refurbishing building surfaces; and provide relief from congestion, as discussed in Chapter 3. The total quantifiable benefit of the 2012 AQMP amounts to approximately $5.95 billion in 2014 and $9.1 billion in 2023. The $PM_{2.5}$ and ozone measures would result in an annual cost of approximately $510 million in 2014 and $357 million in 2023. Both benefits and costs will affect the employment base in the four-county economy.

The four-county economy will expand from the effects of two major forces resulting from cleaner air. First, the substitution of imports [general consumer purchases (which would increase due to the reduction in health care expenditures)] for local production (reduced health care services related to improved air quality) leads to jobs not created.[1] Second, the improvement in the quality of life will make the area more attractive so that more people will move in until the expected real earnings rate is reduced sufficiently to compensate for the estimated effect of the increased amenities (Greenwood et al., 1991).[2] This influx will increase labor force and local demand. On the other hand, the local economy will also experience relative slowdown from implementing control measures. This is because the increased cost of doing business leads to fewer jobs created and the resulting higher product price would lower consumer purchasing power. Table 4-1 shows the average annual job impacts, as well as job impacts with respect to the years 2014 and 2023, for quantified benefits and control measures,

[1] General consumer purchases can be satisfied by local production and imports. Health care services are locally produced goods.

[2] Because of cleaner air, economic migrants are willing to move into the Basin in exchange for lower earnings (wage and salary) than what the Basin would otherwise be. Currently, there is no systematic approach to evaluating migration of retired persons as they do not belong to the labor force. Therefore, their willingness to pay (and non-wage generated income stream) for avoided morbidity and mortality is not accounted for in the migration functions that were used only for economic migrants in the labor force.

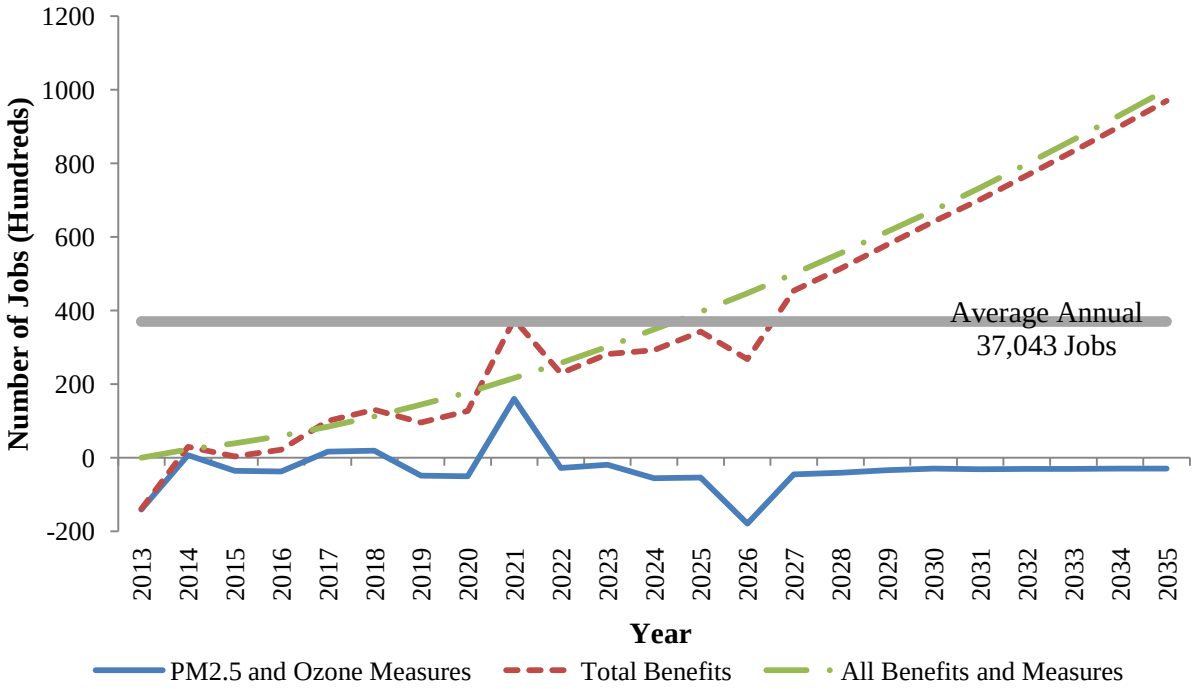
respectively. Figure 4-1 shows the trends of job impacts from clean air benefits, control measures, and both combined from 2013 to 2035, respectively.

TABLE 4-1
Job Impacts of Quantified Clean Air Benefits and Measures

Category	2014	2023	2035	Average Annual
Clean Air Benefits & Measures (2013-2035)*	2,988	28,187	96,968	37,043
Clean Air Benefits (2014-2035)*	2,262	30,146	100,016	42,174
Congestion Relief*	348	20,371	87,843	32,986
Visibility Improvements	1,008	5,313	6,445	4,947
Reduced Materials Expenditures	133	191	181	179
Health Benefits	774	4,146	5,214	3,910
Control Measures (2013-2035)	731	-1,929	-2,955	-3,257
TCMs	715	537	-813	-1,611
District $PM_{2.5}$	7	-10	-3	-4
Ozone Strategy	26	-2,457	-2,142	-1,639

Results from modeling all the categories are slightly different from the sum of results from modeling each category one at a time because of nonlinearity of the REMI model.
*Based on all the TCMs in the 2012 RTP.

FIGURE 4-1
Job Impacts of Clean Air Benefits and Measures



Note that job impacts in the REMI model are generated for each year which represents the difference between the baseline projections and a policy event (control measures, clean air

benefits, etc.) An increase or decrease in the number of jobs represents the net flow of jobs from one year to the next as the economy continues to operate. These jobs are not necessarily permanent because of the dynamic structure of an economy. There is no implication that the jobs created or forgone in a particular year will be sustained (e.g., same employer and employee) in subsequent years.

The job impact of air quality benefits is assessed separately for each benefit category: visibility improvements, health benefits, reduced congestion, and reduced expenditures on materials. Many of the benefits of improved air quality can be seen as both direct and indirect benefits to individuals living in the area. Reductions in morbidity would lead to reduced health care expenditures by the general public and employers (the cost of illness portion only).[3] It was assumed that 60 percent of the reduced expenditures would benefit the employers as a reduction in the cost of doing business and the remaining 40 percent would flow back to the economy in the form of additional spending on all consumption categories. Furthermore, reductions in out-of-pocket health expenditures are used as a proxy for the quality-of-life value of morbidity benefits (i.e., reduced illness). The positive amenities from cleaner air (reductions in premature deaths and morbidity, the ability to see farther, reduced expenditures in refurbishing and cleaning to residences, and reductions in VMT and VHT) would induce more in-migration. Additional health care expenditures from economic migrants would more than compensate for the reduction in these expenditures due to avoided morbidity. During the 2014-2035 period, a net gain of approximately 3,910 more jobs annually, on average, from health benefits is projected. Moreover, decreased congestion could create an additional 32,986 jobs during the same period. Together, the quantified benefits could result in an average of 42,174 jobs created annually.

According to the REMI baseline forecast (adjusted to reflect SCAG projections), the four-county area's jobs would grow at an annual rate of 0.92 percent between 2009 and 2035 to 11.5 million jobs in 2035. The $PM_{2.5}$ and ozone control measures will result in an average of 3,257 jobs forgone annually, on average, over the period from 2013 to 2035. Approximately, 50 percent of the jobs forgone (or 1,611 jobs forgone) annually are projected to result from the 143 transportation projects alone. These projects were assumed to be funded through local revenue sources and out-of-area funding sources (state and federal governments). However, it should be noted that operation and maintenance of these infrastructure projects will continue to be required long after these projects are completed. The District portion of the $PM_{2.5}$ strategy would result in very few jobs forgone. The ozone strategy is projected to result in 1,639 jobs forgone.

The combined impact of clean air benefits and control measures would translate to an annual gain of 37,043 jobs, on average, from 2013 to 2035.

Job Impacts by Industry

Table 4-2 show the job impacts for the benchmark years 2014 and 2023, and the average annual job impact by industry between 2014 and 2035 for clean air benefits. In total, cleaner air would result in a creation of 42,174 jobs annually, on average, from 2014 to 2035 which is

[3]It should be noted that reductions in health care expenditures accrued to the government sector were not accounted for in the analysis herein. These reductions could result in more positive impacts since the government sector may use the savings to increase spending in other critical areas or to reduce taxes and fees.

approximately 0.4 percent of the baseline jobs (employment projections without the implementation of the 2012 AQMP) during the same period. Approximately 91 percent of the projected 42,174 jobs are due to the increased amenities resulting from reduction in morbidity and mortality, improved visibility, reduced materials expenditure and reduced traffic congestion.[4] The sectors that are projected to have the relatively large share of jobs created over the period of 2014 to 2035 are accommodation and food services, government, retail trade, and real estate/rental/leasing. As the area becomes more attractive due to cleaner air, more people will move in and thus demand more services from these sectors. The jobs forgone in the truck transportation sector are due to the reduced demand for this sector resulting from reductions in VHT due to the implementation of SCAG TCMs.

TABLE 4-2
2012 AQMP Employment Impacts by Industry for Clean Air Benefits*

Industry	NAICS	Jobs		Average Annual (2014-2035)	
		2014	2023	Jobs	% Baseline
Agriculture, Forestry, Fishing & Hunting	11	1	15	44	0.208%
Mining	21	8	101	132	0.300%
Utilities	22	15	167	224	0.702%
Construction	23	235	2,442	3,264	0.604%
Transportation Equipment Mfg.	336	4	73	95	0.121%
Petroleum & Coal Products Mfg.	324	2	20	25	0.371%
Other Manufacturing	31-33 ex. 324 & 336	91	1,463	1,758	0.268%
Wholesale Trade	42	92	1,136	1,511	0.318%
Retail Trade	44-45	25	3,182	4,653	0.463%
Truck Transportation	484, 492	-81	-1,191	-778	-0.464%
Transit Transportation	485	15	156	195	0.599%
Other Transportation & Warehousing	48-49 ex. 484-485 & 492	19	355	471	0.304%
Information	51	35	426	597	0.179%
Finance and Insurance	52	13	399	712	0.114%
Real Estate and Rental and Leasing	53	354	3,194	4,148	0.739%
Professional and Technical Services	54	153	1,749	2,379	0.293%
Management & Support Services	55-56	155	1,943	2,789	0.321%
Education, Health and Social Services	61-62	441	4,334	5,910	0.494%
Arts, Entertainment, and Recreation	71	104	927	1,204	0.379%
Accommodation and Food Services	72	603	5,333	6,691	0.973%
Other Services	81	-461	-944	-354	-0.052%
Government	92	440	4,866	6,505	0.516%
Total		**2,262**	**30,145**	**42,174**	**0.399%**

*Based on all the TCMs in the 2012 RTP.

[4]Economic migrants are willing to move to an area with more amenities in exchange for lower earnings. This would lower the cost of doing business and increase the competitiveness of local industries. As a result, output will rise and more workers will be hired.

Implementation of $PM_{2.5}$ and ozone measures would, on the other hand, result in jobs forgone. Table 4-3 show the job impacts for the benchmark years 2014 and 2023, and the average annual job impact by industry between 2013 and 2035 for $PM_{2.5}$ and ozone control measures. In 2014, job impacts are the result of implementation of SCAG TCMs under the $PM_{2.5}$ strategy and early implementation of incentive programs proposed in the on- and off-road measures. These are the sources for the majority of job impacts in 2023. Of the total 2,457 jobs forgone in 2023 from the ozone strategy, 70 percent are due to the on- and off-road measures.

Sectors of construction, and professional and technical services are projected to gain jobs. The heavy infrastructure investment resulting from the 143 transportation projects would certainly benefit those two sectors. On the other hand, the construction sector is assumed to participate in the voluntary/incentive programs proposed in the on- and off-road mobile source measures. The government sector is projected to experience jobs forgone due to the reduced spending elsewhere in order to compensate for the increase in these investments. The retail trade sector is projected to have a relatively large share of jobs forgone mainly due to the reduction in personal income resulting from the overall jobs forgone in the economy when clean air benefits are not considered. All the sectoral jobs forgone are less than one percent of the baseline projected jobs.

TABLE 4-3

2012 AQMP Employment Impacts by Industry for Measures

Industry	NAICS	2014		2023		Average Annual (2013-2035)	
		$PM_{2.5}$	Ozone	$PM_{2.5}$	Ozone	Plan	% Baseline
Agriculture, Forestry, Fishing & Hunting	11	-1	0	-3	-1	-4	-0.020%
Mining	21	-40	1	-13	-15	-35	-0.081%
Utilities	22	-15	10	-3	41	22	0.068%
Construction	23	4,635	3	1,981	-205	1,357	0.253%
Transportation Equipment Mfg.	336	-23	24	-14	1	-7	-0.009%
Petroleum & Coal Products Mfg.	324	-6	0	-3	-5	-8	-0.122%
Other Manufacturing	31-33 ex. 324 & 336	-204	12	-106	-39	-153	-0.023%
Wholesale Trade	42	-183	13	-63	-57	-203	-0.043%
Retail Trade	44-45	-855	-118	-197	-620	-1,010	-0.101%
Truck Transportation	484, 492	-17	4	-9	-44	-57	-0.034%
Transit Transportation	485	-22	20	-10	-84	-114	-0.350%
Other Transportation & Warehousing	48-49 ex. 484-485 & 492	-81	12	-45	-114	-153	-0.099%
Information	51	-114	1	-27	-21	-71	-0.021%
Finance and Insurance	52	-407	1	-95	-69	-257	-0.041%
Real Estate and Rental and Leasing	53	-143	-1	98	-134	-168	-0.030%
Professional and Technical Services	54	396	7	-216	-116	98	0.012%
Management & Support Services	55-56	-398	9	-199	-220	-446	-0.052%
Education, Health and Social Services	61-62	-524	-4	-171	-107	-531	-0.045%
Arts, Entertainment, and Recreation	71	-85	0	-4	-28	-75	-0.024%
Accommodation and Food Services	72	-564	1	-194	-113	-440	-0.064%
Other Services	81	-229	-3	-27	-166	-317	-0.047%
Government	92	-414	35	-154	-343	-684	-0.055%
Total		**705**	**26**	**528**	**-2,457**	**-3,256**	**-0.031%**

Table 4-4 shows the job impact by industry for clean air benefits and control measures as a whole. More industries would experience jobs forgone in 2014 than in other years because the negative effect of control measures dominates the positive effect of clean air. Over time the reverse is true, thus resulting in net job gains for most of the industries.

TABLE 4-4
Job Impacts by Industry for Clean Air Benefits and Measures Combined*

Industry	NAICS	Jobs		Average Annual (2013-2035)	
		2014	2023	Jobs	% Baseline
Agriculture, Forestry, Fishing & Hunting	11	-1	11	38	0.182%
Mining	21	-32	73	91	0.210%
Utilities	22	11	205	236	0.744%
Construction	23	4,873	4,216	4,478	0.835%
Transportation Equipment Mfg.	336	4	60	83	0.107%
Petroleum & Coal Products Mfg.	324	-5	13	16	0.234%
Other Manufacturing	31-33 ex. 324 & 336	-102	1,317	1,529	0.233%
Wholesale Trade	42	-79	1,014	1,242	0.263%
Retail Trade	44-45	-949	2,358	3,428	0.343%
Truck Transportation	484, 492	-95	-1,245	-807	-0.484%
Transit Transportation	485	14	62	72	0.222%
Other Transportation & Warehousing	48-49 ex. 484-485 & 492	-51	196	297	0.192%
Information	51	-78	377	500	0.151%
Finance and Insurance	52	-393	234	422	0.068%
Real Estate and Rental and Leasing	53	210	3,160	3,803	0.680%
Professional and Technical Services	54	556	1,415	2,373	0.294%
Management & Support Services	55-56	-234	1,522	2,220	0.257%
Education, Health and Social Services	61-62	-87	4,051	5,125	0.430%
Arts, Entertainment, and Recreation	71	19	894	1,077	0.340%
Accommodation and Food Services	72	39	5,024	5,963	0.870%
Other Services	81	-694	-1,140	-679	-0.100%
Government	92	61	4,367	5,536	0.442%
Total		**2,987**	**28,186**	**37,043**	**0.352%**

*Based on all the TCMs in the 2012 RTP.

Small Business Effects

The District defines a "small business" in Rule 102 as one which employs 10 or fewer persons and which earns less than $500,000 in gross annual receipts. In addition to the District's definition of a small business, the federal Small Business Administration (SBA), the federal Clean Air Act Amendments of 1990 (CAAA), and the California Department of Health Services (DHS) also provide their own definitions of a small business. Two common characteristics of the SBA, CAAA, and DHS small business definitions are the following: (1) standards are

unique to each industry type, and (2) the businesses have to be independently owned and operated, and cannot be dominant in their field.

The SBA's definition of a small business uses the criterion of either gross annual receipts (ranging from $0.5 million to $17 million, depending on industry type) or number of employees (ranging from 100 to 1,500). The CAAA classifies a facility as a "small business stationary source" if it (1) employs 100 or fewer employees, (2) does not emit more than 10 tons per year of either ROG or NO_X, and (3) is a small business as defined by SBA. The DHS definition of a small business uses an annual gross receipt criterion (ranging from $1 million to $9.5 million, depending on industry type) for non-manufacturing industries and an employment criterion of fewer than 250 employees for manufacturing industries.

Under the SBA's and CAAA's definitions of small business, the AQMP could potentially impact a wide range of small businesses. The number of affected small businesses will be fewer under the District's definition. Small businesses are more highly concentrated in non-manufacturing than manufacturing sectors. A few control measures such as CTS-01 on architectural coatings and CMB-03 on commercial space heating may affect small businesses. Since the affected businesses are not exactly known at this stage, additional analyses of the number and types of small businesses affected by control measure and the ensuing job impacts will be performed during individual rule development processes.

SUMMARY

The employment impact assessments herein were based on the congestion relief benefit for all the TCMs in the 2012 RTP. Employment impacts based on the corresponding congestion benefit for the SIP-committed TCMs ($519 million annually) are in Appendix H—TCM Benefit at 2014 Level.

Clean air benefits are projected to result in a gain of 42,714 jobs annually, on average, from 2014 to 2035. Implementation of control measures is projected to have 3,257 jobs forgone annually, on average, from 2013 to 2035. The 2012 AQMP as a whole would result in an annual net gain of 37,043 jobs, on average, from 2013 to 2035. The jobs created from clean air benefits would amount to 0.86 percent of the total four-county jobs in 2035. The jobs forgone from control measures would be 0.03 percent of the total jobs in 2035.

Without the 2012 AQMP, jobs in the four-county area are projected to grow at an annual rate of approximately 0.922 percent between 2009 and 2035. The 2012 AQMP as a whole (clean air benefits and control measures) would result in an increase in the annual job growth rate by 0.033 percent. Looking at the benefits and costs separately, cleaner air from the 2012 AQMP would increase the job growth rate by 0.034 percent and bring it to an annual rate of 0.96 percent. On the other hand, control measures would slow down the rate of job growth by 0.001 percent, to 0.921 percent.

Nearly all of the industries would experience additional jobs created due to cleaner air. The sectors of accommodation and food services, government, retail trade, and real estate/rental/leasing would experience larger shares of jobs created due to additional demand for their products as more people migrate to the region and demand more services from these sectors.

The potential small business impacts of individual control measures will be further examined in the rule development process. In addition, as measures are developed into rules, their potential employment impacts will be specifically assessed.

CHAPTER 5

IMPACTS ON ECONOMIC GROUPS AND COMMUNITIES

INTRODUCTION

Socioeconomic issues have become increasingly important in recent years during the development of air quality regulations and policies. Evaluation of the distribution of job and cost impacts among ethnic and economic groups, as well as geographic communities, is a key topic to be considered.

While a socioeconomic assessment provides valuable information regarding the potential direct and secondary effects, the analysis does have some limitations. Establishing appropriate methods to estimate distribution effects is difficult given that few analytical models exist that can be easily adapted to air quality policy analysis. The lengthy data collection process makes it formidable to timely follow the rapidly-changing socioeconomic characteristics, especially in Southern California. Moreover, there is an inherent bias because costs tend to be more easily measured than benefits. Finally, there are additional uncertainties associated with examining subpopulations within the four-county area. Overall, socioeconomic assessments require substantially more data than what currently exists because existing data are often limited or based on small samples, thereby making estimates less reliable.

The REMI model, used to analyze potential impacts of the 2012 AQMP, projects possible impacts on jobs, the distribution of jobs, income, and product prices based upon cost data for control measures and benefit data for each quantified effect of clean air. The reliability of such projections is dependent upon the validity of the input. The assessments below were based on the congestion relief benefit for all the TCMs in the 2012 RTP. The assessments based on the corresponding congestion benefit for the SIP-committed TCMs ($519 million annually) are in Appendix H—TCM Benefit at 2014 Level.

COSTS BY SUB-REGION

The 2012 AQMP requires emission reductions from stationary, area, on-road, and off-road sources. Emission reductions from stationary sources consist of those from point and area sources. Projected emission reductions in 2023 from area sources were assigned to a 4 kilometer by 4 kilometer grid and those from point sources were assigned to a facility in the 2008 emission inventory. The emission reductions for each quantified measure in each grid or facility were then aggregated to a total of 21 sub-regions. The annual cost for each quantified measure (annualized capital and annual operating and maintenance expenditures) during the implementation period was then allocated to each sub-region according to its proportion of emission reductions.

The cost of SCAG TCMs will be mostly financed by public funding through sales and gasoline taxes and bond issuance. The private funding through development agreements plays a small role and was allocated to the construction sector according to the location of projects. The public funding was assigned to each county according to project descriptions and then to each sub-region according to its population share in the county. For area, on-road, and off-road sources, the annual cost of each control measure was allocated to each sub-region according to its share of emission reductions, which was aggregated from emission reductions at air quality grids. Surrogate variables such as population were used to

distribute emission reductions to grids. For voluntary and incentive measures where emission reductions are not available, sub-region population was used for allocation.

As described in Chapter 3, the average annual cost of all quantified measures from 2013 to 2035 is projected to be $448 million. Table 5-1 shows the projected cost share in each sub-region for all the quantified control measures by implementation jurisdiction. Nearly all the costs of $PM_{2.5}$ measures are from TCM projects, the distribution of which among sub-regions reflects where the TCM projects are. The Los Angeles County central, San Fernando, west, and southwest sub-regions would experience most of the costs. The southwest beach community in Los Angeles County is projected to have the highest share (10 percent) of the cost for ozone measures that would be implemented by the District. This is mainly due to the control on refinery boilers from Control Measures CMB-01 (RECLAIM Phase II). The cost distribution of the 2012 AQMP follows that of $PM_{2.5}$ and ozone measures. The sub-regions with the highest costs are the central, southwest, and San Fernando areas of Los Angeles County.

TABLE 5-1
Cost Share by Sub-region for Control Measures

Sub-Region	$PM_{2.5}$ Measures		Ozone Measures		All Measures	
	Millions $	%	Millions $	%	Millions $	%
LA CO Beach & Catalina	$16	5%	$12	10%	$28	6%
LA CO Burbank	16	5%	3	3%	19	4%
LA CO Central	32	10%	7	6%	39	9%
LA CO North	18	5%	4	3%	22	5%
LA CO San Fernando	32	10%	7	6%	39	9%
LA CO SG Valley East	17	5%	4	3%	21	5%
LA CO SG Valley West	26	8%	5	4%	31	7%
LA CO South	23	7%	7	6%	30	7%
LA CO South Central	26	8%	5	4%	32	7%
LA CO Southeast	32	10%	7	6%	39	9%
LA CO West	23	7%	5	4%	29	6%
Orange Central	16	5%	7	6%	23	5%
Orange North	8	2%	4	3%	11	3%
Orange South	15	5%	6	5%	21	5%
Orange West	12	4%	5	4%	17	4%
Northwest Riverside	3	1%	8	6%	11	2%
Other Riverside	3	1%	4	3%	7	2%
Southwest Riverside	2	1%	4	4%	7	2%
San Bernardino City	3	1%	8	7%	11	2%
Other San Bernardino	2	1%	3	3%	5	1%
Southwest San Bernardino	2	1%	6	5%	8	2%
Total	**$327**	**100%**	**$122**	**100%**	**$448**	**100%**

CLEAN AIR BENEFITS BY SUB-REGION

The Plan is designed to bring northwest Riverside (the Mira Loma area), the only area in exceedance of the federal $PM_{2.5}$ standard, into attainment. However, $PM_{2.5}$ air quality benefits occur throughout the Basin. As shown in Table 5-2, the San Fernando Valley, southern Los Angeles County, and the northwest Riverside County would experience the highest proportions of the total $10.7 billion air quality benefit. The western portions of Los Angeles and Orange Counties and the eastern and northern portions of San Bernardino County are projected to have the highest shares of health benefits due to high population density and/or lower $PM_{2.5}$. The health benefits from reductions in $PM_{2.5}$ are expected to reach nearly $4.1 billion in 2014 and $2.2 billion annually, on average, from 2014 to 2035.

TABLE 5-2
Average Annual Benefits (2014-2035) by Sub-region

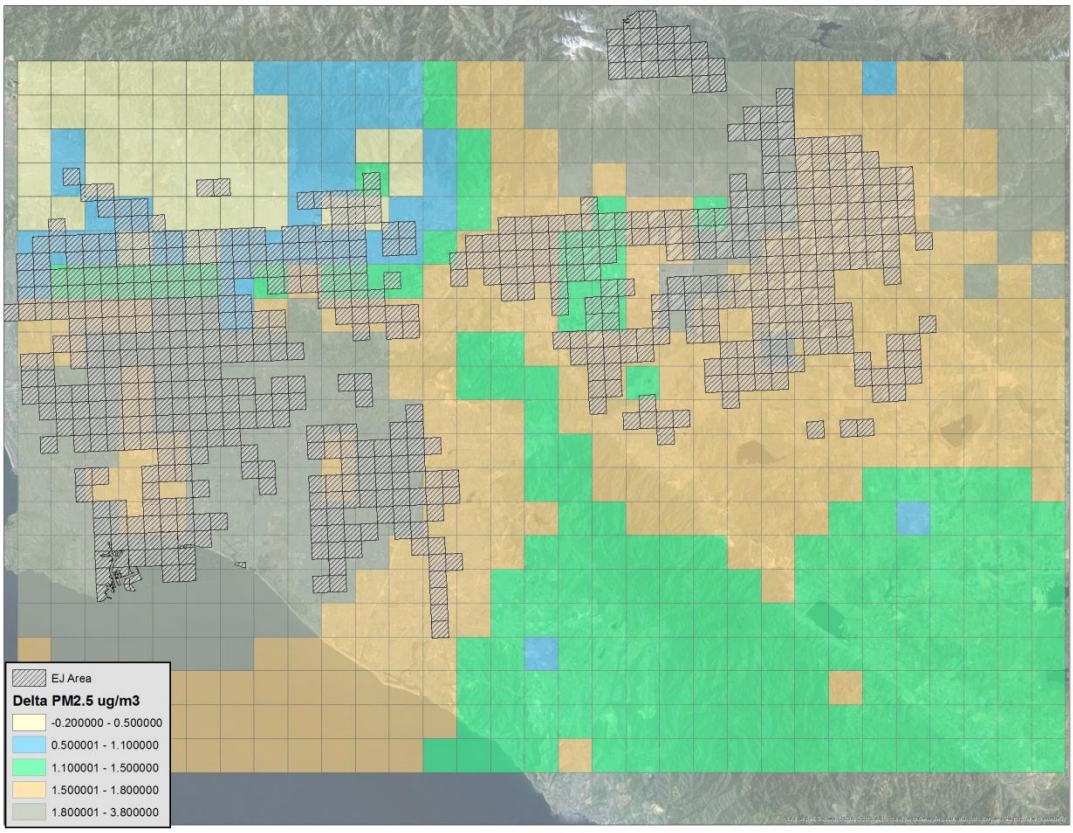
Sub-region	Health		Congestion*		Material		Visibility		Total	
	MM$	%	MM$	%	MM$	%	MM$	%	MM$	%
LA CO Beach & Catalina	78	3%	541	7%	0.4	3%	26	4%	646	6%
LA CO Burbank	19	1%	1034	13%	0.4	3%	26	4%	1079	10%
LA CO Central	145	6%	-356	-5%	0.9	6%	37	5%	-174	-2%
LA CO North	44	2%	220	3%	0.4	3%	9	1%	273	3%
LA CO San Fernando	157	7%	946	12%	0.8	6%	41	6%	1145	11%
LA CO SG Valley East	96	4%	491	6%	0.4	3%	20	3%	608	6%
LA CO SG Valley West	81	4%	368	5%	0.6	4%	33	5%	481	5%
LA CO South	145	6%	1044	14%	0.6	4%	21	3%	1211	11%
LA CO South Central	16	1%	134	2%	0.6	4%	13	2%	163	2%
LA CO Southeast	70	3%	432	6%	0.6	5%	22	3%	524	5%
LA CO West	203	9%	64	1%	0.8	5%	94	13%	362	3%
Orange Central	115	5%	131	2%	0.8	6%	23	3%	270	3%
Orange North	118	5%	42	1%	0.4	3%	22	3%	184	2%
Orange South	128	6%	146	2%	0.9	7%	60	9%	334	3%
Orange West	202	9%	227	3%	0.7	5%	41	6%	470	4%
Northwest Riverside	117	5%	1069	14%	1.0	7%	55	8%	1242	12%
Other Riverside	116	5%	309	4%	1.1	8%	29	4%	455	4%
Southwest Riverside	60	3%	560	7%	0.8	5%	29	4%	650	6%
San Bernardino City	35	2%	130	2%	0.8	6%	47	7%	213	2%
Other San Bernardino	180	8%	16	0%	0.6	4%	10	1%	206	2%
Southwest San Bernardino	122	5%	165	2%	0.6	4%	40	6%	328	3%
Total	**2247**	**100%**	**7712**	**100%**	**14.3**	**100%**	**696**	**100%**	**10670**	**100%**

*Based on all the TCMs in the 2012 RTP.

An important element of the socioeconomic analysis is to identify how the proposed control strategy will impact the sensitive portions of the population, in particular, the segment of the community identified by the District's existing environment justice (EJ) guidance, which is an area that exceeds 10 percent of poverty rate with a cancer risk greater than 850 in a million or a $PM_{2.5}$ concentration greater than 19.02 $\mu g/m^3$. Figure 5-1 provides an overview of the impact of

the 24-hr $PM_{2.5}$ control strategy on exposure to $PM_{2.5}$ to both the EJ and non-EJ portions of the community. More detailed impacts on sub-populations will be conducted in the future. The figure shows the difference between the projected 2014 24-hour $PM_{2.5}$ concentrations with the control strategy applied compared with the baseline 2014 24-hr $PM_{2.5}$ concentrations. Overall across the Basin the majority of areas show 24-hour $PM_{2.5}$ air quality improvements. Only a small segment of the San Gabriel Mountains depicts a nominal negative impact of implementing the control program. Overlaid on each of the 4-km squared $PM_{2.5}$ grid cells are the 1-km squared grid depicting the EJ sub-areas of the region. As illustrated by the overlay, many of the sub-grid cells identified as EJ are located in the areas experiencing the greatest levels of air quality improvements. Those areas include the densely populated portions of metropolitan Los Angeles and southwestern San Bernardino counties. While continuing to show air quality improvements but to a lesser extent than the previously identified areas, Orange and the southern portion of Riverside counties depict a lesser EJ benefit. This is mostly due to the smaller EJ segment of the population.

FIGURE 5-1
Impact of 2014 Change in 24-Hour $PM_{2.5}$ Concentrations on EJ Areas



The majority of the congestion relief benefit would be attributed to Burbank, San Fernando, the southern portion of Los Angeles County, and northwest Riverside County. The west portion of Los Angeles County is projected to have the highest share of the visibility aesthetic benefit, which is calculated based on the number of households, visibility

improvements (compared to the "no control" baseline scenario), net household income (net of housing cost), and percent of college degree holders in each sub-region. Table 5-3 shows the values of these variables by sub-region from the 2006-2010 American Community Survey (ACS) estimates. In 2014 and 2023, southwest Riverside County and southwest San Bernardino County along with areas around San Bernardino City are projected to have the highest visibility improvement relative to its baseline air quality among all the sub-regions.

Information on net household income and percent of college degree holders for the benchmark years 2014, 2023, and 2030 are not available. The annual growth rates of net household income and percent of college degree holders, respectively, between the 2005-2009 and 2006-2010 ACS estimates in each sub-region were used to project the values of these variables for those benchmark years. County growth averages were used for sub-regions with negative growth rates between these two estimates or those with long-term unreasonably high growth rates. Additionally, SCAG household projections were used. The total willingness to pay for visibility improvement is higher in the sub-regions with more relative improvements in visibility and denser population due to their higher net household income and percentage of college degree holders.

TABLE 5-3
Determining Factors for Aesthetic Visibility Benefit by Sub-region

Sub-region	Households	Net Household Income (1995 $)	% College Degree	% Visibility Improvement	
				2014	2023
LA CO Beach & Catalina	217,364	$67,826	42	2.3	1.2
LA CO Burbank	217,084	$58,910	40	3.4	0.7
LA CO Central	432,277	$40,812	28	3.1	0.7
LA CO North	193,640	$55,320	23	1.6	0.4
LA CO San Fernando	411,550	$50,863	28	3.6	0.7
LA CO SG Valley East	189,738	$55,933	29	4.8	0.7
LA CO SG Valley West	276,675	$51,883	27	4.2	1.1
LA CO South	288,268	$47,956	26	2.2	1.4
LA CO South Central	282,396	$29,481	9	4.4	1.1
LA CO Southeast	320,215	$43,251	15	5.4	0.7
LA CO West	388,682	$80,989	58	2.3	1.8
Orange Central	270,871	$48,218	19	3.8	1.6
Orange North	142,121	$66,668	38	2.6	1.8
Orange South	322,268	$78,066	50	2.9	1.6
Orange West	249,243	$70,141	39	3.5	1.6
Northwest Riverside	239,453	$51,552	20	5.0	3.5
Other Riverside	253,968	$45,319	20	4.0	1.3
Southwest Riverside	173,485	$53,984	22	6.1	2.4
San Bernardino City	234,660	$42,914	16	7.4	3.2
Other San Bernardino	181,967	$41,153	15	2.5	1.0
Southwest San Bernardino	179,498	$57,174	25	6.1	3.0

Source: 2006-2010 American Community Survey

The visibility benefit analysis was performed at the 21 sub-region level by aggregating the predicted $PM_{2.5}$ concentration data for each grid and the total light extinction coefficient at the nearest airport for each grid to 21 sub-regions. The congestion relief benefit was assessed by aggregating the reductions in VMT and VHT at the air quality grid level to 21 sub-regions. The assessment of material benefit was performed at the county level and allocated to sub-regions according to their population and housing units within a county. All the assessments were first made for the benchmark years (2014, 2023, and 2030) in the air quality models and interpolated for interim years.

Table 5-4 shows that the $554 per capita clean air benefit far more outweighs the $23 per capita cost. Except for the central Los Angeles County, all sub-regions are projected to have much greater per capita benefit than per capita cost. The dis-benefit in central Los Angeles County is due to the congestion relief dis-benefit resulting from all the TCMs in the 2012 RTP.

TABLE 5-4
Average Annual Per Capita Clean Air Benefit and Cost by Sub-region (in 2005 dollars)

Sub-region	Clean Air Benefit*	Cost
LA CO Beach & Catalina	$996	$43
LA CO Burbank	1665	29
LA CO Central	-128	29
LA CO North	460	37
LA CO San Fernando	812	28
LA CO East	617	30
LA CO South	1227	30
LA CO South Central	153	30
LA CO Southeast	402	30
LA CO West	378	30
OR CO Central	235	20
OR CO North	400	24
OR CO South	359	23
OR CO West	612	22
Northwest Riverside	985	9
Other Riverside	711	9
Chino-Redlands	305	11
Other San Bernardino	322	8
Total Four Counties	**$554**	**$23**

*Based on all the TCMs in the 2012 RTP.

JOB IMPACTS BY SUB-REGION

The baseline employment for Los Angeles County is projected to be 5.72 million jobs in 2014 and 6.11 million in 2023. Orange County is projected to have 1.93 million jobs in 2014 and 2.03 million in 2023. Riverside and San Bernardino Counties are projected to have 1.08 and 0.95 million jobs in 2014 and 1.26 and 1.08 million jobs in 2023, respectively.

The job impact analysis was performed at the 18 sub-region level where the San Gabriel East and West sub-regions were combined into the Los Angeles County East sub-region; the southwest Riverside sub-region was combined into the other Riverside sub-region; and the San Bernardino City and southwest San Bernardino sub-regions were combined into the Chino-Redlands sub-region. The distribution of job impacts (Table 5-5) by sub-region very much mirrors that of clean air benefits and costs.[1] The eastern, southern, and San Fernando sub-regions in Los Angeles County and Riverside County are projected to have more jobs created than other sub-regions resulting from clean air benefits. In terms of the job impact of control measures, the majority of the jobs forgone are in Orange County. This is because the majority of SCAG TCMs in Orange County would be financed by development fees, which would have a heavy burden on one single sector of the economy—the construction sector. A sensitivity test shows that the same project financed by development fees would have 47 times as many jobs forgone as if it were financed by sales tax. For the entire Plan, all sub-regions would show positive job impacts as the four-county area becomes more competitive and attractive with the progress in clean air, which outweighs the negative job impacts of the cost of control measures alone.

TABLE 5-5
Average Annual Job Impacts by Sub-region for Benefits, Control Measures and Plan

Sub-region	Benefits (2014-2035)*	Control Measures (2013-2035)	Plan* (2013-2035)	
			Jobs	% Baseline
LA CO Beach & Catalina	1,569	-35	1,466	0.34%
LA CO Burbank	2,153	17	2,076	0.50%
LA CO Central	1,158	66	1,172	0.16%
LA CO North	828	-87	704	0.20%
LA CO San Fernando	3,042	-200	2,708	0.33%
LA CO East	3,564	-230	3,177	0.31%
LA CO South	3,126	-147	2,841	0.51%
LA CO South Central	1,078	-117	914	0.21%
LA CO Southeast	1,850	14	1,782	0.28%
LA CO West	1,625	120	1,673	0.23%
OR CO Central	1,911	-528	1,298	0.21%
OR CO North	1,061	-234	779	0.27%
OR CO South	2,241	-941	1,197	0.19%
OR CO West	2,223	-687	1,436	0.28%
RV CO NW Riverside	5,698	9	5,453	0.94%
RV CO Other	6,721	-130	6,292	0.90%
Chino-Redlands	1,788	-121	1,585	0.19%
Other San Bernardino	539	-26	489	0.18%
Total	**42,174**	**-3,256**	**37,043**	**0.35%**

*Based on all the TCMs in the 2012 RTP.

[1] Job impacts herein are by place of work.

JOB IMPACTS ON HIGH- VERSUS LOW-PAYING JOBS

Occupations were grouped into five categories, lowest to highest, according to median weekly earnings. Table 5-6 shows the distribution of job impacts in 2014 and 2023 resulting from clean air benefits, control measures, and their combined impacts, respectively, among various occupational wage groups. All the groups are projected to gain from cleaner air. Group 1 would gain the most in 2014 and 2023. For control measures, Groups 1, 2, and 5 would have jobs forgone ranging from 0.008 percent to 0.055 percent relative to the baseline 2014 and 2023 employment, with Group 1 to be affected the most. Nearly all the groups would gain employment from the combined impacts of clean air benefits and implementation of control measures. Group 1 occupations include workers in retail sales and maintenance, assemblers, and food preparation and agricultural workers. Group 5 occupations are scientists, teachers, engineers, and managers/executives. The occupations in each group are listed in Table B-1 of Appendix B.

TABLE 5-6
Employment Impacts by Occupational Wage Group for
Clean Air Benefits and Control Measures

Group	Median Weekly Earnings	No. of Occupations	% Impact from Baseline					
			Clean Air Benefits*		Control Measures		Benefits & Measures*	
			2014	2023	2014	2023	2014	2023
1	$352-$517	19	0.031	0.355	-0.055	-0.041	-0.024	0.313
2	$520-$659	19	0.021	0.256	-0.008	-0.022	0.013	0.234
3	$661-$820	18	0.013	0.241	0.138	0.027	0.151	0.268
4	$821-$996	19	0.028	0.305	0.009	-0.016	0.036	0.289
5	$1,027-$1,729	19	0.025	0.266	-0.008	-0.026	0.017	0.239

*Based on all the TCMs in the 2012 RTP.

IMPACTS ON DISPOSABLE INCOME

Without the 2012 AQMP, real disposable income is projected to grow at an annual rate of 2.245 percent between 2009 and 2035.[2] Clean air benefits of the AQMP could bring the annual growth rate to 2.281 percent. Cleaner air increases amenity in the four-area area, thus bringing in more economic migrants. Population is projected to grow slightly more than real total disposable income, thus resulting in a decrease in per capita disposable income. Per capita real disposable income (total real disposable income divided by population) would decrease by $891 in 2035 relative to the baseline projection.

IMPACTS ON PRICE INDEX BY INCOME

The REMI model develops price indexes of consumption goods for households in five income groups by comparing prices of those goods between the four-county region and the rest of the U.S. Table 5-7 shows the projected percentage change in the price of consumption goods in a market basket (those goods identified in the annual Consumer

[2] The real disposable income for the four county area is projected to be $561 billion (2005 dollars) in 2009 and $999 billion in 2035. Disposable income is the sum of the incomes of all the individuals in the economy after all taxes have been deducted (Baumol and Blinder, 1982).

Expenditure Survey by the Bureau of Labor Statistics) by income group for clean air benefits, control measures, and their combined impacts, respectively, in the years 2014 and 2023. The first quintile represents households earning the lowest 20 percent of income.

TABLE 5-7
Impacts on the Price of Consumption Goods for
Clean Air Benefits and Control Measures
(percent of baseline*)

Household Income	Clean Air Benefits**		Control Measures		Benefits & Measures**	
	2014	2023	2014	2023	2014	2023
1st Quintile	-0.007	-0.013	0.060	0.040	0.052	0.025
2nd Quintile	-0.007	-0.027	0.059	0.039	0.052	0.013
3rd Quintile	-0.007	-0.024	0.058	0.039	0.052	0.015
4th Quintile	-0.007	-0.028	0.058	0.038	0.052	0.011
5th Quintile	-0.007	-0.020	0.060	0.038	0.052	0.018

*Relative to the rest of the U.S.
**Based on all the TCMs in the 2012 RTP.

The change here is relative to the baseline index of consumption goods. The price of consumption goods is projected to decrease by 0.007 percent in 2014 across all household income groups and by 0.013 to 0.028 percent in 2023 due to the attainment of the $PM_{2.5}$ standard. Implementation of control measures is projected to increase the price of consumption goods from 0.039 to 0.06 percent for these same years across all household income groups. All household groups would experience increases in prices of consumption goods resulting from combined impacts of control measures and clean air benefits. The projected increase in the price is due to the pass-through of additional control costs by industries that are affected by a number of control measures.

SUMMARY

The assessments herein were based on the congestion relief benefit for all the TCMs in the 2012 RTP. Impacts based on the corresponding congestion benefit for the SIP-committed TCMs ($519 million annually) are in Appendix H—TCM Benefit at 2014 Level.

Implementation of the 2012 AQMP is projected to result in air quality improvements sufficient to attain the federal air quality standards in 2014 for $PM_{2.5}$ and progress toward attaining the ozone standard in 2023. The San Fernando Valley, southern Los Angeles County, and the northwest Riverside County would experience the highest shares of air quality benefits. The western portions of Los Angeles and Orange Counties and the eastern and northern portions of San Bernardino County are projected to have the highest shares of health benefits.

The attainment of the ozone and $PM_{2.5}$ air quality standards depends on full implementation of control measures that are proposed in the 2012 AQMP. The costs of these measures will ripple throughout various communities. The sub-regions with the highest costs are the

central, southwest, and San Fernando areas of Los Angeles County. These three areas are projected to have the highest cost shares from SCAG TCMs and relative higher cost shares from ozone measures.

All sub-regions are projected to have additional jobs created from cleaner air. Implementation of quantified control measures would result in jobs forgone between 2013 and 2035. Job gains from cleaner air would benefit all five wage groups that are comprised of 94 occupations. Most groups would experience jobs forgone from implementation of control measures. However, there is no significant difference in impacts expected for high- versus low-paying jobs. The same is observed for impacts on the price of consumption goods from one household group to another.

Additional surveys on affected groups and communities need to be developed to better understand the detailed job impacts. Furthermore, additional tools need to be developed relative to presenting socioeconomic and air quality data geographically. Chapter 8 has a more detailed description of these proposed future enhancements to the socioeconomic analysis.

CHAPTER 6

IMPACTS ON COMPETITIVENESS

INTRODUCTION

Regional economic competitiveness depends on various factors including business costs, workforce quality, public infrastructure, quality of life, and the regulatory environment. Air quality regulations directly affect business costs, quality of life, and the regulatory environment. Specifically, the 2012 AQMP will affect regional economic competitiveness in two ways: (1) by imposing costs on business as a result of pollution control strategies; and (2) by improving the region's quality of life by reducing air pollution. Good air quality tends to attract highly qualified professionals, who, in general, are higher wage earners.

The REMI model, used to analyze potential impacts of the 2012 AQMP, projects possible impacts on the cost of production, commodity prices, exports, and imports based upon expenditure made to implement each control measure and clean air benefits. These impacts were analyzed based on the congestion relief benefit for all the TCMs in the 2012 RTP. Similar impacts based on the corresponding congestion benefit for the SIP-committed TCMs ($519 million annually) are in Appendix H—TCM Benefit at 2014 Level.

REGION'S SHARE OF U.S. JOBS

Table 6-1 shows the impacts of clean air benefits and control measures, as well as their combined impacts on the region's share of national jobs. As the air gets cleaner, the four-county region is predicted to gain a larger share of total national jobs through 2025. The increase ranges from 0.001 percent in 2014 to 0.014 percent in 2023, compared to the baseline projection without the AQMP. A similar trend and magnitude are also observed for the region's share of manufacturing jobs in the nation.

TABLE 6-1
Impacts on Region's Share of U.S. Jobs for
Clean Air Benefits and Control Measures (percent)

	Percent Share of U.S. Jobs for Benefits		Percent Share of U.S. Jobs for All Measures		Percent Share of U.S. Jobs for Combined Benefits & Measures	
	2014	2023	2014	2023	2014	2023
Total Jobs						
With Benefits & Measures*					5.127	4.962
With Benefits*	5.126	4.963				
With All Measures			5.126	4.948		
Without 2012 AQMP	5.125	4.949	5.125	4.949	5.125	4.949
Difference	0.001	0.014	0.001	-0.001	0.002	0.013
Manufacturing Jobs						
With Benefits & Measures*					5.654	7.305
With Benefits*	5.656	7.306				
With All Measures			5.654	7.29		
Without 2012 AQMP	5.655	7.292	5.655	7.292	5.655	7.292
Difference	0.001	0.014	-0.001	-0.002	-0.001	0.013

Some numbers are rounded.
*Based on all the TCMs in the 2012 RTP.

As investments in infrastructure and pollution control equipment or devices occur in the beginning of a control measure's implementation period (e.g., the year 2014), the region will continue its trend of having a larger share of the total national jobs. However, as the costs of implementing these measures are continually amortized over the project period, fewer jobs would be created, thus resulting in a decrease in the region's share of total jobs and manufacturing jobs in the U.S. (in 2023). The combined impacts of benefits and control measures show that the region's share of the total national jobs would increase by 0.002 percent in 2014 and 0.013 percent in 2023. The region's share of the U.S. manufacturing jobs would drop in 2014 and rise in 2023.

Due to the extremely small values presented here, neither the quantified benefits nor the quantified measures are expected to result in discernible differences in the four-county region's share of national jobs over the analysis period.

COST OF PRODUCTION AND PRICES

The four-county area has the most diversified metropolitan economy in the U.S. Cleaner air will attract more economic migrants into the area. As the mix of labor skills expands, the access to quality labor would have a positive impact on labor productivity, thereby reducing the cost of doing business for local industries. On the other hand, implementation of control measures increases the cost of doing business for affected industries.

Table 6-2 shows the percentage change in relative cost of production as a result of clean air benefits, control measures, and both combined in 2018 and 2023. These two years were chosen because they have relatively higher impacts than other years in the analysis period of 2013-2035. An index of 0 indicates that there is no change in the cost of production relative to the rest of the United States. An index of above or below 0 means that the cost of production in the four-county areas resulting from the Draft 2012 AQMP is higher or lower, respectively, than that in the rest of the U.S.

Most of the industries would experience a reduction in the cost of production due to clean air benefits. The transportation and warehousing industry is projected to experience the highest cost reduction (1.23 percent in 2014 and increase to 2.25 percent in 2023) because of reductions in vehicle hours traveled associated with business trips (Table 3-9). The same sector would also experience the highest increase in the cost of production (0.096 percent) from the implementation of control measures in 2023 because this sector would experience a relatively higher share of the total cost of the Plan (Table 3-1). All the remaining sectors will experience a smaller magnitude of increase in production cost due to the 2012 AQMP control measures. The combined impact of clean air benefits and control measures shows a downward trend in the cost of doing business for the majority of industries.

TABLE 6-2
Impacts on Cost of Production Relative to Those in the Rest of the U.S.
for Clean Air Benefits and Control Measures

Industry	Clean Air Benefits*		Control Measures		Combined Benefits & Measures*	
	2018	2023	2018	2023	2018	2023
Forestry, Fishing, Other	-0.038%	-0.074%	0.013%	0.007%	-0.025%	-0.068%
Mining	0.045%	0.121%	0.029%	0.018%	0.074%	0.139%
Utilities	0.023%	0.066%	0.057%	0.045%	0.080%	0.112%
Construction	-0.059%	-0.115%	0.238%	0.051%	0.179%	-0.064%
Manufacturing	-0.041%	-0.078%	0.034%	0.021%	-0.008%	-0.057%
Wholesale Trade	-0.047%	-0.087%	0.034%	0.018%	-0.013%	-0.068%
Retail Trade	-0.030%	-0.051%	0.055%	0.032%	0.025%	-0.019%
Transportation and Warehousing	-1.225%	-2.251%	0.054%	0.096%	-1.171%	-2.155%
Information	0.011%	0.034%	0.042%	0.023%	0.052%	0.058%
Finance and Insurance	-0.002%	0.006%	0.049%	0.013%	0.047%	0.019%
Real Estate, Rental, Leasing	0.051%	0.125%	0.124%	0.019%	0.175%	0.143%
Professional and Technical Services	-0.026%	-0.047%	0.038%	0.016%	0.013%	-0.031%
Management of Companies and enterprises	-0.034%	-0.067%	0.034%	0.018%	0.000%	-0.049%
Administrative and Waste Services	-0.031%	-0.057%	0.039%	0.024%	0.008%	-0.034%
Educational Services	-0.029%	-0.057%	0.031%	0.017%	0.002%	-0.040%
Health Care and Social Assistance	-0.035%	-0.071%	0.028%	0.015%	-0.007%	-0.055%
Arts, Entertainment and Recreation	0.000%	0.007%	0.043%	0.024%	0.043%	0.030%
Accommodation and Food Services	-0.020%	-0.033%	0.036%	0.014%	0.016%	-0.019%
Other Services (ex. Government)	-0.017%	-0.025%	0.041%	0.017%	0.024%	-0.008%

*Based on all the TCMs in the 2012 RTP.

Changes in production costs will affect prices of goods produced locally. The relative delivered price of a good is based on its production cost and the transportation cost of delivering the good to where it is consumed or used. The average price of a good at the place of use reflects prices of the good produced locally and imported elsewhere.

Based on the measurement of relative delivered prices in the REMI model, cleaner air is projected to result in lower delivered prices, as shown in Table 6-3. The effect of cleaner air on reducing the production cost in the transportation and warehousing industry is directly transmitted to a lower delivered price in this industry as well (0.96 percent reduction in 2023). Nearly all other industries share the same positive impact, which mirrors the effect of reduction in production cost. As expected, the relative delivered prices will rise as a result of implementing control measures throughout all the industries in the four-county economy. The impact of combined benefits and control measures on the delivered price very much mimics that on the cost of production. The lower cost of production translates to lower delivered prices.

TABLE 6-3
Impacts on Delivered Prices Relative to Those in the Rest of the U.S.
for Clean Air Benefits and Control Measures

Industry	Clean Air Benefits*		Control Measures		Combined Benefits & Measures*	
	2018	2023	2018	2023	2018	2023
Forestry, Fishing, Other	-0.005%	-0.010%	0.003%	0.001%	-0.003%	-0.008%
Mining	0.017%	0.045%	0.011%	0.006%	0.027%	0.051%
Utilities	0.020%	0.058%	0.049%	0.040%	0.070%	0.099%
Construction	-0.056%	-0.110%	0.220%	0.052%	0.164%	-0.058%
Manufacturing	-0.022%	-0.042%	0.018%	0.011%	-0.004%	-0.031%
Wholesale Trade	-0.045%	-0.084%	0.032%	0.018%	-0.013%	-0.066%
Retail Trade	-0.024%	-0.040%	0.044%	0.026%	0.020%	-0.014%
Transportation and Warehousing	-0.657%	-1.236%	0.025%	0.046%	-0.632%	-1.189%
Information	0.003%	0.016%	0.034%	0.016%	0.037%	0.032%
Finance and Insurance	-0.001%	0.005%	0.032%	0.009%	0.031%	0.014%
Real Estate, Rental, Leasing	0.053%	0.128%	0.121%	0.024%	0.174%	0.152%
Professional and Technical Services	-0.024%	-0.044%	0.035%	0.015%	0.011%	-0.029%
Management of Companies and enterprises	-0.021%	-0.040%	0.021%	0.011%	0.001%	-0.029%
Administrative and Waste Services	-0.029%	-0.054%	0.038%	0.024%	0.009%	-0.030%
Educational Services	-0.022%	-0.043%	0.024%	0.013%	0.002%	-0.030%
Health Care and Social Assistance	-0.024%	-0.047%	0.019%	0.011%	-0.004%	-0.037%
Arts, Entertainment and Recreation	-0.003%	0.002%	0.042%	0.019%	0.039%	0.021%
Accommodation and Food Services	-0.016%	-0.027%	0.030%	0.012%	0.014%	-0.015%
Other Services (ex. Government)	-0.013%	-0.018%	0.034%	0.014%	0.021%	-0.004%

*Based on all the TCMs in the 2012 RTP.

IMPORTS AND EXPORTS

Table 6-4 summarizes the overall impact of control measures, benefits, and their combined impacts, respectively, on the region's exports and imports relative to the baseline projections. Cleaner air will increase quality of life for residents, and make the area more attractive to live and more competitive for businesses. As more people migrate to the area, the additional supply of labor would dampen real wage rates, thereby lowering production costs and product prices. As a result, production is projected to rise relative to its baseline condition. Increased production would translate to increases in exports and make the area more self-sufficient, thus able to satisfy the additional demand from local residents and other industries. Part of the demand increase is projected to be fulfilled by increases in imports. The delivered price of products is projected to drop or stay the same.

Implementation of control measures is projected to decrease output (production) in the region as the cost of doing business rises. Demand for additional investments and other goods and services would be satisfied mostly by increases in imports. Demand for goods and services would decline because of the current and carry-over effects of higher product prices resulting from pass-through of additional control costs by affected industries. The

dampened demand would also result in a reduction in imports. Finally, lower production also exerts a negative impact on exports.

The combined benefits and measures are projected to increase demand for products and services as more people are moving into the area. In earlier years, imports would play a bigger role to satisfy the increased demand and there would also be a reduction in exports. As the region adjusts to a larger supply of labor due to migration, output and exports would rise. Overall, the cost of production and the delivered prices would drop or have no change.

It should be noted that the magnitude of all of these directional changes is relatively small when compared with the overall size of the four-county economy. For example, exports are projected to decrease by 0.012 percent of the baseline exports in 2023 resulting from implementing control measures.

TABLE 6-4
Impacts on Imports and Exports for Clean Air Benefits and Control Measures

	Clean Air Benefits**			Control Measures			Benefits & Measures**		
	2014	2023	2030	2014	2023	2030	2014	2023	2030
Demand*	+	+	+	-	-	-	+	+	+
Imports	+	+	+	+	+	+	+	+	+
Self Supply*	+	+	+	-	-	-	-	+	+
Exports	+	+	+	-	-	-	-	+	+
Output (Production)	+	+	+	-	-	-	-	+	+
Delivered Price	-	-	-	-	+	+	-	-	-
Cost of Production	-	-	-	-	+	+	-	-	-

A plus or minus sign means that there is an increase or decrease in the value of that economic variable resulting from benefits, measures, or both of the 2012 AQMP relative to the baseline economic activities.
*Includes changes in demand due to changes in control requirements.
**Based on all the TCMs in the 2012 RTP.

SUMMARY

The Socioeconomic Report examines competitiveness of local industries in four areas: the Basin's share of national jobs, cost of production, relative delivered prices, and exports and imports. These impacts were analyzed based on the congestion relief benefit for all the TCMs in the 2012 RTP. Similar impacts based on the corresponding congestion benefit for the SIP-committed TCMs ($519 million annually) are in Appendix H—TCM Benefit at 2014 Level.

The $PM_{2.5}$ and ozone measures and clean air benefits of the 2012 AQMP are not expected to result in discernible differences in the four-county region's share of national jobs. The impacts on product prices of nearly all the sectors are projected to be less than one percent of their respective baseline indices. The impacts on imports and exports are relatively small as well.

The competitive analysis focuses on the impact on various sectors of the local economy. Individual control measures could result in impacts on individual companies. Competitiveness at the company level will be further considered during individual rulemaking procedures, to the extent feasible.

The actual effects of the 2012 AQMP (including control measures and benefits) on regional competitiveness could deviate from the projected effects. The analysis assumes that air quality in other regions would remain unchanged. This ignores the fact that competing regions tend to follow the District's lead and adopt control measures with objectives similar to those proposed in the District or at a minimum have some level of control with its consequent costs. For example, a number of eastern states have adopted the California vehicle exhaust standards. To the extent that other regions implement similar air quality controls, the competiveness edge that the region is projected to command due to increases in amenity from cleaner air would become smaller since other regions would also incur improvements in air quality.

CHAPTER 7

ASSESSMENT OF CEQA ALTERNATIVES

INTRODUCTION

The California Environmental Quality Act (CEQA) requires that the District propose alternatives to the 2012 AQMP. These alternatives should include realistic measures to attain the basic objectives of the proposed project and provide the means for evaluating the comparative merits of each alternative. The range of alternatives must be sufficient to permit a reasonable choice but need not include every conceivable project alternative. The CEQA Alternatives to the Draft 2012 AQMP are Alternative 1 (No Project, which is the 2007 AQMP), Alternative 2 (Localized PM Control), Alternative 3 (Greater Reliance on NOx Reductions), and Alternative 4 ($PM_{2.5}$ Strategy Only). The Socioeconomic Report herein evaluates those alternatives that meet attainment of the air quality standards.

ALTERNATIVE 1—NO PROJECT (2007 AQMP)

Alternative 1 is continuation of the 2007 AQMP. It is assumed that all the short-term emission reduction targets outlined in the 2007 AQMP have been achieved so far. The only remaining measures to be implemented are the black box measures in the Clean Air Act Section 182(e)(5) and three off-road measures for marine vessel engines, locomotives, and recreational boats, as well as one on-road measure on smog check enhancements. According to the CEQA analysis, Alternative 1 will falls short of attaining the $PM_{2.5}$ standard by 2014.

ALTERNATIVE 2—LOCALIZED PM CONTROL

Mira Loma monitoring station in western Riverside County is the only station that violates the federal 24-hour $PM_{2.5}$ standard in the Basin. This alternative targets sources near the station in hopes of bringing the Basin into compliance. Three $PM_{2.5}$ measures are proposed for this purpose and they would be implemented sequentially and only around the Mira Loma area. Control Measure ONRD-04 (Accelerated Retirement of Older On-road Heavy-duty Vehicles) under the Plan will be implemented first, followed by Control Measure BCM-01 (Residential Wood Burning Devices), and Control Measure BCM-04 (Ammonia from Livestock Waste). Compared to the 2012 AQMP, Alternative 2 also excludes Control Measure BCM-02 (Further Reductions from Opening Burning).

In terms of the socioeconomic analysis herein, the cost of Control Measure BCM-01 under Alternative 2 is assumed to be one-half of that under the Plan as fewer and smaller rounds of media campaigns would be launched to alert residents about the high $PM_{2.5}$ days under Alternative 2. The total cost of ONRD-04 would be the same between the Plan and Alternative 2, but the distribution of the cost among sub-regions would vary. Control Measure ONRD-04 is part of the ozone strategy under the Plan and would be implemented across the District. On the other hand, Control Measure ONRD-04 becomes a $PM_{2.5}$ control measure under Alternative 2 with a more focused implementation surrounding the Mira Loma Station area. There are two phases of implementation for Control Measure BCM-04. Technology assessment is proposed for the first phase under the Plan. The cost of reducing ammonia from livestock is proposed for Phase II under Alternative 2. Implementation of Phase I was assumed to have no costs. The cost of implementing Phase II is projected to be

$2.2 million annually, on average, from 2016 to 2035 and is included in the cost of Alternative 2.

ALTERNATIVE 3—GREATER RELIANCE ON NO_X REDUCTIONS

This alternative relies more heavily on reducing NOx emissions to achieve the $PM_{2.5}$ standard. Since NOx is a precursor to both $PM_{2.5}$ and ozone, greater reductions in NOx emissions would also lead to faster progress toward achieving the ozone standard. Compared to the 2012 AQMP, CEQA Alternative 3 excludes Control Measure BCM-01 (Further Emissions Reductions from Wood Burning Devices), and accelerates the implementation of the CARB's statewide truck and bus regulation from 2014-2022 to 2014-2018 and that of the CARB's in-use off-road diesel vehicle regulation from 2014-2023 to 2014-2018.

ALTERNATIVE 4—$PM_{2.5}$ STRATEGY ONLY

Alternative 4 is the same as the $PM_{2.5}$ strategy portion of the 2012 AQMP, which does not include any ozone measures. Under this alternative, the ozone SIP portion of the 2007 AQMP would not be affected nor would ozone measures be included in the 2012 AQMP.

COMPARISON OF SOCIOECONOMIC IMPACTS

Table 7-1 compares the direct costs, direct air quality benefits related to $PM_{2.5}$ compliance, and job impacts of the Localized PM Control, Greater Reliance on NOx Reductions, and $PM_{2.5}$ Strategy Only Alternatives to the 2012 AQMP. The comparisons were based on the congestion relief benefit for all the TCMs in the 2012 RTP. Comparisons based on the corresponding congestion benefit for the SIP-committed TCMs ($519 million annually) are in Appendix H—TCM Benefit at 2014 Level. Appendix D has a detailed breakdown of annual costs, clean air benefits, and job impacts for the Plan and alternatives. The No Project Alternative will not attain the PM2.5 standard until 2019. As such, the No Project Alternative may not be SIP approvable as it does not attain the standard as expeditiously as practicable. The cost of this alternative includes the cost of the black box and that of some additional ozone measures for compliance with the ozone standard. On the other hand, the 2012 AQMP will meet the $PM_{2.5}$ standard in 2014 and the ozone measures under the 2012 AQMP represent only a partial implementation of the black box. For this reason, the No Project Alternative cannot be meaningfully compared with the 2012 AQMP, as it includes all of the "black box."

TABLE 7-1
Average Annual (2013-2035) Impacts of AQMP and CEQA Alternatives

CEQA Alternatives*	Costs+		PM2.5 Benefits**		Jobs for Combined Costs & Benefits**
	Millions of 2005 Dollars	Jobs	Millions of 2005 Dollars	Jobs	
2012 AQMP	$448	-3,257	$10,670	42,174	37,043
Alt 2—Localized PM Control	450	-3,334	9,526	37,088	32,104
Alt 3—Greater Reliance on NOx Reductions	495	-4,715	11,141	44,408	37,709
Alt 4—$PM_{2.5}$ Strategy Only	$327	-1,620	<$10,670	<42,174	<37,043

*TCM cost = $326 million.

+The cost assessment includes Control Measure CTS-04—Further VOC Reductions from Consumer Products—which has been removed from the Plan.

**Based on all the TCMs in the 2012 RTP.

Except for the $PM_{2.5}$ Strategy Only Alternative, the costs of the 2012 AQMP, and the Localized PM Control and Greater Reliance on NOx Reductions Alternatives reflect both the $PM_{2.5}$ compliance strategy and additional ozone measures for a partial implementation of the black box. The clean air benefit in Table 7-1, on the other hand, results from compliance with the $PM_{2.5}$ standard, which includes measures under the $PM_{2.5}$ strategy and ozone measures listed in Table 7-2.

TABLE 7-2
Ozone Measures Included in the $PM_{2.5}$ Benefit Assessment

Measure No.	Title	Plan	Alternative 2	Alternative 3
CMB-01	RECLAIM-Phase II	X		
CMB-03	Commercial Space Heating [NOx]	X	X	X
CTS-01	Architectural Coatings [VOC]	X	X	X
CTS-02	Misc. Coatings, Adhesives, Solvents & Lubricants [VOC]	X	X	X
CTS-03	Mold Release Products	X	X	X
FUG-02	LPG Transfer & Dispensing--Phase II [VOC]	X	X	X
FUG-03	Fugitive VOC Emissions	X	X	X
OFFRD-01	SOON for Construction & Industrial Equipment [NOx]	X	X	X
OFFRD-02	Freight Locomotives [NOx, PM2.5]	X	X	X
OFFRD-03	Passenger Locomotives [NOx, PM2.5]	X	X	X
A1-ON1	Accelerated CARB Truck & Bus Regulation			X
A1-OFF1	Accelerated CARB Off-road Regulation			X

Both the Localized PM Control and Greater Reliance on NOx Reductions Alternatives have higher costs than the 2012 AQMP and the PM Strategy Only Alternative. The Localized PM Control Alternative has lower benefit than the 2012 AQMP. The $PM_{2.5}$ Strategy Only

Alternative has the lowest cost, but would result in fewer benefits than the 2012 AQMP due to the absence of ozone measures.

The Localized PM Control Alternative is projected to have lower air quality benefits than the 2012 AQMP and the Greater Reliance on NOx Reductions Alternative. Both the Localized PM Control and Greater Reliance on NOx Reductions Alternatives will not meet the federal $PM_{2.5}$ standard until 2017. Although benefits may start to occur prior to 2017, it was assumed that in the analysis herein, benefits would not start until 2017. The Greater Reliance on NOx Reductions Alternative would benefit broader areas than the Plan as NOx is more prevalent than $PM_{2.5}$. Therefore, the Greater Reliance on NOx Reductions Alternative has the highest benefit among all the alternatives. The congestion relief benefit is associated with SCAG's transportation control measures. These measures do not vary by alternative; therefore, the congestion relief benefit is the same among all the alternatives. Table 7-3 shows the distribution of $PM_{2.5}$ compliance benefits for all the alternatives among different benefit categories.

TABLE 7-3
Average Annual Quantified Benefits by Category by Alternative
(millions of 2005 dollars)

CEQA Alternatives	Total*	Health	Visibility	Congestion Relief*	Material
2012 Plan	$10,670	$2,247	$696	$7712	$14
Alt 2—Localized PM Control	9,526	1,370	438	7,712	7
Alt 3—Greater Reliance on NOx Reductions	11,141	2,430	988	7,712	11
Alt 4—$PM_{2.5}$ Strategy Only	<$10,670	<$2,247	<$696	$7,712	<$14

*Based on all the TCMs in the 2012 RTP. The sum of individuals may not equal to the total due to rounding.

SUMMARY

The socioeconomic analysis can affect the selection of alternatives to the proposed Plan as identified in the Environmental Assessment for the 2012 AQMP. In considering whether to adopt the Plan or one of the alternatives, the District Governing Board will seek the best balance of greatest socioeconomic and environmental benefits and least adverse environmental and socioeconomic impacts, while meeting all legal requirements and attaining the NAAQS as expeditiously as practicable.

The No Project Alternative, which is the 2007 AQMP, cannot be meaningfully compared with the Plan since the No Project Alternative would not comply with the $PM_{2.5}$ standard until 2019 and is designed for the compliance of the ozone standard as well while the Plan would comply with the $PM_{2.5}$ standard in 2014 and implement part of the black box.

The comparisons among all the alternatives were based on the congestion relief benefit for all the TCMs in the 2012 RTP. Comparisons based on the corresponding congestion benefit for the SIP-committed TCMs ($519 million annually) are in Appendix H—TCM Benefit at

2014 Level. The Localized PM Control and Greater Reliance on NOx Reductions Alternatives would not comply with the $PM_{2.5}$ standard until 2017. Although the Plan has a higher cost than the $PM_{2.5}$ strategy Only Alternative, the Plan would have higher benefits due to the co-benefit from the ozone measures.

CHAPTER 8

RECENT REFINEMENTS, UNCERTAINTY, AND FUTURE ACTIONS

Introduction

Recent Refinements

Uncertainty and Caveats

Future Enhancements

INTRODUCTION

The District's socioeconomic analysis has evolved over the years. The Socioeconomic Report for the 2012 AQMP identified key areas for recent refinements. Despite the use of a variety of tools and the inclusion of these refinements in assessing the socioeconomic impacts of the 2012 AQMP, the socioeconomic analysis herein could not address all issues. The assessment of some of these issues requires linking information from multiple fields and using data that is currently unavailable. Overcoming these constraints will require interdisciplinary research, data collection, and a combination of approaches. The District plans to continue to work with the Scientific, Technical and Modeling Peer Review Advisory Group (STMPRAG) and other interested parties to improve its socioeconomic analysis.

Issues that are not addressed in the 2012 AQMP socioeconomic report will be pursued for future AQMP revisions. Described below are recent refinements, uncertainty of the current analysis, and recommended actions for the future.

RECENT REFINEMENTS

Recent refinements to the socioeconomic analysis cover the following areas: benefits and costs of clean air, distributional impacts on sub-regions and industries, and impacts on local competitiveness.

Benefits of Clean Air

The Socioeconomic Report for the 2012 AQMP further refines health benefit assessments for $PM_{2.5}$ through the use of BenMAP. Concentration-response relationships between health effects and $PM_{2.5}$ from recent literature were selected. The adult mortality estimate was based on a study for the Los Angeles Metro Area (Krewski et al., 2009). Compared to the 2007 AQMP, the chronic bronchitis effect of $PM_{2.5}$ was dropped from the analysis while asthma attacks were added. Sensitivity tests were performed to examine adult mortality resulting from $PM_{2.5}$ exposure relative to the federal standard (threshold) as opposed to no concentration (no threshold). More recent research (Kochi et al., 2006) was used for the value of a statistical life. Multiple health functions were employed for a single health effect to arrive at a range of avoided cases and associated monetary values. The health effect of non-fatal heart attacks was expanded from a single study (Peters et al., 2001) in the 2007 AQMP to also include four newer studies.

Distributional Impacts

A finer sub-region geography is used for the cost and benefit analysis herein. The four-county area is now divided into 21 sub-regions. The eastern part of Los Angeles County is split into the east and west San Gabriel Valley. Riverside and San Bernardino Counties now have three sub-regions each to reflect increased economic activities in new developments. Catalina Island is merged with the southwestern beach community in Los Angeles County. The refined geography allows for more detailed analysis of impacts at the community level.

The American Community Survey (ACS) 5-year estimates at the census tract level provide an important pillar for many segments in the analysis herein. Data on race and ethnicity of population presents an important backdrop of the current economy on which the analysis is based upon. Information on households, educational attainment, income, and housing costs was essential for the assessment of visibility and material benefits.

UNCERTAINTY AND CAVEATS

As with any complex analysis, some uncertainty is inherent in the methodology employed. Consequently, caveats need to be applied in interpreting the results. The key areas of uncertainty and caveats in this socioeconomic assessment are in estimating emission reductions, costs, air quality changes, and health benefits, among others.

Data

The cost analysis includes $PM_{2.5}$ and ozone control measures. The former are for the demonstration of meeting the $PM_{2.5}$ federal standard in 2014 and the latter show an interim progress toward meeting the ozone standard.

The projected costs of control measures could differ from the actual costs due to advancement of innovative technologies and unexpected modifications to existing plant structure to accommodate control devices. In the past, the District has worked with the CARB to examine actual costs during rule implementation. On the other hand, achieving the final increment towards attainment might result in higher costs as suggested by the STMPRAG.

The benefit analysis focused on reductions in exposure to $PM_{2.5}$. The co-benefits from reductions in ozone and nitrogen dioxides are not included. As such, the benefit assessment may be underestimated. The health benefit analysis in this report is limited by the availability of health studies that quantify health effects associated with exposure to various pollutants and their economic valuation. Not all the known adverse health effects caused by air pollution have been quantified. Similarly, not all other clean air benefits such as congestion relief related to personal trips are quantifiable at this time.

Exposure estimates are based on extrapolations to census boundaries. There is uncertainty in how well this captures actual population exposure.

There are several health effect estimates of dose-response functions in the literature for a given health effect. There are uncertainties and variability in these estimates. For example, the premature mortality estimate used in this analysis was taken from a study conducted in Southern California. Using the mortality function from this study gives estimates of premature mortality that are somewhat higher than those based on national multi-city studies.

The rapidly-changing structure of population and workforce in the four-county area makes uncertain the projection of distribution of job impacts in the long run.

Air Quality Models

Air quality modeling used the most current estimates of emissions, prognostic meteorological models, multilayered dispersion platforms (i.e., CMAQ), and sophisticated chemistry modules. Chapter 1 of Appendix V of the 2012 AQMP provides a summary of the impacts of uncertainty for the various inputs and models used in an air quality simulation. The key areas of uncertainty impacting the estimation of future year health benefits arise from emission estimates, model layer structure, boundary specifications, and dispersion assumptions.

REMI Model

The REMI model, which was used to analyze the impacts of the 2012 AQMP, projects possible impacts on jobs, distribution of jobs, income, cost of production, relative delivered prices, exports, and imports based upon cost data for control measures and the benefit data for each effect of clean air. The projections are based on national and local statistics for a cluster of economic actors such as industries and population by age and cohort. These statistics reflect the net changes of all the events on these actors and cannot be segregated into gross changes of individual events.

Due to data limitations the REMI analysis herein does not include permit costs associated with control devices and other costs that may be more applicable to individual facilities. During rule development more detailed industry- or facility-specific socioeconomic analysis will be performed to the extent feasible before the District or CARB adopts a regulation.

Because of cleaner air, economic migrants are willing to move into the Basin in exchange for lower earnings (wage and salary) than otherwise. Currently, there is no systematic approach to evaluating migration of retired persons as they do not belong to the labor force. Therefore, their willingness-to-pay (and non-wage generated income stream) for avoided morbidity and mortality is not accounted for in the migration functions that were used only for economic migrants in the labor force.

The actual effects of the 2012 AQMP on regional competitiveness could deviate from the projected effects of quantified measures and benefits since the analysis assumes that all control costs are "extra" costs when compared to air pollution control costs in other regions, and underestimates the clean air benefits that would increase regional attractiveness. This ignores the fact that competing regions often adopt control measures similar to the District's or at least impose some level of control with additional costs.

FUTURE ENHANCEMENTS

Previous AQMPs have identified actions that would further enhance the ability to quantify and evaluate the benefits and costs of the proposed Plan. This Socioeconomic Report has accomplished several of these actions and identified others for future assessments. Enhancements to this Socioeconomic Report include finer geography for more detailed assessments of distributional impacts, incorporation of new concentration and response health functions for a range of health effects, and greater use of the ACS 5-year estimates from the U.S. Census Bureau.

The following enhancements are recommended for future AQMPs:

- Conduct a review of the District's socioeconomic analysis to update methods and approaches, as appropriate;
- Quantification of uncertainty through sensitivity analysis and/or probabilistic confidence intervals;
- Include the value of a statistical life (VSL) related to health risks in future years of an individual's life and illness-specific VSLs;
- Incorporate health benefits resulting from reductions in air toxic pollutants such as diesel particulates;
- Expand sub-regional analyses to include environmental justice (EJ) areas. These areas may be classified by income or race;
- Evaluate potential social ramifications of migration and job losses;
- Analyze the impact of highly polluted areas on property values and rents and the ensuing impacts on the concentration of lower-income households;
- Perform a periodic assessment of projections relative to reality to track the performance of various models that are used for socioeconomic analyses; and
- Explore scenarios where other regions may adopt controls similar to AQMD's for the competitive analysis.

Furthermore, future enhancements to health benefit assessments would include the impact of exposure to pollutants on life expectancy, differential impacts on various segments of the population, and identification of significant pollutant thresholds.

The socioeconomic analysis will continue to evolve to reflect changes in regulatory structure such as greater reliance on incentive programs and public financing strategy. Building a time series database would enhance the assessment on specific segments of an industry, facilitate the alignment with published governmental statistics, and strengthen the analysis on competitiveness impacts. To this end, future efforts may include the use of different databases to track existing facilities and new facilities, review of inspectors' reports for annotated information on firm turnover and closure, and identification of start-up companies in high tech disciplines.

APPENDIX A

ASSESSMENT METHODOLOGY

Introduction

Costs

Benefits

Other Socioeconomic Impacts

INTRODUCTION

The socioeconomic assessment of the 2012 AQMP is divided into three segments: costs, benefits, and employment and other impacts. The following describes how each segment is assessed.

COSTS

Table A-1 lists the 33 stationary and mobile measures in the 2012 AQMP for $PM_{2.5}$ and ozone strategies, respectively, as well as the average annual costs of each control measure. There are nine $PM_{2.5}$ measures and another 24 ozone measures. Six $PM_{2.5}$ measures were quantified with costs. The remaining $PM_{2.5}$ measures are ongoing programs with no additional projected costs. Two ongoing $PM_{2.5}$ measures are also ozone measures. There is another incentive measure for stationary sources under the ozone strategy. All the mobile measures are voluntary and incentive programs, most of which are quantified. .

TABLE A-1
2012 AQMP Control Measures

Measure No.	Control Measure Title	Average Annual[+]	No Cost Data[**]
$PM_{2.5}$ MEASURES			
BCM-01	Further Reductions from Residential Wood Burning Devices [PM2.5]	$0.123	
BCM-02	Further Reductions from Open Burning [PM2.5]	$0	
BCM-03	Emission Reductions from Under-Fired Charbroilers [PM2.5]	$0	
BCM-04	Further Ammonia Reductions from Livestock Waste [NH3]	$0	
CMB-01[*]	Further NOx Reductions from RECLAIM [NOx] –Phase I	$0	
EDU-01	Further Criteria Pollutant Reductions from Education, Outreach and Incentives [All Pollutants]		X
IND -01	Backstop Measures for Indirect Sources of Emissions from Ports and Port-Related Sources [NOx, SOx, PM2.5]		X
MCS-01	Application of All Feasible Measures Assessment [All Pollutants]		X
SCAG TCM	Transportation Control Measures	$326.435	
OZONE MEASURES			
Stationary			
CMB-01[#]	Further NOx Reductions from RECLAIM [NOx] – Phase II	$10.126	
CMB-02	NOx Reductions from Biogas Flares [NOx]	$1.966	
CMB-03	Reductions from Commercial Space Heating [NOx] -- Phase II	$1.848	
CTS-01	Further VOC Reductions from Architectural Coatings (R1113) [VOC]	$7.702	
CTS-02	Further Emission Reduction from Miscellaneous Coatings, Adhesives, Solvents and Lubricants [VOC]	$5.013	
CTS-03	Further VOC Reductions from Mold Release Products [VOC]	$2.958	
CTS-04[%]	Further VOC Reductions from Consumer Products [VOC]	$2.282	

TABLE A-1 (Continued)

Measure No.	Control Measure Title	Cost Data Available*	No Cost Data**
EDU-01	Further Criteria Pollutant Reductions from Education, Outreach and Incentives [All Pollutants]		X
FUG-01	Further VOC Reductions from Vacuum Trucks [VOC]	$1.678	
FUG-02	Emission Reduction from LPG Transfer and Dispensing [VOC] – Phase II	$1.497	
FUG-03	Further VOC Reductions from Fugitive VOC Emissions [VOC]	$2.417	
INC-01	Economic Incentive Programs to Adopt Zero and Near-Zero Technologies [NOx]		X
INC-02	Expedited Permitting and CEQA Preparation Facilitating the Manufacturing of Zero and Near-Zero Technologies [All Pollutants]		X
MCS-01	Application of All Feasible Measures Assessment [All Pollutants]		X
MCS-02	Further Emission Reductions from Green Waste Processing [VOC]	$2.107	
MCS-03	Improved Start-up, Shutdown and Turnaround Procedures [All Pollutants]	$0.001	
Mobile[&]			
ONRD-01	Accelerated Penetration of Partial Zero-Emission and Zero Emission Vehicles [VOC, NOx, PM]	-$0.940	
ONRD-02	Accelerated Retirement of Older Light- and Medium-Duty Vehicles [VOC, NOx, PM]	$2.113	
ONRD-03	Accelerated Penetration of Partial Zero-Emission and Zero-Emission Light-Heavy- and Medium-Heavy-Duty Vehicles [NOx, PM]	$43.773	
ONRD-04	Accelerated Retirement of Older On-Road Heavy-Duty Vehicles [NOx, PM]	$15.678	
ONRD-05[**]	Further Emission Reductions from Heavy-Duty Vehicles Serving Near-Dock Railyards [NOx, PM]		X
OFFRD-01	Extension of the SOON Provision for Construction/Industrial Equipment [NOx]	$14.023	
OFFRD-02	Further Emission Reductions from Freight Locomotives [NOx, PM]		X
OFFRD-03	Further Emission Reductions from Passenger Locomotives [NOx, PM]	$7.354	
OFFRD-04	Further Emission Reductions from Ocean-Going Marine Vessels While at Berth [NOx, PM]		X
OFFRD-05	Emission Reductions from Ocean-Going Marine Vessels [NOx]		X

*Millions of 2005 dollars (2013-2035).
*Based on average RTC trading price of $7,950/ton/day in 2011. Impacts on sellers and buyers are analyzed in REMI.
#BARCT costs are applied to Phase I and II for three tons per day reductions.
&All measures are voluntary/incentive programs.
%The cost assessment in the Socioeconomic Report includes CTS-04. However, it has been removed from the Plan.
**Please refer to Table 6-4 in the 2012 AQMP and respective measures in appendices IV (A) and IV (B) to the 2012 AQMP for additional information on measures without cost data.

Cost data have been developed for each of the 20 control measures listed in Table A-1. Direct costs from complying with the requirements of control measures include capital expenditures on control equipment, annual operating and maintenance costs for the equipment, costs of low-polluting (e.g., reformulated) materials, and potential savings related to new requirements. Investments in transportation projects, their annual operating and maintenance costs, and public funding from various sources such as gasoline and sales taxes are also included. Capital costs are annualized based on a 4 percent real interest rate and the economic life of the equipment or project. Costs from each measure are allocated to the 21sub-region geography depicted in

Figure A-1 based on emission reductions at a point source or gridded emission reductions (with each grid measured by 16 square kilometers) aggregated to the sub-region level.

FIGURE A-1
21 Sub-region Geography

Cost estimates for SCAG transportation control measures were provided by SCAG. Assumptions from CARB current regulations were used for cost quantification of mobile source measures. Control cost estimates for all other measures were based on information from equipment vendors, raw material manufacturers, and affected industries.

BENEFITS

Better air quality will reduce adverse impacts to human health and building materials, and improve visibility. Some of these effects can be measured and are quantified in monetary terms relative to the baseline "no additional control" scenario for key benchmark years.

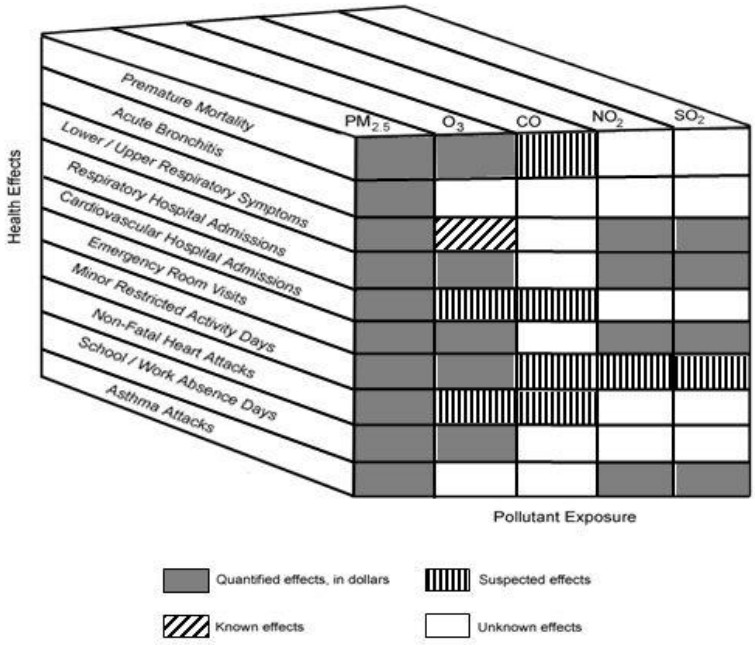
Quantifiable Benefits

The benefits of better air quality in terms of improved human health, reduced damage to building materials, and improved visibility were estimated based on previously published studies. Transportation control measures would improve traffic flow, resulting in reductions in vehicle miles and hours travelled.

Health

Based on numerous published epidemiology studies, observed health effects have been linked with the exposure to ambient $PM_{2.5,}$ ozone, and NO_2. Epidemiology studies use data on the reported incidence of disease and attempt to discern an association with the concentration of ambient air pollutants measured at the time. Figure A-2 shows the correspondence between pollutants and adverse health effects. The greater breadth of the recent epidemiology literature allows for a refined characterization health effects than was possible in the past. A new concentration-response relationship between asthma attacks and $PM_{2.5}$ has been established. There have also been additional $PM_{2.5}$ mortality studies specific to the Los Angeles area since the 2007 AQMP.

FIGURE A-2
Health Effects of Criteria Pollutants



The health benefit analysis was performed via the U.S. EPA approved BenMAP model (Version 4.0.52), which is an integration of air quality data, epidemiological studies, population and demographic data, and valuation of health effects. The modeling results from the CMAQ Model (Community Multiscale Air Quality Model) were used to show the ambient concentration changes of $PM_{2.5}$ from implementation of $PM_{2.5}$ and ozone measures (see Appendix V of the 2012 AQMP). The CMAQ model projects air quality improvements at each grid cell from implementing the 2012 AQMP as compared to the baseline conditions absent such additional control. To estimate health benefits, the results from the CMAQ model were fed into the BenMAP model. The BenMAP model then calculates the increased or decreased exposure of the four-county area's population to $PM_{2.5}$ from

the 2012 AQMP, compared to baseline projections of these pollutants. These comparisons were made for the years 2014 and 2023 for $PM_{2.5}$, using projected population by age cohort and gender from REMI (adjusted to the SCAG forecast) for 18 sub-regions and demographic distributions between 16 square kilometer grids and census tracts based on the 2010 Census. The projected change in exposure to $PM_{2.5}$ brought about by implementing the 2012 AQMP was then used in the concentration-response functions for changes in specific health effects, including mortality. Finally, dollar values in terms of willingness to pay to avoid a health effect or cost of treating an illness were used to estimate monetary value for health effects. It was assumed that future years beyond 2023 would have the same health benefits as 2023.

It should be noted that reductions in $PM_{2.5}$ and NOx from control measures would reduce exposure to ozone and NO_2 related health effects.

Visibility

The benefits associated with improved visibility were estimated by using a percentage of the public's willingness to pay for improved visibility as determined through housing prices (Beron et al., 2001). The Beron et al. study was conducted at the census tract level and based on matching housing sales data with air quality data and neighborhood statistics in the 2000 Census in the four-county area. The average willingness to pay per household for visibility improvements reflects the household income net of housing cost, education, and visibility improvements in each tract.

For the 2012 AQMP, the willingness to pay for visibility improvement was calculated at the sub-county region level for the benchmark years 2014, 2023, 2030, and 2035. The empirical visibility models developed for four locations (Rubidoux, Long Beach, Ontario, and Burbank) in the Basin for the 1991 AQMP were used to estimate future year visibility for the 21 sub-regions. Empirical equations that relate visibility to concentrations of visibility reducing particulate chemical species were used. To estimate future year visibility for each sub-region, average sub-regional chemical species concentrations were calculated for sulfate, nitrate, organic and elemental carbon, respectively. The chemical species concentrations for future year base and control scenarios were taken from the results of the CMAQ modeling analysis. The visibility data at the sub-region level for 2014, 2023, and 2030 was developed by summing the multiplication of the predicted $PM_{2.5}$ concentration at each grid by the total light extinction coefficient (in $10^{-4}m^{-1}$) at the nearest airport for that grid across all the grids within a sub-region. The 2035 visibility data was assumed to be the same as the 2030 visibility data. The trend in household income and education between the American Community Survey (ACS) 2005-2009 estimates at the sub-region level was used to develop the values for these two variables for 2014, 2023, 2030, and 2035.[1] The projected number of households at the county level from the SCAG forecast was distributed to sub-regions according to

[1] If the growth rates are negative in a given sub-region between the two periods of ACS estimates, respective county weighted averages were used for trend projections.

the 2006-2010 ACS household counts for each sub-region to calculate the total willingness to pay for each sub-region.

The public's willingness to pay as determined through housing prices reflects the value of many benefits including improved health and reduced damage to materials and property as well as improved visibility. In an effort to avoid the double counting of those other benefits and account for the visibility aesthetics only, this analysis attributes only 45 percent of the total willingness to pay factor to visibility. The determination to use a 45 percent factor was based upon a 1994 study prepared by Loehman et al.

Materials

The material benefit assessment was made at the county level and allocated to sub-regions based on the proportions of household counts in various sub-regions in the ACS 2006-2010 estimate. $PM_{2.5}$ concentration data for 2014, 2023, and 2030 at seven locations was used to estimate the decreased costs of repainting wood and stucco (Murray et al., 1985) and cleaning indoor surfaces (Cummings et al., 1985). It was assumed that the 2035 PM2.5 concentrations at these stations would be the same as those in 2030. The 4.81 ratio of the total suspended particulate matter (TSP) to PM2.5 was used to convert PM2.5 to TSP, which was used in the original material benefit assessment by Murray et al. (1985). Reductions in cleaning and repainting costs were assessed for the benchmark years 2014, 2023, 2030, and 2035 based on the projected households that were converted to housing units via the ratio of the two in the ACS 2006-2010 estimate at the county level. Results for interim years were interpolated.

Traffic Congestion Relief

Congestion reduces operating speeds of vehicles, thus resulting in travel delays and increased shipping and storage costs for businesses. Congestion also prevents vehicles from operating under their optimum conditions and thereby increases the operating and maintenance costs of vehicles. Using various studies on congestion costs (SCAG 2004 and Association of Bay Area Governments 2002) and potential reductions in VMT and VHT, congestion benefits in the form of reduced vehicle operating and maintenance expenditures and value of lost time due to the 2007 AQMP were assessed at the sub-region level. Data on reductions in VMT and VHT were provided by SCAG.

Unquantifiable Benefits

Full quantification of health effects is hindered by the lack of known quantitative relationships between pollutant concentrations and the incidence of health effects. In some cases, these quantitative relationships may be known, but the air quality data needed to perform the calculations may be uncertain.

Further establishment of relationships between poor air quality and its damage, as well as the measurement of damage, is key to quantifying the benefits from improved air quality in the areas of plant life, livestock, building materials, and human health effects. Inadequate data does not allow full assessments to be made at this time. Benefit assessments which incorporate only quantified benefits significantly underestimate the total benefits as a result of implementing the 2012 AQMP.

OTHER SOCIOECONOMIC IMPACTS

The four-county economy will be affected as control measures in the 2012 AQMP are implemented, industries spend resources to comply with new requirements, and transportation infrastructure is built. Implementation of the 2012 AQMP could lead to differential impacts on industries at different times.

REMI Model

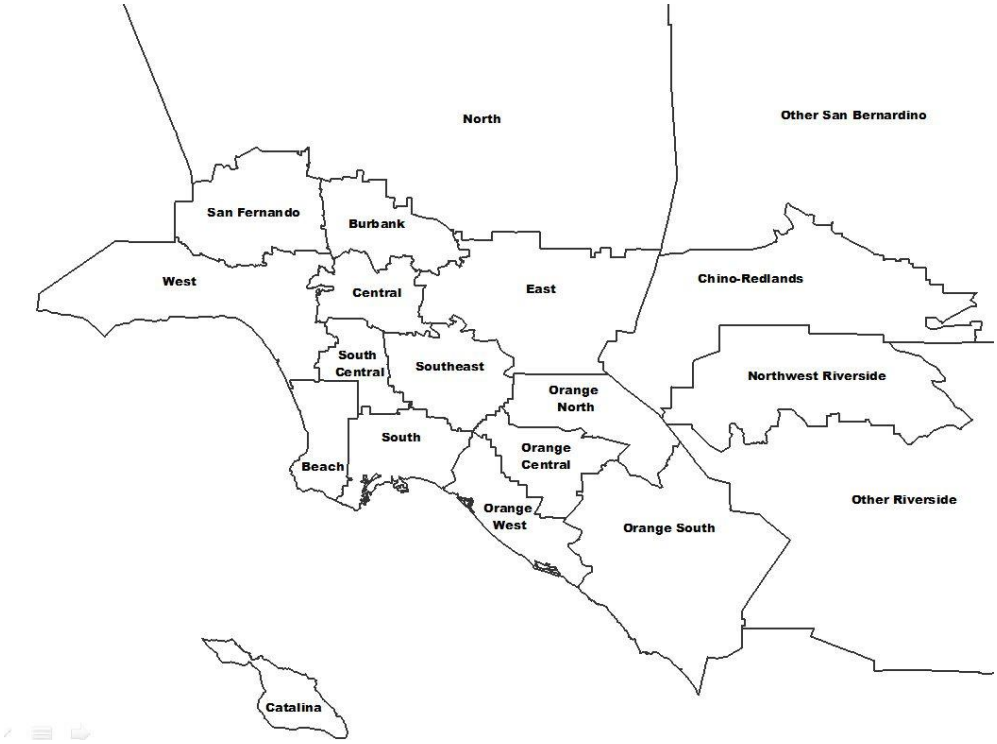
District staff relies on the REMI (Regional Economic Models, Inc.) model to estimate potential employment impacts and other socioeconomic impacts (e.g., product prices, cost of production, and income) of quantified measures and benefits. The REMI model is widely used by the U.S. EPA, CARB, SCAG, other state and local agencies, academicians, and consultants. The REMI model incorporates state-of-the-art modeling techniques and the most recent economic data. The REMI model has been independently evaluated and found to be "technically sound" by the Massachusetts Institute of Technology (Polenske et al., 1992).

The REMI model is built on published data from 1969 to the present with econometrically estimated parameters and can be used to simulate the impact of public policies on the economy of Los Angeles, Orange, Riverside, and San Bernardino Counties. The REMI model allows an assessment of the economic impacts that a policy (such as an AQMP revision or a proposed rule) may cause to each sub-region economy (Figure A-3) for 70 private and public sectors which correspond to three-digit NAICS codes in most cases. The REMI model for the 2012 AQMP combines the San Gabriel Valley East and West into one sub-region, and the San Bernardino City and San Bernardino Southwest areas into another sub-region. The Riverside Southwest and other Riverside areas are combined into one sub-region. Economic impacts include those on jobs, costs of inputs in the production process, personal income, gross regional product, and product prices. A detailed description of the REMI model is provided in Appendix B—The REMI Model.

Impact analyses in the REMI model follow a two-step process. First, the national economic projection provided by the Bureau of Labor Statistics (BLS) is used to determine the local baseline economic forecast without any policy change. Second, the direct costs and benefits of a policy are input to the REMI model to generate an alternative forecast for the local economy with the policy. The difference between the baseline and alternative forecasts gives the total effects of the policy. The

baseline forecast is recalibrated to ensure consistency with SCAG's population and employment forecasts. Appendix C—Adjustment of the REMI Control Forecast—provides a detailed description of the recalibration process.

FIGURE A-3
Analysis Domain



The assessment of job and other socioeconomic impacts was performed for all control measures under the PM2.5 and ozone strategies, clean air benefits, and PM2.5 control measures and associated clean air benefits, respectively.

Input to REMI

To estimate employment impacts from quantified measures, direct costs associated with each of the control measures were utilized as inputs into the model. Implementation costs of measures were distributed in two ways. First, they were distributed to the regulated industries based on the proportion of emission reductions of these industries by geographic location, as proposed in the 2012 AQMP. These costs are the additional cost of doing business. Second, these costs are additional sales to industries which supply necessary equipment and services. These sales were assumed to occur where the regulated industries are or where emission reductions

would take place. The analysis is performed from the implementation year of a control measure to the year 2035.

In addition to the categories already described, a number of benefits from clean air were quantified and input into the REMI model. These benefits are estimated for those benchmark years when air quality data was available. To provide continuous forecast estimates, estimates for years between benchmark years were interpolated linearly. Quantifiable benefits include improved visibility, reduced damage to materials and health, and relief from traffic congestion. Visibility improvements and reductions in mortality and morbidity in terms of the willingness to pay and the present value of the future income stream were translated into additional amenities to the four-county area via the migration equation for economic migrants age 65 and below. Reductions in morbidity would lead to reduced health care expenditures by the general public and employers (the cost of illness portion only). It was assumed that 60 percent of the reduced expenditures would benefit the employers as a reduction in the cost of doing business and the remaining 40 percent would flow back to the economy in the form of additional spending on all consumption categories. Congestion relief benefits were input as a decrease in the cost of doing business for the trucking and warehousing industry and a decrease in sales for auto repair services. Better traffic flow would result in reduced demand for transportation services. Consumers were assumed to re-spend the savings from vehicle operation and maintenance on all consumer goods. The congestion relief benefit to the owners of light-duty/passenger vehicles and commuters and the material benefit accrued to residents were translated into additional amenity benefits.

Output from REMI

To assess the impacts on socioeconomic groups, the impacts on product prices identified by the REMI model were overlaid on consumption patterns of various income groups to examine the changes in consumer price indexes of these income groups. The data on consumption patterns are from the Bureau of Labor Statistics' Consumer Expenditure Survey.

To assess the impacts of a policy on the competitiveness of the four-county region, the following factors were evaluated: the region's share of national jobs in those industries whose products are also sold in the national market, the impacts on product prices and cost of production by industry, and the changes in imports and exports. These factors were selected based on a review of effects of past public policies on a region's competitiveness.

APPENDIX B

THE REMI MODEL

Introduction
Framework of the REMI Model
Economic Geography Linkage
Assumptions of the REMI Model
Verification of the Model
Enhancements to the Model

INTRODUCTION

In an effort to expand socioeconomic impact assessments for proposed rules and AQMP revisions, the District has been using a computerized economic model from Regional Economic Models, Inc. (REMI) to assess the socioeconomic impacts on the four-county economy since 1990. The REMI covers the geographic area within the counties of Los Angeles, Orange, Riverside, and San Bernardino. The structure and assumptions of the model are briefly described below.

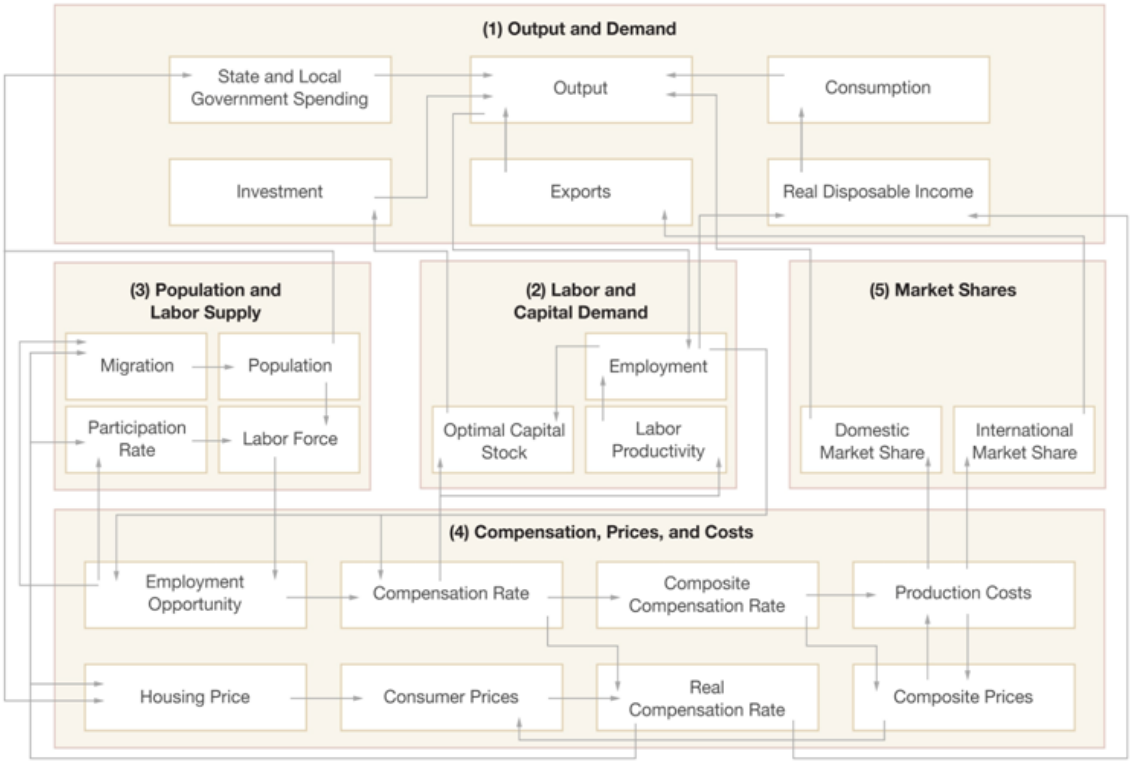
FRAMEWORK OF THE REMI MODEL

The District's REMI model links the economic activities in the counties of Los Angeles, Orange, Riverside, and San Bernardino. The model used for the 2012 AQMP assessment is unique in that each county is further divided to account for the politically, socially, economically, and geographically diversified structure of the Southern California economy. There are 10 sub-county regions in Los Angeles County, four in Orange County, two in Riverside County, and two in San Bernardino County. The divisions of the sub-regions were originally developed in 1996 and have been updated to reflect the 2000 Census.

The REMI model for each sub-region is comprised of a five block structure that includes (1) output and demand, (2) labor and capital, (3) population and labor force, (4) compensation, prices and costs, and (5) market shares. These five blocks are interrelated and the linkages are shown in Figure B-1. Each block is built upon a two-step process. First, producers and consumers throughout all regions of the country are assumed to have similar behavioral characteristics. Because of these similarities, statistical techniques are used to estimate economic responses based on studies performed throughout the U. S. The second step of the modeling process is region specific, and involves calibration of the model based on region-specific historical data.

The standard structure has 66 private non-farm industries (3-digit NAICS), three government sectors and a farm sector, 94 occupations, and 88 final demand sectors. The demographic/migration component captures population changes due to births, deaths, migration, and changes to special population (e.g., prisoners and college students); and has 808 ages/gender/race/ethnicity cohorts. The input-output module contains detailed inter-industry relationships for 403 sectors and is used to assess the detailed inter-industry effect of a policy change. Results from the input-output module are fed through population, price and economic geography equations to produce a complete economic and demographic assessment.

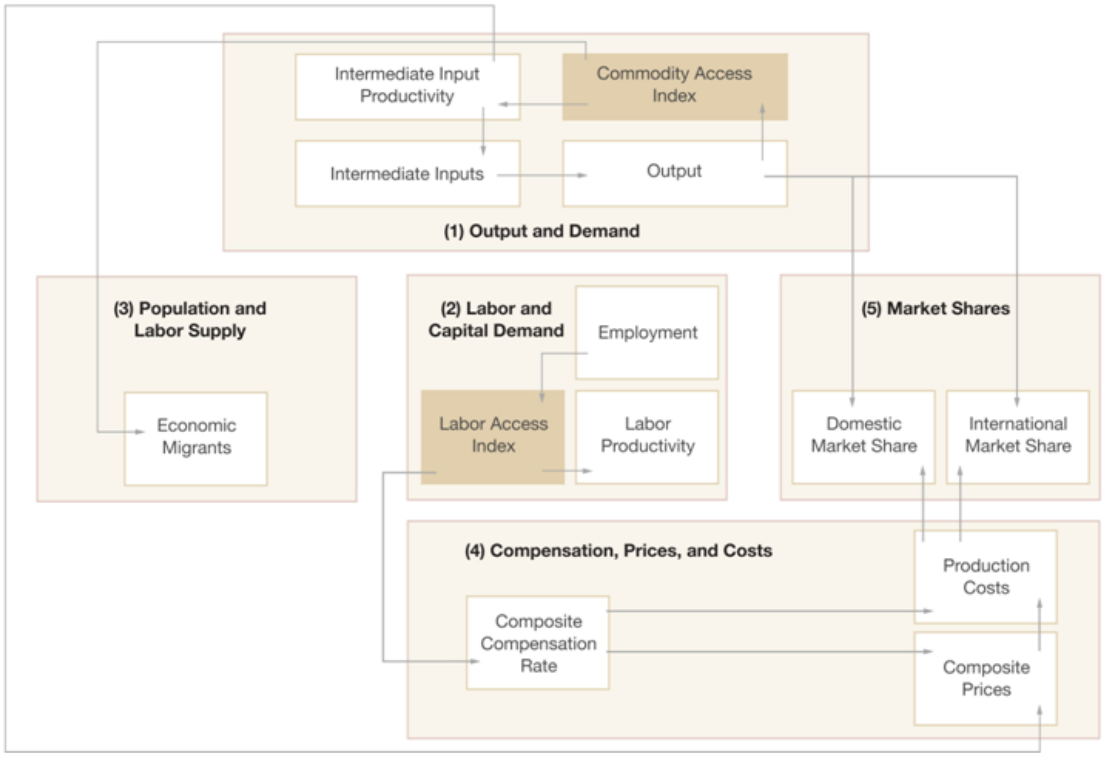
FIGURE B-1
Components of REMI Model



ECONOMIC GEOGRAPHY LINKAGE

The economic geography module (Figure B-2) explains dispersion and agglomeration effects among competing factors in urban and regional economics through two indexes in the model. The commodity index assesses the impact of increased access to intermediate inputs on increased productivity and thus a reduction in production cost. Consumers would benefit as well due to the increased access to goods and services. The labor index captures the positive impact on labor productivity and cost as access to labor with a mix of skills expands. As land price rises and congestion sets in, economic activities tend to disperse.

FIGURE B-2
Economic Geography Linkage



ASSUMPTIONS OF THE REMI MODEL

The REMI model has been built based on well-established economic theory and is updated regularly to incorporate new findings in economic theory and new historical data. Major assumptions behind the REMI model fall into the following three categories: overall, production, and population and labor. The major assumptions behind the REMI model are as follows.

Overall

1. Production costs, such as capital equipment, labor and fuel, are allowed to be substituted based on the changes in relative costs of these inputs to those in the United States. Total production costs are the sum of input costs weighted by their usage.

2. Location of a firm is driven by profitability.

3. All industries sell to both local and national markets. The model calculates the proportions of local demand that an industry can satisfy and its export share. Exports are divided into shipments from one sub-county region to the remaining regions (18 regions altogether) and sales outside of the four counties (Los Angeles, Orange, Riverside, and San Bernardino).

4. The economic geography module accounts for productivity and corresponding price effects due to access to labor and other production inputs. The labor access index (Block 2 in Figure B-2) as well as the nominal wage rate determines the composite wage rate, which, in turn, affects the cost of production along with prices of other inputs. The delivered price of a good or service is based on the cost of the commodity at the production site and the cost of delivering the commodity to the destination place. This price weights the delivered prices from all locations that ship to the home region and is calculated relative to the delivered prices in all other regions.

5. The REMI model consists of exogenous and endogenous economic variables. Values of exogenous variables are determined outside of the model. Exogenous variables are a driving force of change in the regional economy. The resulting changes are reflected in the values of endogenous variables calculated by the model. Therefore, policy changes can be simulated by changing exogenous variables whose values are developed by AQMD staff as input to the REMI model. For example, increases in demand for control equipment due to a rule can be simulated by increasing the sales of the supplier of control equipment. The impact of such a policy change includes changes in employment, among others.

6. There will be two avenues for market expansion. First, as the cost of production decreases, firms become more competitive in the export market and more competitive with imports. Second, markets are assumed to expand as a region's economy grows.

Production

1. Production costs affect regional competitiveness which impacts the shares of local and export markets. As the relative production costs increase, there will be a reduction in the proportion of local demand which can be satisfied locally as imported goods are substituted for local goods.

2. Production levels drive labor demand which interacts with labor supply to determine wage rates. Combined with other production costs, e.g., capital and fuel costs, wages determine relative production costs in the four-county region compared to the rest of the United States.

3. Production levels are determined by the total demand which consists of consumption, investment, government spending, and net exports. Employment is determined by the level of production and labor intensity, i.e., number of employees per unit of production.

4. An increase in demand will increase production by a factor greater than one because of indirect impacts.

Population and Labor

1. There are four types of migrants: international migrants, retired migrants, former military personnel, and economic migrants. These economic migrants are individuals moving to the region for employment opportunities. They respond to both economic and amenity factors.

2. The demographic section of the model predicts the number of births and deaths that occur in the population. Labor supply is derived from the indigenous labor force and potential job migrants.

3. Labor is segmented by occupation as well as by industry. Employment within an industry is translated to occupation level employment through the use of occupational skill requirements by industry.

VERIFICATION OF THE MODEL

The REMI model for the Southern California geography was independently evaluated by the University of Pittsburgh in 1989 to determine its forecasting and simulation capabilities. The model's performance was judged to meet accepted standards of practice (Cassing and Giarratani, 1992).

ENHANCEMENTS TO THE MODEL

The District's socioeconomic assessment process is an evolving one. The assessment has expanded from impacts on directly affected industries to include employment impacts on all industries with the use of the REMI model. In 1992, enhancements were made to the REMI model to allow the assessment of impacts on different income groups and on low- versus high-wage groups.

Using the nationwide median weekly earnings of full-time workers from the 2010 Bureau of Labor Statistics (BLS) Current Population Survey (CPS), 94 occupations in the REMI model were ranked in ascending order of earnings and divided into five equal (quintile) groups. Table B-1 shows how the 94 civilian occupations were ranked.

TABLE B-1
Ranking of Occupational Earnings

Occupation	Median Weekly Earnings	Quintile Group
Other food preparation and serving related workers	$352	1
Entertainment attendants and related workers	$369	1
Cooks and food preparation workers	$391	1
Other transportation workers	$393	1
Agricultural workers	$400	1
Textile, apparel, and furnishings occupations	$401	1
Food and beverage serving workers	$405	1
Fishing and hunting workers	$416	1
Forest, conservation, and logging workers	$416	1
Other personal care and service workers	$419	1
Grounds maintenance workers	$433	1
Building cleaning and pest control workers	$444	1
Funeral service workers	$455	1
Personal appearance workers	$455	1
Nursing, psychiatric, and home health aides	$457	1
Retail sales workers	$470	1
Food processing occupations	$476	1
Material moving occupations	$495	1
Assemblers and fabricators	$517	1
Other healthcare support occupations	$520	2
Helpers, construction trades	$521	2
Supervisors, food preparation and serving workers	$522	2
Other protective service workers	$528	2
Other education, training, and library occupations	$545	2
Animal care and service workers	$572	2
Information and record clerks	$584	2
Woodworkers	$599	2
Water transportation occupations	$599	2
Financial clerks	$601	2
Other production occupations	$601	2
Communications equipment operators	$619	2
Other office and administrative support workers	$621	2
Occupational and physical therapist assistants and aides	$622	2
Supervisors, personal care and service workers	$622	2
Printing occupations	$625	2
Material recording, scheduling, dispatching, and distributing occupations	$635	2
Transportation, tourism, and lodging attendants	$640	2

TABLE B-1 (Continued)

Occupation	Median Weekly Earnings	Quintile Group
Secretaries and administrative assistants	$659	2
Motor vehicle operators	$661	3
Supervisors, building and grounds cleaning and maintenance workers	$664	3
Construction trades and related workers	$675	3
Metal workers and plastic workers	$694	3
Supervisors, farming, fishing, and forestry workers	$719	3
Miscellaneous community and social service specialists	$740	3
Supervisors, transportation and material moving workers	$743	3
Vehicle and mobile equipment mechanics, installers, and repairers	$744	3
Supervisors, sales workers	$749	3
Health technologists and technicians	$757	3
Supervisors, office and administrative support workers	$761	3
Other teachers and instructors	$789	3
Other sales and related workers	$791	3
Supervisors, production workers	$800	3
Counselors, Social workers	$803	3
Legal support workers	$806	3
Life, physical, and social science technicians	$820	3
Other installation, maintenance, and repair occupations	$820	3
Other construction and related workers	$821	4
Media and communication equipment occupations	$848	4
Electrical and electronic equipment mechanics, installers, and repairers	$855	4
Librarians, curators, and archivists	$863	4
Religious workers	$878	4
Plant and system operators	$881	4
Law enforcement workers	$891	4
Drafters, engineering, and mapping technicians	$895	4
Sales representatives, services	$899	4
Art and design occupations	$912	4
Primary, secondary, and special education teachers	$918	4
Entertainers and performers, sports and related occupations	$950	4
Supervisors, construction and extraction workers	$955	4
First-line supervisors/managers, protective service workers	$956	4
Media and communication occupations	$957	4
Sales representatives, wholesale and manufacturing	$958	4
Supervisors of installation, maintenance, and repair workers	$964	4
Life scientists	$968	4
Extraction workers	$996	4

TABLE B-1 (Continued)

Occupation	Median Weekly Earnings	Quintile Group
Business operations specialists	$1,027	5
Fire fighting and prevention workers	$1,044	5
Other healthcare practitioners and technical occupations	$1,078	5
Financial specialists	$1,083	5
Health diagnosing and treating practitioners	$1,092	5
Other management occupations	$1,125	5
Social scientists and related occupations	$1,144	5
Postsecondary teachers	$1,166	5
Architects, surveyors, and cartographers	$1,209	5
Physical scientists	$1,225	5
Rail transportation occupations	$1,234	5
Operations specialties managers	$1,289	5
Computer specialists	$1,289	5
Advertising, marketing, promotions, public relations, and sales managers	$1,300	5
Mathematical science occupations	$1,339	5
Air transportation occupations	$1,365	5
Engineers	$1,381	5
Top executives	$1,621	5
Lawyers, judges, and related workers	$1,729	5

The percentage changes of a policy on each quintile of earnings can thus be reported for occupational wage rate, employment, and wage bill.

The Quarterly Census of Employment and Wages (QCEW), formerly ES-202 data (excluding self-employment), from the BLS for the four-county area provides the average annual wage per worker (full-time and part-time) for the 66 private non-farm industries in the REMI model. By ranking the 66 industries in ascending order of average annual wages per worker, we can divide them into five equal groups, as shown in Table B-2:

TABLE B-2
Ranking of Compensation Rates by Sector

Sector	Average Annual Wages	Quintile Group
Private households	$7,387	1
Real estate	$11,125	1
Forestry and logging; Fishing, hunting, and trapping	$14,882	1
Food services and drinking places	$18,204	1
Personal and laundry services	$19,147	1
Performing arts and spectator sports	$19,239	1
Social assistance	$20,153	1
Agriculture and forestry support activities; Other	$21,058	1
Amusement, gambling, and recreation	$21,730	1
Transit and ground passenger transportation	$23,453	1
Repair and maintenance	$25,242	1
Retail trade	$27,135	1
Administrative and support services	$27,785	1
Accommodation	$30,897	2
Nursing and residential care facilities	$31,614	2
Oil and gas extraction	$32,075	2
Museums, historical sites, zoos, and parks	$34,177	2
Educational services	$34,490	2
Rental and leasing services; Lessors of nonfinancial intangible assets	$35,172	2
Membership associations and organizations	$37,384	2
Leather and allied product manufacturing	$37,914	2
Truck transportation; Couriers and messengers	$37,931	2
Construction	$39,803	2
Apparel manufacturing	$40,176	2
Warehousing and storage	$41,030	2
Textile product mills	$42,795	2
Furniture and related product manufacturing	$42,883	3
Wood product manufacturing	$43,528	3
Food manufacturing	$47,928	3
Textile mills	$48,014	3
Printing and related support activities	$48,941	3
Scenic and sightseeing transportation; support activities	$50,252	3
Securities, commodity contracts, investments	$51,548	3
Ambulatory health care services	$53,143	3
Waste management and remediation services	$54,920	3
Professional and technical services	$56,553	3
Plastics and rubber products manufacturing	$56,879	3

TABLE B-2 (Continued)

Sector	Average Annual Wages	Quintile Group
Fabricated metal product manufacturing	$57,869	3
Motion picture and sound recording industries	$59,544	3
Nonmetallic mineral product manufacturing	$60,007	4
Monetary authorities	$61,682	4
Hospitals	$63,453	4
Miscellaneous manufacturing	$64,847	4
Wholesale trade	$66,672	4
Insurance carriers and related activities	$66,838	4
Mining (except oil and gas)	$68,291	4
Machinery manufacturing	$70,295	4
Support activities for mining	$71,093	4
Beverage and tobacco product manufacturing	$72,929	4
Paper manufacturing	$73,520	4
Primary metal manufacturing	$73,525	4
Broadcasting, except Internet; Telecommunications	$75,030	4
Electrical equipment and appliance manufacturing	$75,388	5
Air transportation	$76,238	5
Publishing industries, except Internet	$76,806	5
Motor vehicle manufacturing	$77,869	5
Internet services and data processing; Other information services	$79,517	5
Water transportation	$80,369	5
Transportation equipment mfg. excl. motor vehicles	$94,053	5
Rail transportation	$100,255	5
Chemical manufacturing	$103,237	5
Computer and electronic product manufacturing	$104,116	5
Management of companies and enterprises	$108,279	5
Utilities	$111,659	5
Pipeline transportation	$115,724	5
Petroleum and coal products manufacturing	$151,997	5

The percentage change in employment, wage bill, and wage rate resulting from a policy can thus be reported for each quintile of wages, by sector.

The 2010 Consumer Expenditure Survey (CEX), published by the BLS, provides a continuous flow of information on the buying habits of American households. The CEX reports average annual expenditures and characteristics of households by income group. There are five income groups: from the households earning the top 20 percent of income to those earning the bottom 20 percent of income.

By linking consumption expenditures in the REMI model with spending patterns of the eight income groups in the CEX, we can then develop a composite price change for consumer goods for each income group.

In 1996, the REMI model for the South Coast economy had expanded from a county-based model with four counties to a sub-county model with 19 sub-county regions as Los Angeles and Orange Counties have grown denser and Riverside and San Bernardino Counties have sprawled to accommodate economic migrants. Catalina Island had since been merged with the Los Angeles Beach sub-region. The resulting 18 sub-region geography provided opportunities for the integration of economic and air quality data, resulting in a more balanced outlook of socioeconomic impacts of public policy.

APPENDIX C

ADJUSTMENT OF THE REMI CONTROL FORECAST

The 2012 AQMP uses SCAG's forecasts on population, employment, and other economic variables for future emission projections (Health and Safety Code Section 40460). The REMI model is used in the AQMP to generate a baseline forecast from which the effects of a policy are evaluated. The REMI and SCAG forecasts use different data inputs and assumptions.

The REMI model uses employment data published by the Bureau of Economic Analysis (BEA) while SCAG uses data published by the Bureau of Labor Statistics (BLS). Employment statistics released by the BLS and BEA differ because they contain different data sources and estimation procedures. BLS employment statistics are the product of the Quarterly Census of Employment and Wages (QCEW) Program, which is based on workers covered by the state unemployment insurance (UI) and unemployment compensation for federal employees (UCFE). The BEA data includes more complete coverage of employees who are not covered by the UI and UCFE and uses additional data sources to estimate employment in the farm sector, private households, private elementary and secondary schools, non-profit organizations, and so on. The BEA data is also adjusted to account for misreporting under the UI and UCFE. The BEA data include federal military jobs and a much higher estimate of the self-employed than the BLS data. The self-employed are embedded in the estimates of sectoral employment in the BEA but are listed separately from the sectoral employment in the BLS.

An audit of the District's socioeconomic analysis methods by Massachusetts Institute of Technology recommended further evaluation of the inconsistency between the REMI and SCAG forecasts (Polenske et al., 1992). The District and SCAG commissioned the Center for the Continuing Study of the California Economy (CCSCE, 1994) to determine the sources of inconsistency between these forecasts. The CCSCE recommended a three-step process to ensure consistency between REMI and SCAG forecasts:

- REMI and SCAG should use the same U.S. projections for population and employment;
- REMI and SCAG should use the same birth rates by age cohort; and
- REMI and SCAG models should use similar rates of growth for employment projections.

The 2012 release of the 70-sector REMI model was adjusted in 2012 in preparation for work on the 2012 AQMP. This version of the REMI model has the same U.S. population projections as the SCAG model (Census, 2008). REMI's U.S. employment growth is based on the BLS 2018 employment projection, which is the same data source as SCAG's employment projection. Therefore, no further adjustment to the REMI U.S. forecast is needed.

SCAG's birth rates for four race/ethnicity groups (White, Black, Hispanic, Asian & Other) and eight age cohorts for each of the four counties in a five-year interval were incorporated into the REMI model from 2008 to 2035. The five-year interval fertility rate targets were interpolated for in-between years to ensure smooth birth rate patterns. Birth rates for a particular county were used for its subregions.[1] Specifically, the percentage differences between SCAG and REMI's birth rates were calculated and applied to the model using the birth rate variable within the model. The resultant birth rates are within 0.5percent of the target birth rates.

[1] There are 10 subregions for Los Angeles County, four for Orange County, and two each for Riverside and San Bernardino Counties, respectively, in the REMI model.

After the above adjustments the REMI and SCAG models continued to display different growth rates of employment. SCAG has employment projections at a higher aggregate industry level than REMI's. Therefore, for each five-year interval (beginning in 2008), employment by REMI industry by sub-region was calculated as a percentage of the total employment of the SCAG industry within that county where the subregions belong. Based on SCAG employment growth rates for each five-year interval, the corresponding REMI target growth rates were derived using the 2008 REMI employment data as a starting point. A trend function was developed to interpolate values for intervening years (2008-2020 and 2020-2035). The annual growth rates by industry by sub-region were entered into REMI using the Employment Update function via a multiplicative adjustment to ensure that the adjusted forecasts reflect SCAG growth rates and are incorporated into the baseline.

Additionally, REMI adjusted the population growth trends using the International Migration variable, which affects the most likely source of discrepancies in demographic estimates within California. Population of each sub-region was calculated as a share of the corresponding county. Based on the 2008 population data and projected 2020 and 2035 REMI population, and population growth rates from SCAG, a county population growth pattern was created. As with the employment adjustment, the 5-year interval population growth targets were linearly interpolated for interim years. The data was entered in a control forecast as changes to the population between 2008 and 2035.

Adjustments to the employment growth rates and population were carried out iteratively to ensure that the percentage change in employment and population for the periods of 2008-2020 and 2020-2035 was consistent between the two models at the county level.

Table C-1 shows the region-wide difference in population between 2008-2020 and 2020-2035 for the unadjusted and adjusted REMI and SCAG forecasts. Table C-2 compares the employment growth rates between the unadjusted and adjusted REMI and SCAG forecasts for the periods of 2008-2020 and 2020-2035. The difference of the employment growth rates of the two forecasts is less than one percentage point for the four-county region.

Table C-1
Unadjusted and Adjusted REMI versus SCAG Population Comparison
(in percent growth rate)

	2008-2020			2020-2035		
	Unadjusted REMI	Adjusted REMI	SCAG	Unadjusted REMI	Adjusted REMI	SCAG
Los Angeles	8.60%	6.80%	6.40%	10.30%	9.10%	9.10%
Orange	13.50%	9.50%	9.30%	13.60%	5.00%	4.60%
Riverside	28.70%	23.50%	23.00%	22.90%	29.10%	29.20%
San Bernardino	11.50%	12.90%	13.20%	13.40%	20.60%	20.50%
4-County Total	12.30%	10.10%	9.80%	13.10%	12.50%	12.60%

TABLE C-2
Unadjusted and Adjusted REMI versus SCAG Employment Comparison
(in percent growth rate)

	2008-2020			2020-2035		
	Unadjusted REMI	Adjusted REMI	SCAG	Unadjusted REMI	Adjusted REMI	SCAG
Los Angeles	17.70%	5.30%	5.00%	13.90%	6.20%	5.90%
Orange	18.70%	0.10%	0.10%	14.90%	8.80%	9.40%
Riverside	24.20%	39.10%	40.20%	20.60%	33.20%	32.80%
San Bernardino	16.30%	17.20%	16.90%	14.60%	28.60%	29.30%
4-County Total	18.40%	8.40%	8.20%	14.80%	12.10%	12.20%

APPENDIX D

ANNUAL COST, BENEFIT AND JOB IMPACTS

Costs of Measures (in millions of 2005$)*

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	Avg Ann (2013-2035)
All Draft Plan Measures	359	1246	1114	1119	510	766	787	566	381	462	481	330	331	357	294	253	1763	227	214	209	204	205	205	231	206	206	448
$PM_{2.5}$ Measures	359	1246	1114	1096	484	720	727	478	263	318	319	159	154	150	118	90	1626	90	90	90	90	90	90	90	90	90	327
Ozone Measures	0	0	0	23	26	46	61	88	119	144	161	172	177	207	175	163	138	137	124	119	115	115	115	141	116	116	122
Alt 2	359	1246	1114	1119	510	765	791	570	384	465	484	333	333	359	296	255	1765	229	216	211	206	206	206	232	207	207	450
Alt 3	359	1246	1114	1119	557	860	929	755	617	640	601	392	335	357	294	253	1763	227	214	209	204	205	205	231	206	206	495

Job Impacts of Measures (in number of jobs)*

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	Avg Ann (2013-2035)
All Draft Plan Measures	15916	-4428	-7594	-14093	731	-3582	-3770	1639	1891	-4855	-5042	15999	-2800	-1929	-5557	-5423	-17913	-4561	-4131	-3438	-2936	-3157	-3040	-3030	-2952	-2955	-3257
$PM_{2.5}$ Measures	15916	-4428	-7594	-14193	706	-4271	-4219	1150	1387	-4659	-4269	17722	-717	527	-1982	-1785	-14369	-1266	-1229	-837	-632	-946	-883	-842	-834	-820	-1620
Ozone Measures	0	0	0	100	26	690	447	488	504	-197	-776	-1721	-2084	-2457	-3576	-3640	-3549	-3299	-2903	-2604	-2307	-2215	-2161	-2192	-2124	-2142	-1639
Alt 2	15916	-4428	-7594	-14087	734	-3651	-3887	1511	1759	-4990	-5125	15906	-2903	-2041	-5611	-5495	-18001	-4660	-4234	-3527	-2998	-3209	-3083	-3068	-2988	-3026	-3334
Alt 3	15916	-4428	-7594	-14081	828	-4431	-5699	-1474	-2449	-11163	-10709	11419	-6051	-3518	-5087	-4748	-17152	-3803	-4422	-4265	-3704	-3865	-3682	-3605	-3416	-3359	-4715

*Cost and job impacts prior to 2013 reflect TCM projects that took place at the time.

Clean Air Benefits (in millions of 2005$)

Health Benefits	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	Avg Annual (2014-2035)
Draft Plan	4120	3851	3582	3312	3043	2774	2504	2235	1966	1696	1696	1696	1696	1696	1696	1696	1696	1696	1696	1696	1696	1696	2247
Alt2				1098	1198	1298	1397	1497	1597	1696	1696	1696	1696	1696	1696	1696	1696	1696	1696	1696	1696	1696	1370
Alt3				7761	6750	5739	4729	3718	2707	1696	1696	1696	1696	1696	1696	1696	1696	1696	1696	1696	1696	1696	2430
Visibilty Benefits																							
Draft Plan	1274	1204	1135	1065	996	926	857	787	718	649	613	578	542	506	471	435	400	411	422	432	443	454	696
Alt2				277	385	493	601	709	817	649	613	578	542	506	471	435	400	411	422	432	443	454	438
Alt3				2294	2402	2510	2618	2726	2834	649	613	578	542	506	471	435	400	411	422	432	443	454	988
Material Benefits																							
Draft Plan	35	33	30	32	25	23	20	18	15	13	12	10	9	8	6	5	4	4	4	4	3	3	14
Alt2				3	10	11	11	12	12	13	12	10	9	8	6	5	4	4	4	4	3	3	7
Alt3				14	38	33	28	23	18	13	12	10	9	8	6	5	4	4	4	4	3	3	11
Congestion Total	519	1200	1882	2563	3245	3926	4608	5296	5984	6673	7361	8050	8738	9426	10115	10803	11491	12180	12868	13557	14245	14933	7712
VMT	161	242	323	404	484	565	646	677	708	739	770	802	833	864	895	926	957	988	1019	1051	1082	1113	739
VHT	358	958	1559	2160	2760	3361	3962	4619	5276	5933	6591	7248	7905	8562	9220	9877	10534	11191	11849	12506	13163	13820	6973
Total Benefit																							
Draft Plan	5948	6288	6628	6973	7309	7649	7989	8336	8683	9031	9682	10334	10985	11637	12288	12940	13592	14291	14990	15689	16388	17087	10670
Alt2	519	1200	1882	3941	4838	5728	6617	7514	8411	9031	9682	10334	10985	11637	12288	12940	13592	14291	14990	15689	16388	17087	9526
Alt3	519	1200	1882	12632	12435	12208	11982	11763	11544	9031	9682	10334	10985	11637	12288	12940	13592	14291	14990	15689	16388	17087	11141

Job Impacts of Clean Air Benefits (in number of jobs)

Health Benefits	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	Avg Annual (2014-2035)
Draft Plan	774	1314	1809	2279	2714	3132	3456	3736	3968	4146	4319	4471	4602	4721	4833	4933	5002	5072	5133	5183	5200	5214	3910
Alt2	0	0	0	205	368	545	723	918	1127	1347	1560	1764	1960	2147	2333	2514	2677	2845	3008	3162	3304	3438	1634
Alt3	0	0	0	1464	2384	3155	3729	4192	4533	4739	4966	5157	5310	5431	5540	5638	5717	5804	5879	5932	5955	5963	4159
Visibilty Benefits																							
Draft Plan	1008	1628	2206	2769	3305	3846	4278	4674	5021	5313	5579	5799	5979	6130	6257	6350	6388	6436	6468	6487	6470	6445	4947
Alt2	0	0	0	204	430	713	1032	1407	1836	2131	2432	2711	2965	3196	3405	3589	3734	3895	4048	4192	4323	4445	2304
Alt3	0	0	0	1666	2882	4173	5445	6811	8251	8242	8648	9021	9314	9525	9663	9743	9753	9777	9783	9759	9698	9601	6898
Material Benefits																							
Draft Plan	133	139	143	146	153	164	173	182	188	191	196	200	201	202	201	199	195	194	191	189	185	181	179
Alt2	0	0	0	26	32	42	49	58	66	75	82	85	88	90	91	93	93	95	97	99	100	102	67
Alt3	0	0	0	115	122	133	140	146	150	152	158	162	164	166	167	166	165	165	165	166	163	162	133
Congestion	348	804	1761	3186	4973	7266	9806	12938	16469	20371	24604	29081	33776	38754	44088	49676	55367	61464	67791	74314	81011	87843	32986
Total Clean Air Benefit																							
Draft Plan	2262	3889	5933	8404	11181	14458	17783	21617	25748	30146	34839	39705	44730	49999	55592	61386	67202	73432	79864	86467	93180	100016	42174
Alt2	348	804	1761	3622	5809	8572	11628	15351	19540	23982	28750	33731	38896	44313	50062	56029	62048	68490	75149	81987	88977	96080	37088
Alt3	348	804	1761	6438	10397	14796	19234	24250	29619	33742	38635	43696	48857	54188	59790	65573	71370	77596	84019	90581	97260	104016	44408

Job Impacts for Combined Costs & Benefits

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	AVG (2013-2035)
Draft Plan	15799	-4554	-7634	-13964	2988	300	2150	10021	13047	9576	12710	37561	22922	28187	29250	34246	26788	45368	51390	57872	64188	70194	76740	83354	90138	96968	37043
Alternative 2	15799	-4555	-7634	-13958	1080	-2851	-2132	5124	7553	3563	6480	31216	16616	21914	23110	28204	20866	39585	45755	52424	58969	65199	71981	78833	85899	92961	32104
Alternative 3	15799	-4555	-7634	-13952	1174	-3631	-3943	4947	7921	3600	8480	35586	23519	30170	33493	38892	31659	50295	55278	61214	67568	73633	80235	86874	93738	100548	37709

APPENDIX E

SCAG TRANSPORTATION CONTROL MEASURES

TABLE E-1
TCM Committed or TCM Project Listing Report for 2011 FTIP

county	project_id	RTP	agency	amend-ment	conformity category	program code	route	project description	completion date	total project cost	fund type	fiscal year	eng	row	con
LA	LA000357	LA000357	CALTRANS	0	TCM Committed	CAR62	5	Route 005: --- FROM ROUTE 17	12/31/2011	207838	TCRF	2003/2004	10136	5028	0
LA	LA000357	LA000357	CALTRANS	0	TCM Committed	CAR62	5	Route 005: --- FROM ROUTE 1	12/31/2011	207838	STCASHR	2004/2005	4440	13685	0
LA	LA000357	LA000357	CALTRANS	0	TCM Committed	CAR62	5	Route 005: --- FROM ROUTE 1	12/31/2011	207838	TCRF	2006/2007	0	25087	0
LA	LA000357	LA000357	CALTRANS	0	TCM Committed	CAR62	5	Route 005: --- FROM ROUTE 1	12/31/2011	207838	PC25	2007/2008	2238	0	0
LA	LA000357	LA000357	CALTRANS	0	TCM Committed	CAR62	5	Route 005: --- FROM ROUTE 17	12/31/2011	207838	STPL-R	2007/2008	9133	0	0
LA	LA000357	LA000357	CALTRANS	0	TCM Committed	CAR62	5	Route 005: --- FROM ROUTE 1	12/31/2011	207838	AR-RSTP	2008/2009	0	0	15420
LA	LA000357	LA000357	CALTRANS	0	TCM Committed	CAR62	5	Route 005: --- FROM ROUTE 1	12/31/2011	207838	CMAQ	2008/2009	0	0	27360
LA	LA000357	LA000357	CALTRANS	0	TCM Committed	CAR62	5	Route 005: --- FROM ROUTE 1	12/31/2011	207838	PC25	2008/2009	0	11000	11837
LA	LA000357	LA000357	CALTRANS	0	TCM Committed	CAR62	5	Route 005: --- FROM ROUTE 17	12/31/2011	207838	SLP	2008/2009	0	0	25075
LA	LA000357	LA000357	CALTRANS	0	TCM Committed	CAR62	5	Route 005: --- FROM ROUTE 17	12/31/2011	207838	STCASHR	2008/2009	1929	0	41801
LA	LA000357	LA000357	CALTRANS	0	TCM Committed	CAR62	5	Route 005: --- FROM ROUTE 17	12/31/2011	207838	STPL-R	2008/2009	650	0	3019
LA	LA000358	LA000358	CALTRANS	6	TCM Committed	CAN69	5	Route 005: --- FROM ROUTE 1	12/31/2014	712274	PC25	2001/2002	1269	0	0
LA	LA000358	LA000358	CALTRANS	6	TCM Committed	CAN69	5	Route 005: --- FROM ROUTE 13	12/31/2014	712274	STCASHI	2001/2002	211	0	0
LA	LA000358	LA000358	CALTRANS	6	TCM Committed	CAN69	5	Route 005: --- FROM ROUTE 13	12/31/2014	712274	STCASHR	2002/2003	16171	0	0
LA	LA000358	LA000358	CALTRANS	6	TCM Committed	CAN69	5	Route 005: --- FROM ROUTE 13	12/31/2014	712274	STCASHI	2003/2004	822	0	0
LA	LA000358	LA000358	CALTRANS	6	TCM Committed	CAN69	5	Route 005: --- FROM ROUTE 1	12/31/2014	712274	PC25	2004/2005	12424	0	0
LA	LA000358	LA000358	CALTRANS	6	TCM Committed	CAN69	5	Route 005: --- FROM ROUTE 1	12/31/2014	712274	STCASHI	2005/2006	9203	0	0
LA	LA000358	LA000358	CALTRANS	6	TCM Committed	CAN69	5	Route 005: --- FROM ROUTE 1	12/31/2014	712274	STCASHR	2006/2007	3000	850	0
LA	LA000358	LA000358	CALTRANS	6	TCM Committed	CAN69	5	Route 005: --- FROM ROUTE 13	12/31/2014	712274	PC25	2007/2008	0	21710	0
LA	LA000358	LA000358	CALTRANS	6	TCM Committed	CAN69	5	Route 005: --- FROM ROUTE 1	12/31/2014	712274	STCASHI	2007/2008	0	2780	0
LA	LA000358	LA000358	CALTRANS	6	TCM Committed	CAN69	5	Route 005: --- FROM ROUTE 1	12/31/2014	712274	STCASHR	2007/2008	0	1060	0
LA	LA000358	LA000358	CALTRANS	6	TCM Committed	CAN69	5	Route 005: --- FROM ROUTE 1	12/31/2014	712274	CMAQ	2008/2009	0	0	13289
LA	LA000358	LA000358	CALTRANS	6	TCM Committed	CAN69	5	Route 005: --- FROM ROUTE 13	12/31/2014	712274	DEMOSTL	2008/2009	0	0	400
LA	LA000358	LA000358	CALTRANS	6	TCM Committed	CAN69	5	Route 005: --- FROM ROUTE 13	12/31/2014	712274	PC25	2008/2009	16000	2895	65815
LA	LA000358	LA000358	CALTRANS	6	TCM Committed	CAN69	5	Route 005: --- FROM ROUTE 1	12/31/2014	712274	AR-RSTP	2009/2010	0	0	25000
LA	LA000358	LA000358	CALTRANS	6	TCM Committed	CAN69	5	Route 005: --- FROM ROUTE 1	12/31/2014	712274	CMAQ	2009/2010	0	0	69000
LA	LA000358	LA000358	CALTRANS	6	TCM Committed	CAN69	5	Route 005: --- FROM ROUTE 13	12/31/2014	712274	STPL-R	2009/2010	0	0	40000
LA	LA000358	LA000358	CALTRANS	6	TCM Committed	CAN69	5	Route 005: --- FROM ROUTE 13	12/31/2014	712274	PC25	2010/2011	8000	30905	3700
LA	LA000358	LA000358	CALTRANS	6	TCM Committed	CAN69	5	Route 005: --- FROM ROUTE 13	12/31/2014	712274	STC-RIPP	2010/2011	0	35440	0
LA	LA000358	LA000358	CALTRANS	6	TCM Committed	CAN69	5	Route 005: --- FROM ROUTE 1	12/31/2014	712274	CMIA	2011/2012	0	0	73000
LA	LA000358	LA000358	CALTRANS	6	TCM Committed	CAN69	5	Route 005: --- FROM ROUTE 13	12/31/2014	712274	PC25	2011/2012	0	0	117522
LA	LA000358	LA000358	CALTRANS	6	TCM Committed	CAN69	5	Route 005: --- FROM ROUTE 13	12/31/2014	712274	SLP	2011/2012	0	0	20000
LA	LA000358	LA000358	CALTRANS	6	TCM Committed	CAN69	5	Route 005: --- FROM ROUTE 13	12/31/2014	712274	STIPACIP	2011/2012	350	780	2185
LA	LA000358	LA000358	CALTRANS	6	TCM Committed	CAN69	5	Route 005: --- FROM ROUTE 1	12/31/2014	712274	STIPACRP	2011/2012	2000	80	116413
LA	LA000548	LA000548	CALTRANS	17	TCM Committed	CAN69	10	Route 10: FROM PUENTE TO C	2/12/2016	184522	TCRF	2001/2002	157	0	0
LA	LA000548	LA000548	CALTRANS	17	TCM Committed	CAN69	10	Route 10: FROM PUENTE TO C	2/12/2016	184522	STCASGI	2004/2005	1228	0	0
LA	LA000548	LA000548	CALTRANS	17	TCM Committed	CAN69	10	Route 10: FROM PUENTE TO C	2/12/2016	184522	STCASHI	2009/2010	0	304	0
LA	LA000548	LA000548	CALTRANS	17	TCM Committed	CAN69	10	Route 10: FROM PUENTE TO C	2/12/2016	184522	STCASHP	2009/2010	12500	22000	0
LA	LA000548	LA000548	CALTRANS	17	TCM Committed	CAN69	10	Route 10: FROM PUENTE TO C	2/12/2016	184522	CMAQ	2011/2012	0	0	45000

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LA	LA000548	LA000548	CALTRANS	17	TCM Committed	CAN69	10	Route 10: FROM PUENTE TO C	2/12/2016	184522	CMIA	2011/2012	0	0	26100
LA	LA000548	LA000548	CALTRANS	17	TCM Committed	CAN69	10	Route 10: FROM PUENTE TO C	2/12/2016	184522	STIPACIP	2011/2012	0	0	5691
LA	LA000548	LA000548	CALTRANS	17	TCM Committed	CAN69	10	Route 10: FROM PUENTE TO C	2/12/2016	184522	STIPACRP	2011/2012	0	0	3642
LA	LA000548	LA000548	CALTRANS	17	TCM Committed	CAN69	10	Route 10: FROM PUENTE TO C	2/12/2016	184522	CMAQ	2013/2014	0	0	67900
LA	LA002738	LA002738	LOS ANGELE	0	TCM Committed	NCR26	0	BIKEWAY/PEDESTRIAN BRIDGE	7/31/2015	5000	LTF	2006/2007	149	0	0
LA	LA002738	LA002738	LOS ANGELE	0	TCM Committed	NCR26	0	BIKEWAY/PEDESTRIAN BRIDGE	7/31/2015	5000	STPE-R	2006/2007	744	0	0
LA	LA002738	LA002738	LOS ANGELE	0	TCM Committed	NCR26	0	BIKEWAY/PEDESTRIAN BRIDG	7/31/2015	5000	LTF	2010/2011	0	0	351
LA	LA002738	LA002738	LOS ANGELE	0	TCM Committed	NCR26	0	BIKEWAY/PEDESTRIAN BRIDG	7/31/2015	5000	STPE-P	2010/2011	0	0	3756
LA	LA01342	LA01342	CALTRANS	0	TCM Committed	CAN69	10	Route 010: RT 10 FROM RT 60	10/28/2013	200064	PC25	2004/2005	960	0	0
LA	LA01342	LA01342	CALTRANS	0	TCM Committed	CAN69	10	Route 010: RT 10 FROM RT 60	10/28/2013	200064	STCASHR	2005/2006	12848	25453	0
LA	LA01342	LA01342	CALTRANS	0	TCM Committed	CAN69	10	Route 010: RT 10 FROM RT 60	10/28/2013	200064	TCRF	2005/2006	2749	25100	0
LA	LA01342	LA01342	CALTRANS	0	TCM Committed	CAN69	10	Route 010: RT 10 FROM RT 60	10/28/2013	200064	CMAQ	2007/2008	0	0	61851
LA	LA01342	LA01342	CALTRANS	0	TCM Committed	CAN69	10	Route 010: RT 10 FROM RT 60	10/28/2013	200064	STCASHR	2007/2008	0	5210	0
LA	LA01342	LA01342	CALTRANS	0	TCM Committed	CAN69	10	Route 010: RT 10 FROM RT 60	10/28/2013	200064	STCASHP	2008/2009	0	0	65893
LA	LA0B311	LA0B311	FOOTHILL TR	24	TCM	TDN64	0	Park and Ride Facilities (Transi	12/31/2013	42175	5307LA	2007/2008	0	0	1800
LA	LA0B311	LA0B311	FOOTHILL TR	24	TCM	TDN64	0	Park and Ride Facilities (Transi	12/31/2013	42175	5309c	2007/2008	0	0	5267
LA	LA0B311	LA0B311	FOOTHILL T	24	TCM	TDN64	0	Park and Ride Facilities (Transi	12/31/2013	42175	PC5	2008/2009	0	0	500
LA	LA0B311	LA0B311	FOOTHILL T	24	TCM	TDN64	0	Park and Ride Facilities (Transi	12/31/2013	42175	STA	2008/2009	0	0	200
LA	LA0B311	LA0B311	FOOTHILL T	24	TCM	TDN64	0	Park and Ride Facilities (Transi	12/31/2013	42175	5309c	2010/2011	0	0	2635
LA	LA0B311	LA0B311	FOOTHILL TR	24	TCM	TDN64	0	Park and Ride Facilities (Transi	12/31/2013	42175	GEN	2010/2011	0	0	2500
LA	LA0B311	LA0B311	FOOTHILL TR	24	TCM	TDN64	0	Park and Ride Facilities (Transi	12/31/2013	42175	PTMISEA	2010/2011	0	0	3272
LA	LA0B311	LA0B311	FOOTHILL TR	24	TCM	TDN64	0	Park and Ride Facilities (Transi	12/31/2013	42175	TDA	2010/2011	0	0	1613
LA	LA0B311	LA0B311	FOOTHILL TR	24	TCM	TDN64	0	Park and Ride Facilities (Transi	12/31/2013	42175	5307LA	2011/2012	0	0	16365
LA	LA0B311	LA0B311	FOOTHILL T	24	TCM	TDN64	0	Park and Ride Facilities (Transi	12/31/2013	42175	GEN	2011/2012	0	0	1000
LA	LA0B311	LA0B311	FOOTHILL T	24	TCM	TDN64	0	Park and Ride Facilities (Transi	12/31/2013	42175	PTMISEA	2011/2012	0	0	7023
LA	LA0B7330	1NL04	LOS ANGELE	0	TCM Committed	NCR26	0	SAN FERNANDO RD ROW BIKE	11/30/2011	10198	5307LA	2003/2004	0	0	2302
LA	LA0B7330	1NL04	LOS ANGELE	0	TCM Committed	NCR26	0	SAN FERNANDO RD ROW BIKE	11/30/2011	10198	LTF	2005/2006	0	0	575
LA	LA0B7330	1NL04	LOS ANGELE	0	TCM Committed	NCR26	0	SAN FERNANDO RD ROW BIKE	11/30/2011	10198	LTF	2006/2007	0	0	881
LA	LA0B7330	1NL04	LOS ANGELE	0	TCM Committed	NCR26	0	SAN FERNANDO RD ROW BIKE	11/30/2011	10198	STPL-R	2007/2008	0	0	3524
LA	LA0B7330	1NL04	LOS ANGELE	0	TCM Committed	NCR26	0	SAN FERNANDO RD ROW BIKE	11/30/2011	10198	LTF	2009/2010	0	0	2916
LA	LA0B875	LA0B875	CALTRANS	17	TCM Committed	CAN69	10	Route 10: HOV LANES FROM C	3/15/2016	192643	TCRF	2001/2002	143	0	0
LA	LA0B875	LA0B875	CALTRANS	17	TCM Committed	CAN69	10	Route 10: HOV LANES FROM C	3/15/2016	192643	CMAQ	2004/2005	500	0	0
LA	LA0B875	LA0B875	CALTRANS	17	TCM Committed	CAN69	10	Route 10: HOV LANES FROM C	3/15/2016	192643	STCASHR	2007/2008	14500	0	0
LA	LA0B875	LA0B875	CALTRANS	17	TCM Committed	CAN69	10	Route 10: HOV LANES FROM C	3/15/2016	192643	STC-RIPP	2010/2011	0	9500	0
LA	LA0B875	LA0B875	CALTRANS	17	TCM Committed	CAN69	10	Route 10: HOV LANES FROM C	3/15/2016	192643	PC40	2011/2012	0	0	40000
LA	LA0B875	LA0B875	CALTRANS	17	TCM Committed	CAN69	10	Route 10: HOV LANES FROM C	3/15/2016	192643	PC40	2012/2013	0	0	75000
LA	LA0B875	LA0B875	CALTRANS	17	TCM Committed	CAN69	10	Route 10: HOV LANES FROM C	3/15/2016	192643	PC40	2013/2014	0	0	29941
LA	LA0B875	LA0B875	CALTRANS	17	TCM Committed	CAN69	10	Route 10: HOV LANES FROM C	3/15/2016	192643	STIPACRP	2014/2015	0	0	23059
LA	LA0B951	LA0B951	CALTRANS	17	TCM Committed	CAR62	71	Route 71: ROUTE 10 TO ROUT	10/24/2023	250000	TCRF	2004/2005	4800	0	0
LA	LA0B951	LA0B951	CALTRANS	17	TCM Committed	CAR62	71	Route 71: ROUTE 10 TO ROUT	10/24/2023	250000	NH	2005/2006	1592	0	0
LA	LA0B951	LA0B951	CALTRANS	17	TCM Committed	CAR62	71	Route 71: ROUTE 10 TO ROUT	10/24/2023	250000	TCRF	2012/2013	7000	0	0
LA	LA0C10	LA0C10	LOS ANGELE	8	TCM Committed	LRN92	0	MID-CITY/EXPOSITION CORRID	12/31/2012	930562	CMAQ	2005/2006	8300	7300	0

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LA	LA0C10	LA0C10	LOS ANGELE	8	TCM Committed	LRN92	0	MID-CITY/EXPOSITION CORRID	12/31/2012	930562	TCRF	2005/2006	0	0	249800
LA	LA0C10	LA0C10	LOS ANGELE	8	TCM Committed	LRN92	0	MID-CITY/EXPOSITION CORRID	12/31/2012	930562	AGENCY	2006/2007	0	14900	10000
LA	LA0C10	LA0C10	LOS ANGELE	8	TCM Committed	LRN92	0	MID-CITY/EXPOSITION CORRID	12/31/2012	930562	AGENCY	2007/2008	0	0	11200
LA	LA0C10	LA0C10	LOS ANGELE	8	TCM Committed	LRN92	0	MID-CITY/EXPOSITION CORRID	12/31/2012	930562	PTA-RIP	2007/2008	0	0	314653
LA	LA0C10	LA0C10	LOS ANGELE	8	TCM Committed	LRN92	0	MID-CITY/EXPOSITION CORRID	12/31/2012	930562	PTMISEA	2007/2008	0	0	58500
LA	LA0C10	LA0C10	LOS ANGELE	8	TCM Committed	LRN92	0	MID-CITY/EXPOSITION CORRID	12/31/2012	930562	5309c	2008/2009	0	0	475
LA	LA0C10	LA0C10	LOS ANGELE	8	TCM Committed	LRN92	0	MID-CITY/EXPOSITION CORRID	12/31/2012	930562	LTF	2008/2009	0	0	7525
LA	LA0C10	LA0C10	LOS ANGELE	8	TCM Committed	LRN92	0	MID-CITY/EXPOSITION CORRID	12/31/2012	930562	CMAQ	2009/2010	0	0	30000
LA	LA0C10	LA0C10	LOS ANGELE	8	TCM Committed	LRN92	0	MID-CITY/EXPOSITION CORRID	12/31/2012	930562	LTF	2009/2010	0	0	68009
LA	LA0C10	LA0C10	LOS ANGELE	8	TCM Committed	LRN92	0	MID-CITY/EXPOSITION CORRID	12/31/2012	930562	PTMISEA	2009/2010	0	0	63126
LA	LA0C10	LA0C10	LOS ANGELE	8	TCM Committed	LRN92	0	MID-CITY/EXPOSITION CORRID	12/31/2012	930562	STPL-R	2009/2010	0	0	70000
LA	LA0C10	LA0C10	LOS ANGELE	8	TCM Committed	LRN92	0	MID-CITY/EXPOSITION CORRID	12/31/2012	930562	PTMISEA	2011/2012	0	0	16774
LA	LA0C57	LA0C57	PICO RIVERA	0	TCM Committed	CAN61	0	ACE/GATEWAY CITIES-CONSTR	12/31/2010	44530	TCRF	2007/2008	0	16200	0
LA	LA0C57	LA0C57	PICO RIVERA	0	TCM Committed	CAN61	0	ACE/GATEWAY CITIES-CONSTR	12/31/2010	44530	CITY	2008/2009	0	0	2170
LA	LA0C57	LA0C57	PICO RIVERA	0	TCM Committed	CAN61	0	ACE/GATEWAY CITIES-CONSTR	12/31/2010	44530	DEMOSTL	2008/2009	0	0	2960
LA	LA0C57	LA0C57	PICO RIVERA	0	TCM Committed	CAN61	0	ACE/GATEWAY CITIES-CONSTR	12/31/2010	44530	TCRF	2008/2009	0	0	3500
LA	LA0C8114	LA0C8114	LOS ANGELE	0	TCM Committed	TDM20	0	LA CNTY RIDESHARE SERVICES	12/30/2016	82560	PC25	2004/2005	0	0	5300
LA	LA0C8114	LA0C8114	LOS ANGELE	0	TCM Committed	TDM20	0	LA CNTY RIDESHARE SERVICES	12/30/2016	82560	ST-CASH	2005/2006	0	0	4900
LA	LA0C8114	LA0C8114	LOS ANGELE	0	TCM Committed	TDM20	0	LA CNTY RIDESHARE SERVICES	12/30/2016	82560	PC25	2007/2008	0	0	5400
LA	LA0C8114	LA0C8114	LOS ANGELE	0	TCM Committed	TDM20	0	LA CNTY RIDESHARE SERVICES	12/30/2016	82560	PC25	2008/2009	0	0	5400
LA	LA0C8114	LA0C8114	LOS ANGELE	0	TCM Committed	TDM20	0	LA CNTY RIDESHARE SERVICES	12/30/2016	82560	PC25	2009/2010	0	0	4561
LA	LA0C8114	LA0C8114	LOS ANGELE	0	TCM Committed	TDM20	0	LA CNTY RIDESHARE SERVICES	12/30/2016	82560	PC25	2010/2011	0	0	4999
LA	LA0C8164	LA0C8164	LOS ANGELE	12	TCM Committed	NCN26	0	EXPOSITION BLVD RIGHT-OF-W	2/2/2012	14710	LTF	2005/2006	26	0	199
LA	LA0C8164	LA0C8164	LOS ANGELE	12	TCM Committed	NCN26	0	EXPOSITION BLVD RIGHT-OF-W	2/2/2012	14710	STPE-R	2006/2007	110	0	0
LA	LA0C8164	LA0C8164	LOS ANGELE	12	TCM Committed	NCN26	0	EXPOSITION BLVD RIGHT-OF-W	2/2/2012	14710	LTF	2008/2009	39	0	0
LA	LA0C8164	LA0C8164	LOS ANGELE	12	TCM Committed	NCN26	0	EXPOSITION BLVD RIGHT-OF-W	2/2/2012	14710	5307-TR	2011/2012	300	0	0
LA	LA0C8164	LA0C8164	LOS ANGELE	12	TCM Committed	NCN26	0	EXPOSITION BLVD RIGHT-OF-W	2/2/2012	14710	LTF	2011/2012	0	0	2808
LA	LA0C8164	LA0C8164	LOS ANGELE	12	TCM Committed	NCN26	0	EXPOSITION BLVD RIGHT-OF-W	2/2/2012	14710	STPE-R	2011/2012	0	0	11228
LA	LA0C8237	LA0C8237	LONG BEAC	24	TCM	TDR64	0	LONG BEACH PARK AND RIDE	6/30/2014	3902	AGENCY	2010/2011	76	89	604
LA	LA0C8237	LA0C8237	LONG BEAC	24	TCM	TDR64	0	LONG BEACH PARK AND RIDE	6/30/2014	3902	PC10	2010/2011	305	354	2474
LA	LA0C8380	LA0C8380	LOS ANGELE	0	TCM Committed	TRRH6	0	CHINATOWN/COLLEGE STREET	12/31/2012	18190	5309c	2005/2006	0	0	1500
LA	LA0C8380	LA0C8380	LOS ANGELE	0	TCM Committed	TRRH6	0	CHINATOWN/COLLEGE STREE	12/31/2012	18190	CITY	2005/2006	1000	0	0
LA	LA0C8380	LA0C8380	LOS ANGELE	0	TCM Committed	TRRH6	0	CHINATOWN/COLLEGE STREE	12/31/2012	18190	DEMOT21	2005/2006	0	0	1500
LA	LA0C8380	LA0C8380	LOS ANGELE	0	TCM Committed	TRRH6	0	CHINATOWN/COLLEGE STREE	12/31/2012	18190	FEE	2005/2006	0	0	3500
LA	LA0C8380	LA0C8380	LOS ANGELE	0	TCM Committed	TRRH6	0	CHINATOWN/COLLEGE STREE	12/31/2012	18190	LTF	2005/2006	0	0	4600
LA	LA0C8380	LA0C8380	LOS ANGELE	0	TCM Committed	TRRH6	0	CHINATOWN/COLLEGE STREET	12/31/2012	18190	PVT	2005/2006	0	3000	0
LA	LA0C8380	LA0C8380	LOS ANGELE	0	TCM Committed	TRRH6	0	CHINATOWN/COLLEGE STREET	12/31/2012	18190	STPL-R	2005/2006	0	0	3090
LA	LA0D198	LA0D198	LOS ANGELE	6	TCM Committed	LRN92	0	CRENSHAW/LAX TRANSIT COR	12/31/2018	1733188	5339	2009/2010	1200	0	0
LA	LA0D198	LA0D198	LOS ANGELE	6	TCM Committed	LRN92	0	CRENSHAW/LAX TRANSIT COR	12/31/2018	1733188	5309c	2009/2010	7113	0	0
LA	LA0D198	LA0D198	LOS ANGELE	6	TCM Committed	LRN92	0	CRENSHAW/LAX TRANSIT COR	12/31/2018	1733188	MEA_R	2009/2010	4100	0	0
LA	LA0D198	LA0D198	LOS ANGELE	6	TCM Committed	LRN92	0	CRENSHAW/LAX TRANSIT COR	12/31/2018	1733188	PC25	2009/2010	1937	0	0
LA	LA0D198	LA0D198	LOS ANGELE	6	TCM Committed	LRN92	0	CRENSHAW/LAX TRANSIT COR	12/31/2018	1733188	STP-RIP	2009/2010	142	0	0

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LA	LA0D198	LA0D198	LOS ANGELE	6	TCM Committed	LRN92	0	CRENSHAW/LAX TRANSIT COR	12/31/2018	1733188	MEA_R	2010/2011	13300	0	0
LA	LA0D198	LA0D198	LOS ANGELE	6	TCM Committed	LRN92	0	CRENSHAW/LAX TRANSIT COR	12/31/2018	1733188	PC25	2010/2011	18100	0	0
LA	LA0D198	LA0D198	LOS ANGELE	6	TCM Committed	LRN92	0	CRENSHAW/LAX TRANSIT COR	12/31/2018	1733188	STP-RIP	2010/2011	2200	0	0
LA	LA0D198	LA0D198	LOS ANGELE	6	TCM Committed	LRN92	0	CRENSHAW/LAX TRANSIT COR	12/31/2018	1733188	TIGER	2010/2011	20000	0	0
LA	LA0D198	LA0D198	LOS ANGELE	6	TCM Committed	LRN92	0	CRENSHAW/LAX TRANSIT COR	12/31/2018	1733188	MEA_R	2011/2012	9800	0	20700
LA	LA0D198	LA0D198	LOS ANGELE	6	TCM Committed	LRN92	0	CRENSHAW/LAX TRANSIT COR	12/31/2018	1733188	PTMISEA	2011/2012	7300	21000	0
LA	LA0D198	LA0D198	LOS ANGELE	6	TCM Committed	LRN92	0	CRENSHAW/LAX TRANSIT COR	12/31/2018	1733188	PC25	2012/2013	3200	0	47500
LA	LA0D198	LA0D198	LOS ANGELE	6	TCM Committed	LRN92	0	CRENSHAW/LAX TRANSIT COR	12/31/2018	1733188	PTMISEA	2012/2013	64800	108000	0
LA	LA0D198	LA0D198	LOS ANGELE	6	TCM Committed	LRN92	0	CRENSHAW/LAX TRANSIT COR	12/31/2018	1733188	MEA_R	2013/2014	0	0	258400
LA	LA0D198	LA0D198	LOS ANGELE	6	TCM Committed	LRN92	0	CRENSHAW/LAX TRANSIT COR	12/31/2018	1733188	CMAQ	2014/2015	0	0	14200
LA	LA0D198	LA0D198	LOS ANGELE	6	TCM Committed	LRN92	0	CRENSHAW/LAX TRANSIT COR	12/31/2018	1733188	MEA_R	2014/2015	0	0	260400
LA	LA0D198	LA0D198	LOS ANGELE	6	TCM Committed	LRN92	0	CRENSHAW/LAX TRANSIT COR	12/31/2018	1733188	CITY	2015/2016	0	0	51400
LA	LA0D198	LA0D198	LOS ANGELE	6	TCM Committed	LRN92	0	CRENSHAW/LAX TRANSIT COR	12/31/2018	1733188	CMAQ	2015/2016	0	0	74000
LA	LA0D198	LA0D198	LOS ANGELE	6	TCM Committed	LRN92	0	CRENSHAW/LAX TRANSIT COR	12/31/2018	1733188	MEA_R	2015/2016	0	0	94400
LA	LA0D198	LA0D198	LOS ANGELE	6	TCM Committed	LRN92	0	CRENSHAW/LAX TRANSIT COR	12/31/2018	1733188	PC25	2015/2016	0	0	63000
LA	LA0D198	LA0D198	LOS ANGELE	6	TCM Committed	LRN92	0	CRENSHAW/LAX TRANSIT COR	12/31/2018	1733188	PC25	2016/2017	0	0	10000
LA	LA0D198	LA0D198	LOS ANGELE	6	TCM Committed	LRN92	0	CRENSHAW/LAX TRANSIT COR	12/31/2018	1733188	TIFIA	2016/2017	0	0	545900
LA	LA0D198	LA0D198	LOS ANGELE	6	TCM Committed	LRN92	0	CRENSHAW/LAX TRANSIT COR	12/31/2018	1733188	PC25	2017/2018	0	0	9700
LA	LA0D198	LA0D198	LOS ANGELE	6	TCM Committed	LRN92	0	CRENSHAW/LAX TRANSIT COR	12/31/2018	1733188	PC25	2018/2019	0	0	1396
LA	LA0D206	REG0702	COVINA	7	TCM Committed	PLN40	0	METROLINK PEDESTRIAN BRID	12/31/2012	469	DEMOT21	2010/2011	375	0	0
LA	LA0D206	REG0702	COVINA	7	TCM Committed	PLN40	0	METROLINK PEDESTRIAN BRID	12/31/2012	469	PVT	2010/2011	94	0	0
LA	LA0D372	LA0D372	PASADENA	0	TCM Committed	CANT4	0	SOUTH ACCESS PEDESTRIAN B	9/30/2012	8000	CITY	2003/2004	610	0	0
LA	LA0D372	LA0D372	PASADENA	0	TCM Committed	CANT4	0	SOUTH ACCESS PEDESTRIAN B	9/30/2012	8000	CITY	2004/2005	100	0	0
LA	LA0D372	LA0D372	PASADENA	0	TCM Committed	CANT4	0	SOUTH ACCESS PEDESTRIAN B	9/30/2012	8000	CITY	2008/2009	390	800	0
LA	LA0D372	LA0D372	PASADENA	0	TCM Committed	CANT4	0	SOUTH ACCESS PEDESTRIAN B	9/30/2012	8000	5309c	2010/2011	0	0	1600
LA	LA0D372	LA0D372	PASADENA	0	TCM Committed	CANT4	0	SOUTH ACCESS PEDESTRIAN B	9/30/2012	8000	AGENCY	2010/2011	0	0	2400
LA	LA0D372	LA0D372	PASADENA	0	TCM Committed	CANT4	0	SOUTH ACCESS PEDESTRIAN B	9/30/2012	8000	CITY	2010/2011	0	0	600
LA	LA0D372	LA0D372	PASADENA	0	TCM Committed	CANT4	0	SOUTH ACCESS PEDESTRIAN B	9/30/2012	8000	PC40	2010/2011	0	0	1500
LA	LA0D47	1ITS04	PASADENA	0	TCM Committed	ITS14	0	SR 710 MITIGATION PROJECT-T	12/30/2008	9575	5394	2003/2004	1272	0	7205
LA	LA0D47	1ITS04	PASADENA	0	TCM Committed	ITS14	0	SR 710 MITIGATION PROJECT-	12/30/2008	9575	CITY	2003/2004	21	0	119
LA	LA0D47	1ITS04	PASADENA	0	TCM Committed	ITS14	0	SR 710 MITIGATION PROJECT-	12/30/2008	9575	PC25	2003/2004	144	0	814
LA	LA0D73	LA0D73	CALTRANS	17	TCM Committed	CAN69	5	Route 5: LA MIRADA, NORWA	12/1/2016	1241757	STCASGI	2003/2004	42654	15115	0
LA	LA0D73	LA0D73	CALTRANS	17	TCM Committed	CAN69	5	Route 5: LA MIRADA, NORWAL	12/1/2016	1241757	STCASHI	2003/2004	12599	0	0
LA	LA0D73	LA0D73	CALTRANS	17	TCM Committed	CAN69	5	Route 5: LA MIRADA, NORWA	12/1/2016	1241757	STCASHR	2005/2006	1068	408	0
LA	LA0D73	LA0D73	CALTRANS	17	TCM Committed	CAN69	5	Route 5: LA MIRADA, NORWA	12/1/2016	1241757	TCRF	2005/2006	6000	0	0
LA	LA0D73	LA0D73	CALTRANS	17	TCM Committed	CAN69	5	Route 5: LA MIRADA, NORWA	12/1/2016	1241757	PC25	2006/2007	7213	1589	0
LA	LA0D73	LA0D73	CALTRANS	17	TCM Committed	CAN69	5	Route 5: LA MIRADA, NORWAL	12/1/2016	1241757	CMIA	2010/2011	0	0	72291
LA	LA0D73	LA0D73	CALTRANS	17	TCM Committed	CAN69	5	Route 5: LA MIRADA, NORWAL	12/1/2016	1241757	DEMOSTL	2010/2011	0	832	0
LA	LA0D73	LA0D73	CALTRANS	17	TCM Committed	CAN69	5	Route 5: LA MIRADA, NORWAL	12/1/2016	1241757	PC25	2010/2011	3480	134456	0
LA	LA0D73	LA0D73	CALTRANS	17	TCM Committed	CAN69	5	Route 5: LA MIRADA, NORWA	12/1/2016	1241757	PC40	2010/2011	0	0	11400
LA	LA0D73	LA0D73	CALTRANS	17	TCM Committed	CAN69	5	Route 5: LA MIRADA, NORWAL	12/1/2016	1241757	STIPACRP	2010/2011	0	135804	0
LA	LA0D73	LA0D73	CALTRANS	17	TCM Committed	CAN69	5	Route 5: LA MIRADA, NORWAL	12/1/2016	1241757	TCRF	2010/2011	0	18200	0

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LA	LA0D73	LA0D73	CALTRANS	17	TCM Committed	CAN69	5	Route 5: LA MIRADA, NORWA	12/1/2016	1241757	CMIA	2011/2012	0	0	314709
LA	LA0D73	LA0D73	CALTRANS	17	TCM Committed	CAN69	5	Route 5: LA MIRADA, NORWA	12/1/2016	1241757	STCASHI	2011/2012	1233	0	0
LA	LA0D73	LA0D73	CALTRANS	17	TCM Committed	CAN69	5	Route 5: LA MIRADA, NORWAL	12/1/2016	1241757	TCRF	2011/2012	0	21468	0
LA	LA0D73	LA0D73	CALTRANS	17	TCM Committed	CAN69	5	Route 5: LA MIRADA, NORWAL	12/1/2016	1241757	CMAQ	2012/2013	0	0	36039
LA	LA0D73	LA0D73	CALTRANS	17	TCM Committed	CAN69	5	Route 5: LA MIRADA, NORWA	12/1/2016	1241757	PC25	2012/2013	0	0	118942
LA	LA0D73	LA0D73	CALTRANS	17	TCM Committed	CAN69	5	Route 5: LA MIRADA, NORWA	12/1/2016	1241757	SLP	2012/2013	0	0	62656
LA	LA0D73	LA0D73	CALTRANS	17	TCM Committed	CAN69	5	Route 5: LA MIRADA, NORWA	12/1/2016	1241757	STIPACIP	2012/2013	0	0	22784
LA	LA0D73	LA0D73	CALTRANS	17	TCM Committed	CAN69	5	Route 5: LA MIRADA, NORWAL	12/1/2016	1241757	STIPACRP	2012/2013	0	89757	1728
LA	LA0D73	LA0D73	CALTRANS	17	TCM Committed	CAN69	5	Route 5: LA MIRADA, NORWA	12/1/2016	1241757	TCRF	2012/2013	0	19833	0
LA	LA0D73	LA0D73	CALTRANS	17	TCM Committed	CAN69	5	Route 5: LA MIRADA, NORWA	12/1/2016	1241757	CMAQ	2013/2014	0	0	30000
LA	LA0D73	LA0D73	CALTRANS	17	TCM Committed	CAN69	5	Route 5: LA MIRADA, NORWA	12/1/2016	1241757	TCRF	2013/2014	0	19833	0
LA	LA0D73	LA0D73	CALTRANS	17	TCM Committed	CAN69	5	Route 5: LA MIRADA, NORWAL	12/1/2016	1241757	TCRF	2014/2015	0	39666	0
LA	LA0F096	1NL04	SANTA FE SP	11	TCM Committed	TDR64	0	NORWALK SANTA FE SPRINGS	8/23/2011	4057	5309c	2007/2008	0	1226	0
LA	LA0F096	1NL04	SANTA FE SP	11	TCM Committed	TDR64	0	NORWALK SANTA FE SPRINGS	8/23/2011	4057	PC10	2007/2008	0	400	0
LA	LA0F096	1NL04	SANTA FE SP	11	TCM Committed	TDR64	0	NORWALK SANTA FE SPRINGS	8/23/2011	4057	CITY	2008/2009	0	306	0
LA	LA0F096	1NL04	SANTA FE SP	11	TCM Committed	TDR64	0	NORWALK SANTA FE SPRINGS	8/23/2011	4057	PC10	2008/2009	0	0	672
LA	LA0F096	1NL04	SANTA FE SP	11	TCM Committed	TDR64	0	NORWALK SANTA FE SPRINGS	8/23/2011	4057	5309c	2010/2011	475	0	0
LA	LA0F096	1NL04	SANTA FE SP	11	TCM Committed	TDR64	0	NORWALK SANTA FE SPRINGS	8/23/2011	4057	PC10	2010/2011	0	0	978
LA	LA0G010	1TR0404	LOS ANGELE	1	TCM Committed	RAN92	0	Regional Connector - Light Rai	12/31/2019	1366100	CITY	2009/2010	3800	0	0
LA	LA0G010	1TR0404	LOS ANGELE	1	TCM Committed	RAN92	0	Regional Connector - Light Rai	12/31/2019	1366100	FEE	2009/2010	200	0	0
LA	LA0G010	1TR0404	LOS ANGELE	1	TCM Committed	RAN92	0	Regional Connector - Light Rai	12/31/2019	1366100	STP-RIP	2009/2010	1900	0	0
LA	LA0G010	1TR0404	LOS ANGELE	1	TCM Committed	RAN92	0	Regional Connector - Light Rai	12/31/2019	1366100	CITY	2010/2011	27500	0	0
LA	LA0G010	1TR0404	LOS ANGELE	1	TCM Committed	RAN92	0	Regional Connector - Light Rai	12/31/2019	1366100	STAL-S	2010/2011	11100	0	0
LA	LA0G010	1TR0404	LOS ANGELE	1	TCM Committed	RAN92	0	Regional Connector - Light Rai	12/31/2019	1366100	5309b	2011/2012	51800	0	0
LA	LA0G010	1TR0404	LOS ANGELE	1	TCM Committed	RAN92	0	Regional Connector - Light Rai	12/31/2019	1366100	CITY	2011/2012	10000	0	0
LA	LA0G010	1TR0404	LOS ANGELE	1	TCM Committed	RAN92	0	Regional Connector - Light Rai	12/31/2019	1366100	PTMISEA	2011/2012	24300	0	0
LA	LA0G010	1TR0404	LOS ANGELE	1	TCM Committed	RAN92	0	Regional Connector - Light Rai	12/31/2019	1366100	STAL-S	2011/2012	200	0	0
LA	LA0G010	1TR0404	LOS ANGELE	1	TCM Committed	RAN92	0	Regional Connector - Light Rai	12/31/2019	1366100	5309b	2012/2013	0	0	71800
LA	LA0G010	1TR0404	LOS ANGELE	1	TCM Committed	RAN92	0	Regional Connector - Light Rai	12/31/2019	1366100	CITY	2012/2013	0	3600	0
LA	LA0G010	1TR0404	LOS ANGELE	1	TCM Committed	RAN92	0	Regional Connector - Light Rai	12/31/2019	1366100	STAL-S	2012/2013	0	44300	0
LA	LA0G010	1TR0404	LOS ANGELE	1	TCM Committed	RAN92	0	Regional Connector - Light Rai	12/31/2019	1366100	5309b	2013/2014	0	0	67900
LA	LA0G010	1TR0404	LOS ANGELE	1	TCM Committed	RAN92	0	Regional Connector - Light Rai	12/31/2019	1366100	CITY	2013/2014	0	0	3400
LA	LA0G010	1TR0404	LOS ANGELE	1	TCM Committed	RAN92	0	Regional Connector - Light Rai	12/31/2019	1366100	PTMISEA	2013/2014	0	0	35400
LA	LA0G010	1TR0404	LOS ANGELE	1	TCM Committed	RAN92	0	Regional Connector - Light Rai	12/31/2019	1366100	STAL-S	2013/2014	0	6400	0
LA	LA0G010	1TR0404	LOS ANGELE	1	TCM Committed	RAN92	0	Regional Connector - Light Rai	12/31/2019	1366100	5309b	2014/2015	0	0	148900
LA	LA0G010	1TR0404	LOS ANGELE	1	TCM Committed	RAN92	0	Regional Connector - Light Rai	12/31/2019	1366100	CITY	2014/2015	0	0	7400
LA	LA0G010	1TR0404	LOS ANGELE	1	TCM Committed	RAN92	0	Regional Connector - Light Rai	12/31/2019	1366100	MEA_R	2014/2015	0	0	73100
LA	LA0G010	1TR0404	LOS ANGELE	1	TCM Committed	RAN92	0	Regional Connector - Light Rai	12/31/2019	1366100	PTMISEA	2014/2015	0	0	14100
LA	LA0G010	1TR0404	LOS ANGELE	1	TCM Committed	RAN92	0	Regional Connector - Light Rai	12/31/2019	1366100	STAL-S	2014/2015	0	0	4700
LA	LA0G010	1TR0404	LOS ANGELE	1	TCM Committed	RAN92	0	Regional Connector - Light Rai	12/31/2019	1366100	5309b	2015/2016	0	0	170200
LA	LA0G010	1TR0404	LOS ANGELE	1	TCM Committed	RAN92	0	Regional Connector - Light Rai	12/31/2019	1366100	CITY	2015/2016	0	0	8500
LA	LA0G010	1TR0404	LOS ANGELE	1	TCM Committed	RAN92	0	Regional Connector - Light Rai	12/31/2019	1366100	MEA_R	2015/2016	0	0	74300

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LA	LA0G010	1TR0404	LOS ANGELE	1	TCM Committed	RAN92	0	Regional Connector - Light Rai	12/31/2019	1366100	PTMISEA	2015/2016	0	0	7900
LA	LA0G010	1TR0404	LOS ANGELE	1	TCM Committed	RAN92	0	Regional Connector - Light Rai	12/31/2019	1366100	STAL-S	2015/2016	0	0	22700
LA	LA0G010	1TR0404	LOS ANGELE	1	TCM Committed	RAN92	0	Regional Connector - Light Rai	12/31/2019	1366100	5309b	2016/2017	0	0	309100
LA	LA0G010	1TR0404	LOS ANGELE	1	TCM Committed	RAN92	0	Regional Connector - Light Rai	12/31/2019	1366100	CITY	2016/2017	0	0	55600
LA	LA0G010	1TR0404	LOS ANGELE	1	TCM Committed	RAN92	0	Regional Connector - Light Rai	12/31/2019	1366100	MEA_R	2016/2017	0	0	12600
LA	LA0G010	1TR0404	LOS ANGELE	1	TCM Committed	RAN92	0	Regional Connector - Light Rai	12/31/2019	1366100	PTMISEA	2016/2017	0	0	67900
LA	LA0G010	1TR0404	LOS ANGELE	1	TCM Committed	RAN92	0	Regional Connector - Light Rai	12/31/2019	1366100	STAL-S	2016/2017	0	0	25500
LA	LA0G139	1HL08D01	LOS ANGELE	3	TCM Committed	CAX69	10	LACRD - Expand capacity of th	12/31/2011	3200	CRD	2010/2011	0	0	3200
LA	LA0G142	LA0G142	FOOTHILL TR	24	TCM	BUN94	0	LACRD - 12 buses for the I-10	12/31/2012	8500	5307LA	2010/2011	0	0	6240
LA	LA0G142	LA0G142	FOOTHILL T	24	TCM	BUN94	0	LACRD - 12 buses for the I-10	12/31/2012	8500	AGENCY	2010/2011	0	0	1560
LA	LA0G145	1TR204	TORRANCE	0	TCM Committed	BUN94	0	LACRD - 4 Expansion Buses for	12/31/2010	2800	5307LA	2008/2009	0	0	2324
LA	LA0G145	1TR204	TORRANCE	0	TCM Committed	BUN94	0	LACRD - 4 Expansion Buses for	12/31/2010	2800	PC20	2008/2009	0	0	476
LA	LA0G147	1TR204	GARDENA	6	TCM Committed	BUO00	0	LACRD - I-110 HOT lane operat	12/31/2011	600	CMAQ	2010/2011	0	0	600
LA	LA0G148	1TR204	TORRANCE	6	TCM Committed	BUO00	0	LACRD - I-110 HOT lane operat	12/31/2011	1200	CMAQ	2010/2011	0	0	1200
LA	LA0G149	1OM08D02	FOOTHILL T	6	TCM Committed	BUO00	0	LACRD - I-10 HOT lane operatio	12/31/2011	3634	CMAQ	2011/2012	0	0	3200
LA	LA0G150	1TR08D7B	LOS ANGELE	18	TCM Committed	BUO00	0	LACRD - I-10 and I-110 Express	12/31/2011	4201	CMAQ	2010/2011	0	0	4201
LA	LA0G154	1TR08D7A	LOS ANGELE	18	TCM Committed	TRRH6	0	LACRD - El Monte Transit Cent	12/31/2012	76909	5307LA	2008/2009	3360	0	0
LA	LA0G154	1TR08D7A	LOS ANGELE	18	TCM Committed	TRRH6	0	LACRD - El Monte Transit Cent	12/31/2012	76909	PC40	2008/2009	840	0	0
LA	LA0G154	1TR08D7A	LOS ANGELE	18	TCM Committed	TRRH6	0	LACRD - El Monte Transit Cent	12/31/2012	76909	5307LA	2009/2010	0	0	11445
LA	LA0G154	1TR08D7A	LOS ANGELE	18	TCM Committed	TRRH6	0	LACRD - El Monte Transit Cent	12/31/2012	76909	PC40	2009/2010	0	0	2861
LA	LA0G154	1TR08D7A	LOS ANGELE	18	TCM Committed	TRRH6	0	LACRD - El Monte Transit Cent	12/31/2012	76909	5307LA	2010/2011	0	0	22435
LA	LA0G154	1TR08D7A	LOS ANGELE	18	TCM Committed	TRRH6	0	LACRD - El Monte Transit Cent	12/31/2012	76909	PC40	2010/2011	0	0	7284
LA	LA0G154	1TR08D7A	LOS ANGELE	18	TCM Committed	TRRH6	0	LACRD - El Monte Transit Cent	12/31/2012	76909	5307LA	2011/2012	0	0	5660
LA	LA0G154	1TR08D7A	LOS ANGELE	18	TCM Committed	TRRH6	0	LACRD - El Monte Transit Cent	12/31/2012	76909	5309c	2011/2012	0	0	9679
LA	LA0G154	1TR08D7A	LOS ANGELE	18	TCM Committed	TRRH6	0	LACRD - El Monte Transit Cent	12/31/2012	76909	LTF	2011/2012	0	0	11930
LA	LA0G154	1TR08D7A	LOS ANGELE	18	TCM Committed	TRRH6	0	LACRD - El Monte Transit Cent	12/31/2012	76909	PC40	2011/2012	0	0	1415
LA	LA0G155	1TR08D7B	LOS ANGELE	2	TCM Committed	ITS10	0	LACRD - Transit signal priority	12/31/2011	1000	CRD	2008/2009	200	0	0
LA	LA0G155	1TR08D7B	LOS ANGELE	2	TCM Committed	ITS10	0	LACRD - Transit signal priority	12/31/2011	1000	CRD	2010/2011	0	0	800
LA	LA0G194	1TL104	LOS ANGELE	0	TCM Committed	BUN94	0	Acquire alternate four (4) fuel	10/31/2011	1029	5309c	2010/2011	0	0	588
LA	LA0G194	1TL104	LOS ANGELE	0	TCM Committed	BUN94	0	Acquire alternate four (4) fuel	10/31/2011	1029	CITY	2010/2011	0	0	441
LA	LA0G196	1TL204	LOS ANGELE	0	TCM Committed	BUN94	0	Acquire alternate fuel buses fo	10/31/2011	613	5309c	2010/2011	0	0	490
LA	LA0G196	1TL204	LOS ANGELE	0	TCM Committed	BUN94	0	Acquire alternate fuel buses fo	10/31/2011	613	GEN	2010/2011	0	0	123
LA	LA0G227	LA0G227	SANTA CLAR	24	TCM	BUN94	0	Purchase 2 buses for Route 75	12/31/2012	1081	5307LA	2010/2011	0	0	805
LA	LA0G227	LA0G227	SANTA CLAR	24	TCM	BUN94	0	Purchase 2 buses for Route 75	12/31/2012	1081	LTF	2010/2011	0	0	276
LA	LA0G257	LA0G257	WHITTIER	24	TCM	NCN25	0	Whittier Greenway Trailhead P	9/30/2014	650	PC40	2008/2009	15	0	0
LA	LA0G257	LA0G257	WHITTIER	24	TCM	NCN25	0	Whittier Greenway Trailhead P	9/30/2014	650	PC40	2009/2010	0	0	285
LA	LA0G257	LA0G257	WHITTIER	24	TCM	NCN25	0	Whittier Greenway Trailhead P	9/30/2014	650	CITY	2011/2012	0	0	350
LA	LA0G268	1TL104	LOS ANGELE	0	TCM Committed	BUN94	0	Purchase clean air buses for se	6/30/2012	250	5309c	2008/2009	0	0	143
LA	LA0G268	1TL104	LOS ANGELE	0	TCM Committed	BUN94	0	Purchase clean air buses for se	6/30/2012	250	PROPA	2008/2009	0	0	107
LA	LA0G270	1TDL04	LOS ANGELE	0	TCM Committed	TDR64	0	Expansion and Improvement to	9/30/2012	360	5309c	2010/2011	0	0	260
LA	LA0G270	1TDL04	LOS ANGELE	0	TCM Committed	TDR64	0	Expansion and Improvement to	9/30/2012	360	PROPA	2010/2011	0	0	100
LA	LA0G354	1TDL04	MONTEBELL	0	TCM Committed	TDR64	0	Construction of transit center a	12/31/2010	325	5307LA	2009/2010	25	0	300

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LA	LA0G358	1RL04	TORRANCE	19	TCM Committed	TDN64	0	South Bay Regional Intermoda	12/31/2015	21000	PTMISEA	2010/2011	0	0	2500
LA	LA0G358	1RL04	TORRANCE	19	TCM Committed	TDN64	0	South Bay Regional Intermoda	12/31/2015	21000	CITY	2011/2012	0	0	400
LA	LA0G358	1RL04	TORRANCE	19	TCM Committed	TDN64	0	South Bay Regional Intermoda	12/31/2015	21000	MR20H	2011/2012	1000	0	0
LA	LA0G358	1RL04	TORRANCE	19	TCM Committed	TDN64	0	South Bay Regional Intermoda	12/31/2015	21000	MR20H	2012/2013	0	0	10500
LA	LA0G358	1RL04	TORRANCE	19	TCM Committed	TDN64	0	South Bay Regional Intermoda	12/31/2015	21000	MR20H	2013/2014	0	0	6600
LA	LA0G406	LA0G406	GLENDALE	24	TCM	TDN64	0	Fairmont Ave. Park-N-Ride fac	12/30/2014	3000	MR20H	2009/2010	0	0	400
LA	LA0G406	LA0G406	GLENDALE	24	TCM	TDN64	0	Fairmont Ave. Park-N-Ride fac	12/30/2014	3000	MR20H	2010/2011	130	0	1050
LA	LA0G406	LA0G406	GLENDALE	24	TCM	TDN64	0	Fairmont Ave. Park-N-Ride faci	12/30/2014	3000	MR02	2011/2012	170	0	1125
LA	LA0G406	LA0G406	GLENDALE	24	TCM	TDN64	0	Fairmont Ave. Park-N-Ride fac	12/30/2014	3000	MR02	2012/2013	0	0	125
LA	LA0G431	1TL204	LOS ANGELE	0	TCM Committed	TRNH6	0	Multi-modal transit center at C	10/1/2012	492	5309c	2010/2011	0	0	392
LA	LA0G431	1TL204	LOS ANGELE	0	TCM Committed	TRNH6	0	Multi-modal transit center at C	10/1/2012	492	GEN	2010/2011	0	0	100
LA	LA0G447	LA0G447	LOS ANGELE	24	TCM	RAN92	0	Metro Purple Line Westside Su	12/31/2023	2511121	LTF	2011/2012	0	16000	0
LA	LA0G447	LA0G447	LOS ANGELE	24	TCM	RAN92	0	Metro Purple Line Westside Su	12/31/2023	2511121	5309b	2012/2013	0	88700	11300
LA	LA0G447	LA0G447	LOS ANGELE	24	TCM	RAN92	0	Metro Purple Line Westside Su	12/31/2023	2511121	LTF	2012/2013	0	34300	13821
LA	LA0G447	LA0G447	LOS ANGELE	24	TCM	RAN92	0	Metro Purple Line Westside Su	12/31/2023	2511121	MEA_R	2012/2013	0	0	10400
LA	LA0G447	LA0G447	LOS ANGELE	24	TCM	RAN92	0	Metro Purple Line Westside Su	12/31/2023	2511121	5309b	2013/2014	0	0	100000
LA	LA0G447	LA0G447	LOS ANGELE	24	TCM	RAN92	0	Metro Purple Line Westside Su	12/31/2023	2511121	MEA_R	2013/2014	0	0	10900
LA	LA0G447	LA0G447	LOS ANGELE	24	TCM	RAN92	0	Metro Purple Line Westside Su	12/31/2023	2511121	5309b	2014/2015	0	0	100000
LA	LA0G447	LA0G447	LOS ANGELE	24	TCM	RAN92	0	Metro Purple Line Westside Su	12/31/2023	2511121	MEA_R	2014/2015	0	0	233200
LA	LA0G447	LA0G447	LOS ANGELE	24	TCM	RAN92	0	Metro Purple Line Westside Su	12/31/2023	2511121	5309b	2015/2016	0	0	100000
LA	LA0G447	LA0G447	LOS ANGELE	24	TCM	RAN92	0	Metro Purple Line Westside Su	12/31/2023	2511121	CITY	2015/2016	0	0	34200
LA	LA0G447	LA0G447	LOS ANGELE	24	TCM	RAN92	0	Metro Purple Line Westside Su	12/31/2023	2511121	MEA_R	2015/2016	0	0	190400
LA	LA0G447	LA0G447	LOS ANGELE	24	TCM	RAN92	0	Metro Purple Line Westside Su	12/31/2023	2511121	5309b	2016/2017	0	0	100000
LA	LA0G447	LA0G447	LOS ANGELE	24	TCM	RAN92	0	Metro Purple Line Westside Su	12/31/2023	2511121	CITY	2016/2017	0	0	29400
LA	LA0G447	LA0G447	LOS ANGELE	24	TCM	RAN92	0	Metro Purple Line Westside Su	12/31/2023	2511121	CMAQ	2016/2017	0	0	4400
LA	LA0G447	LA0G447	LOS ANGELE	24	TCM	RAN92	0	Metro Purple Line Westside Su	12/31/2023	2511121	MEA_R	2016/2017	0	0	8500
LA	LA0G447	LA0G447	LOS ANGELE	24	TCM	RAN92	0	Metro Purple Line Westside Su	12/31/2023	2511121	TIFIA	2016/2017	0	0	282000
LA	LA0G447	LA0G447	LOS ANGELE	24	TCM	RAN92	0	Metro Purple Line Westside Su	12/31/2023	2511121	5309b	2017/2018	0	0	100000
LA	LA0G447	LA0G447	LOS ANGELE	24	TCM	RAN92	0	Metro Purple Line Westside Su	12/31/2023	2511121	CITY	2017/2018	0	0	6300
LA	LA0G447	LA0G447	LOS ANGELE	24	TCM	RAN92	0	Metro Purple Line Westside Su	12/31/2023	2511121	CMAQ	2017/2018	0	0	45700
LA	LA0G447	LA0G447	LOS ANGELE	24	TCM	RAN92	0	Metro Purple Line Westside Su	12/31/2023	2511121	MEA_R	2017/2018	0	0	7300
LA	LA0G447	LA0G447	LOS ANGELE	24	TCM	RAN92	0	Metro Purple Line Westside Su	12/31/2023	2511121	TIFIA	2017/2018	0	0	182000
LA	LA0G447	LA0G447	LOS ANGELE	24	TCM	RAN92	0	Metro Purple Line Westside Su	12/31/2023	2511121	5309b	2018/2019	0	0	100000
LA	LA0G447	LA0G447	LOS ANGELE	24	TCM	RAN92	0	Metro Purple Line Westside Su	12/31/2023	2511121	CMAQ	2018/2019	0	0	12100
LA	LA0G447	LA0G447	LOS ANGELE	24	TCM	RAN92	0	Metro Purple Line Westside Su	12/31/2023	2511121	MEA_R	2018/2019	0	0	6100
LA	LA0G447	LA0G447	LOS ANGELE	24	TCM	RAN92	0	Metro Purple Line Westside Su	12/31/2023	2511121	TIFIA	2018/2019	0	0	113300
LA	LA0G447	LA0G447	LOS ANGELE	24	TCM	RAN92	0	Metro Purple Line Westside Su	12/31/2023	2511121	5309b	2019/2020	0	0	100000
LA	LA0G447	LA0G447	LOS ANGELE	24	TCM	RAN92	0	Metro Purple Line Westside Su	12/31/2023	2511121	CMAQ	2019/2020	0	0	19800
LA	LA0G447	LA0G447	LOS ANGELE	24	TCM	RAN92	0	Metro Purple Line Westside Su	12/31/2023	2511121	MEA_R	2019/2020	0	0	4800
LA	LA0G447	LA0G447	LOS ANGELE	24	TCM	RAN92	0	Metro Purple Line Westside Su	12/31/2023	2511121	TIFIA	2019/2020	0	0	63500
LA	LA0G447	LA0G447	LOS ANGELE	24	TCM	RAN92	0	Metro Purple Line Westside Su	12/31/2023	2511121	5309b	2020/2021	0	0	100000
LA	LA0G447	LA0G447	LOS ANGELE	24	TCM	RAN92	0	Metro Purple Line Westside Su	12/31/2023	2511121	MEA_R	2020/2021	0	0	14200

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LA	LA0G447	LA0G447	LOS ANGELE	24	TCM	RAN92	0	Metro Purple Line Westside Su	12/31/2023	2511121	5309b	2021/2022	0	0	100000
LA	LA0G447	LA0G447	LOS ANGELE	24	TCM	RAN92	0	Metro Purple Line Westside Su	12/31/2023	2511121	MEA_R	2021/2022	0	0	10100
LA	LA0G447	LA0G447	LOS ANGELE	24	TCM	RAN92	0	Metro Purple Line Westside Su	12/31/2023	2511121	5309b	2022/2023	0	0	100000
LA	LA0G447	LA0G447	LOS ANGELE	24	TCM	RAN92	0	Metro Purple Line Westside Su	12/31/2023	2511121	MEA_R	2022/2023	0	0	6100
LA	LA0G447	LA0G447	LOS ANGELE	24	TCM	RAN92	0	Metro Purple Line Westside Su	12/31/2023	2511121	5309b	2023/2024	0	0	50400
LA	LA0G447	LA0G447	LOS ANGELE	24	TCM	RAN92	0	Metro Purple Line Westside Su	12/31/2023	2511121	MEA_R	2023/2024	0	0	1900
LA	LA0G558	LA29212XY	METRO GOL	12	TCM Committed	LRN92	0	Gold Line Foothill LRT Extensio	12/31/2017	847000	MR35	2009/2010	10000	0	0
LA	LA0G558	LA29212XY	METRO GOL	12	TCM Committed	LRN92	0	Gold Line Foothill LRT Extensio	12/31/2017	847000	MR35	2010/2011	10000	0	0
LA	LA0G558	LA29212XY	METRO GOL	12	TCM Committed	LRN92	0	Gold Line Foothill LRT Extensio	12/31/2017	847000	MR35	2011/2012	74400	8000	0
LA	LA0G558	LA29212XY	METRO GOL	12	TCM Committed	LRN92	0	Gold Line Foothill LRT Extensio	12/31/2017	847000	MR35	2013/2014	154600	5000	0
LA	LA0G558	LA29212XY	METRO GOL	12	TCM Committed	LRN92	0	Gold Line Foothill LRT Extensio	12/31/2017	847000	MR35	2014/2015	0	2000	198000
LA	LA0G558	LA29212XY	METRO GOL	12	TCM Committed	LRN92	0	Gold Line Foothill LRT Extensio	12/31/2017	847000	MR35	2015/2016	0	0	200000
LA	LA0G558	LA29212XY	METRO GOL	12	TCM Committed	LRN92	0	Gold Line Foothill LRT Extensio	12/31/2017	847000	MR35	2016/2017	0	0	185000
LA	LA0G626	1TR0704	LOS ANGELE	24	TCM	RAN92	0	Eastside Transit Corridor Phas	9/14/2035	2490000	PROPA	2010/2011	5000	0	0
LA	LA0G626	1TR0704	LOS ANGELE	24	TCM	RAN92	0	Eastside Transit Corridor Phas	9/14/2035	2490000	STPL	2010/2011	800	0	0
LA	LA0G626	1TR0704	LOS ANGELE	24	TCM	RAN92	0	Eastside Transit Corridor Phas	9/14/2035	2490000	5309b	2025/2026	1138500	0	0
LA	LA0G626	1TR0704	LOS ANGELE	24	TCM	RAN92	0	Eastside Transit Corridor Phas	9/14/2035	2490000	MEA_R	2025/2026	1345700	0	0
LA	LA0G632	1TR0101	LOS ANGELE	12	TCM Committed	RAN92	0	South Bay Green Line Extensio	9/21/2035	555000	LTF	2010/2011	4500	0	0
LA	LA0G632	1TR0101	LOS ANGELE	12	TCM Committed	RAN92	0	South Bay Green Line Extensio	9/21/2035	555000	STPL	2010/2011	500	0	0
LA	LA0G632	1TR0101	LOS ANGELE	12	TCM Committed	RAN92	0	South Bay Green Line Extensio	9/21/2035	555000	MEA_R	2025/2026	328200	0	0
LA	LA0G632	1TR0101	LOS ANGELE	12	TCM Committed	RAN92	0	South Bay Green Line Extensio	9/21/2035	555000	PROPA	2025/2026	187500	0	0
LA	LA0G632	1TR0101	LOS ANGELE	12	TCM Committed	RAN92	0	South Bay Green Line Extensio	9/21/2035	555000	STPL-R	2025/2026	34300	0	0
LA	LA0G668	1NL04	TEMPLE CITY	18	TCM Committed	NCN26	0	Rosemead Blvd Safety Enhanc	10/31/2013	6376	CITY	2011/2012	200	0	3483
LA	LA0G668	1NL04	TEMPLE CIT	18	TCM Committed	NCN26	0	Rosemead Blvd Safety Enhanc	10/31/2013	6376	CMAQ	2011/2012	0	0	2250
LA	LA0G668	1NL04	TEMPLE CIT	18	TCM Committed	NCN26	0	Rosemead Blvd Safety Enhance	10/31/2013	6376	LTF	2011/2012	0	0	443
LA	LA29202U1	LA29202U1	LOS ANGELE	0	TCM Committed	CAX62	0	SAN FERNANDO VALLEY E/W B	4/30/2010	21129	5309c	2003/2004	0	0	492
LA	LA29202U1	LA29202U1	LOS ANGELE	0	TCM Committed	CAX62	0	SAN FERNANDO VALLEY E/W B	4/30/2010	21129	AGENCY	2003/2004	0	0	17500
LA	LA29202U1	LA29202U1	LOS ANGELE	0	TCM Committed	CAX62	0	SAN FERNANDO VALLEY E/W B	4/30/2010	21129	5309c	2006/2007	0	0	1179
LA	LA29202U1	LA29202U1	LOS ANGELE	0	TCM Committed	CAX62	0	SAN FERNANDO VALLEY E/W B	4/30/2010	21129	AGENCY	2006/2007	0	0	295
LA	LA29202U1	LA29202U1	LOS ANGELE	0	TCM Committed	CAX62	0	SAN FERNANDO VALLEY E/W B	4/30/2010	21129	5309c	2007/2008	0	0	652
LA	LA29202U1	LA29202U1	LOS ANGELE	0	TCM Committed	CAX62	0	SAN FERNANDO VALLEY E/W B	4/30/2010	21129	AGENCY	2007/2008	0	0	163
LA	LA29202U1	LA29202U1	LOS ANGELE	0	TCM Committed	CAX62	0	SAN FERNANDO VALLEY E/W B	4/30/2010	21129	5309c	2008/2009	0	0	678
LA	LA29202U1	LA29202U1	LOS ANGELE	0	TCM Committed	CAX62	0	SAN FERNANDO VALLEY E/W B	4/30/2010	21129	AGENCY	2008/2009	0	0	170
LA	LA29202U3	LA29202U3	LOS ANGELE	24	TCM	TRNH6	0	SAN FERNANDO VALLEY NORT	12/31/2013	11702	PC40	2004/2005	990	0	0
LA	LA29202U3	LA29202U3	LOS ANGELE	24	TCM	TRNH6	0	SAN FERNANDO VALLEY NORT	12/31/2013	11702	PC40	2005/2006	2710	0	3500
LA	LA29202U3	LA29202U3	LOS ANGELE	24	TCM	TRNH6	0	SAN FERNANDO VALLEY NORT	12/31/2013	11702	5309c	2006/2007	0	0	235
LA	LA29202U3	LA29202U3	LOS ANGELE	24	TCM	TRNH6	0	SAN FERNANDO VALLEY NORT	12/31/2013	11702	5309c	2007/2008	0	0	131
LA	LA29202U3	LA29202U3	LOS ANGELE	24	TCM	TRNH6	0	SAN FERNANDO VALLEY NORT	12/31/2013	11702	PC40	2009/2010	0	0	4000
LA	LA29202U3	LA29202U3	LOS ANGELE	24	TCM	TRNH6	0	SAN FERNANDO VALLEY NORT	12/31/2013	11702	5309c	2010/2011	0	0	136
LA	LA29202W	LA29202W	LOS ANGELE	24	TCM	NCRT2	0	Wilshire Blvd BRTPhase I: 12.5	12/31/2013	80610	AGENCY	2003/2004	0	2200	0
LA	LA29202W	LA29202W	LOS ANGELE	24	TCM	NCRT2	0	Wilshire Blvd BRTPhase I: 12.5	12/31/2013	80610	CMAQ	2003/2004	0	16300	4900
LA	LA29202W	LA29202W	LOS ANGELE	24	TCM	NCRT2	0	Wilshire Blvd BRTPhase I: 12.5	12/31/2013	80610	AGENCY	2004/2005	0	0	600

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LA	LA29202W	LA29202W	LOS ANGELE	24	TCM	NCRT2	0	Wilshire Blvd BRTPhase I: 12.5	12/31/2013	80610	5309b	2010/2011	0	0	9759
LA	LA29202W	LA29202W	LOS ANGELE	24	TCM	NCRT2	0	Wilshire Blvd BRTPhase I: 12.5	12/31/2013	80610	LTF	2010/2011	0	0	3429
LA	LA29202W	LA29202W	LOS ANGELE	24	TCM	NCRT2	0	Wilshire Blvd BRTPhase I: 12.5	12/31/2013	80610	STA-1B	2010/2011	15	0	0
LA	LA29202W	LA29202W	LOS ANGELE	24	TCM	NCRT2	0	Wilshire Blvd BRTPhase I: 12.5	12/31/2013	80610	5309b	2011/2012	0	0	13558
LA	LA29202W	LA29202W	LOS ANGELE	24	TCM	NCRT2	0	Wilshire Blvd BRTPhase I: 12.5	12/31/2013	80610	LTF	2011/2012	0	0	4764
LA	LA963542	1TL104	LOS ANGELE	17	TCM Committed	BUN94	0	ACQUISTION REVENUE VEHIC	6/30/2014	619858	AB2766	2004/2005	0	0	800
LA	LA963542	1TL104	LOS ANGELE	17	TCM Committed	BUN94	0	ACQUISTION REVENUE VEHIC	6/30/2014	619858	AB2766	2005/2006	0	0	854
LA	LA963542	1TL104	LOS ANGELE	17	TCM Committed	BUN94	0	ACQUISTION REVENUE VEHIC	6/30/2014	619858	STPL-R	2005/2006	0	0	12510
LA	LA963542	1TL104	LOS ANGELE	17	TCM Committed	BUN94	0	ACQUISTION REVENUE VEHIC	6/30/2014	619858	5307LA	2007/2008	0	0	12071
LA	LA963542	1TL104	LOS ANGELE	17	TCM Committed	BUN94	0	ACQUISTION REVENUE VEHIC	6/30/2014	619858	5309c	2007/2008	0	0	5000
LA	LA963542	1TL104	LOS ANGELE	17	TCM Committed	BUN94	0	ACQUISTION REVENUE VEHIC	6/30/2014	619858	5307LA	2008/2009	0	0	28449
LA	LA963542	1TL104	LOS ANGELE	17	TCM Committed	BUN94	0	ACQUISTION REVENUE VEHIC	6/30/2014	619858	5309c	2008/2009	0	0	5000
LA	LA963542	1TL104	LOS ANGELE	17	TCM Committed	BUN94	0	ACQUISTION REVENUE VEHIC	6/30/2014	619858	AR-5307	2008/2009	0	0	84000
LA	LA963542	1TL104	LOS ANGELE	17	TCM Committed	BUN94	0	ACQUISTION REVENUE VEHIC	6/30/2014	619858	CMAQ	2008/2009	0	0	45059
LA	LA963542	1TL104	LOS ANGELE	17	TCM Committed	BUN94	0	ACQUISTION REVENUE VEHIC	6/30/2014	619858	PC40	2008/2009	0	0	180000
LA	LA963542	1TL104	LOS ANGELE	17	TCM Committed	BUN94	0	ACQUISTION REVENUE VEHIC	6/30/2014	619858	STA-1B	2008/2009	0	0	20000
LA	LA963542	1TL104	LOS ANGELE	17	TCM Committed	BUN94	0	ACQUISTION REVENUE VEHIC	6/30/2014	619858	PC40	2009/2010	0	0	43956
LA	LA963542	1TL104	LOS ANGELE	17	TCM Committed	BUN94	0	ACQUISTION REVENUE VEHIC	6/30/2014	619858	PC40	2011/2012	0	0	194
LA	LA963542	1TL104	LOS ANGELE	17	TCM Committed	BUN94	0	ACQUISTION REVENUE VEHIC	6/30/2014	619858	PC40	2012/2013	0	0	2397
LA	LA963542	1TL104	LOS ANGELE	17	TCM Committed	BUN94	0	ACQUISTION REVENUE VEHIC	6/30/2014	619858	STPL-R	2012/2013	0	0	28900
LA	LA963542	1TL104	LOS ANGELE	17	TCM Committed	BUN94	0	ACQUISTION REVENUE VEHIC	6/30/2014	619858	PC40	2013/2014	0	0	1930
LA	LA963542	1TL104	LOS ANGELE	17	TCM Committed	BUN94	0	ACQUISTION REVENUE VEHIC	6/30/2014	619858	STPL-R	2013/2014	0	0	6000
LA	LA974165	LA974165	LOS ANGELE	17	TCM Committed	TRRH6	0	MACARTHUR PARK STATION I	12/30/2011	1931	CO	2007/2008	399	0	0
LA	LA974165	LA974165	LOS ANGELE	17	TCM Committed	TRRH6	0	MACARTHUR PARK STATION I	12/30/2011	1931	LTF	2011/2012	0	0	386
LA	LA974165	LA974165	LOS ANGELE	17	TCM Committed	TRRH6	0	MACARTHUR PARK STATION IM	12/30/2011	1931	STPE-P	2011/2012	0	0	229
LA	LA974165	LA974165	LOS ANGELE	17	TCM Committed	TRRH6	0	MACARTHUR PARK STATION IM	12/30/2011	1931	STPE-R	2011/2012	0	0	917
LA	LA996134	LA996134	CALTRANS	0	TCM Committed	CAN71	5	Route 5: RTE. 5/14 INTERCHAN	5/24/2013	161100	PC25	2004/2005	0	2000	0
LA	LA996134	LA996134	CALTRANS	0	TCM Committed	CAN71	5	Route 5: RTE. 5/14 INTERCHA	5/24/2013	161100	STCASHR	2005/2006	6372	1776	0
LA	LA996134	LA996134	CALTRANS	0	TCM Committed	CAN71	5	Route 5: RTE. 5/14 INTERCHA	5/24/2013	161100	PC25	2006/2007	4006	0	0
LA	LA996134	LA996134	CALTRANS	0	TCM Committed	CAN71	5	Route 5: RTE. 5/14 INTERCHAN	5/24/2013	161100	STCASHR	2006/2007	3744	0	29208
LA	LA996134	LA996134	CALTRANS	0	TCM Committed	CAN71	5	Route 5: RTE. 5/14 INTERCHAN	5/24/2013	161100	CMAQ	2007/2008	0	0	109494
LA	LA996134	LA996134	CALTRANS	0	TCM Committed	CAN71	5	Route 5: RTE. 5/14 INTERCHAN	5/24/2013	161100	CMAQ	2008/2009	0	0	4500
LA	LAE0001A	LAE0001A	GLENDALE	0	TCM Committed	BUN94	0	PURCHASE OF 2 CNG BUSES F	12/1/2011	786	5309c	2010/2011	0	0	386
LA	LAE0001A	LAE0001A	GLENDALE	0	TCM Committed	BUN94	0	PURCHASE OF 2 CNG BUSES FO	12/1/2011	786	PC25	2010/2011	0	0	400
LA	LAE0036	LAE0036	LOS ANGELE	0	TCM Committed	NCR27	0	WILSHIRE/ VERMONT PEDESTR	10/1/2011	1960	5309c	2006/2007	0	0	1123
LA	LAE0036	LAE0036	LOS ANGELE	0	TCM Committed	NCR27	0	WILSHIRE/ VERMONT PEDEST	10/1/2011	1960	AGENCY	2006/2007	0	0	281
LA	LAE0036	LAE0036	LOS ANGELE	0	TCM Committed	NCR27	0	WILSHIRE/ VERMONT PEDEST	10/1/2011	1960	5309c	2007/2008	0	0	218
LA	LAE0036	LAE0036	LOS ANGELE	0	TCM Committed	NCR27	0	WILSHIRE/ VERMONT PEDEST	10/1/2011	1960	AGENCY	2007/2008	0	0	55
LA	LAE0036	LAE0036	LOS ANGELE	0	TCM Committed	NCR27	0	WILSHIRE/ VERMONT PEDESTR	10/1/2011	1960	5309c	2008/2009	0	0	226
LA	LAE0036	LAE0036	LOS ANGELE	0	TCM Committed	NCR27	0	WILSHIRE/ VERMONT PEDESTR	10/1/2011	1960	AGENCY	2008/2009	0	0	57
LA	LAE0039	LAE0039	MONROVIA	24	TCM	NCRT2	0	TRANSIT VILLAGE - PROVIDE A	12/31/2012	3026	5309c	2010/2011	0	0	1909
LA	LAE0039	LAE0039	MONROVIA	24	TCM	NCRT2	0	TRANSIT VILLAGE - PROVIDE A	12/31/2012	3026	CITY	2010/2011	0	0	179

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LA	LAE0039	LAE0039	MONROVIA	24	TCM	NCRT2	0	TRANSIT VILLAGE - PROVIDE A	12/31/2012	3026	5309c	2011/2012	0	0	750
LA	LAE0039	LAE0039	MONROVIA	24	TCM	NCRT2	0	TRANSIT VILLAGE - PROVIDE A	12/31/2012	3026	CITY	2011/2012	0	0	188
LA	LAE0076	LAE0076	BALDWIN PA	1	TCM Committed	NCN25	0	CONSTRUCT ADD'L VEHICLE PA	12/31/2014	2085	5309c	2010/2011	518	0	1150
LA	LAE0076	LAE0076	BALDWIN PA	1	TCM Committed	NCN25	0	CONSTRUCT ADD'L VEHICLE P	12/31/2014	2085	CITY	2010/2011	130	0	287
LA	LAE0132	LAE0132	CARSON, CIT	0	TCM Committed	BUN93	0	PURCHASE A NEW ALTERNATE	12/31/2011	250	5309c	2006/2007	0	0	48
LA	LAE0132	LAE0132	CARSON, CIT	0	TCM Committed	BUN93	0	PURCHASE A NEW ALTERNATE	12/31/2011	250	CITY	2006/2007	0	0	25
LA	LAE0132	LAE0132	CARSON, CIT	0	TCM Committed	BUN93	0	PURCHASE A NEW ALTERNATE	12/31/2011	250	5309c	2007/2008	0	0	50
LA	LAE0132	LAE0132	CARSON, CIT	0	TCM Committed	BUN93	0	PURCHASE A NEW ALTERNATE	12/31/2011	250	CITY	2007/2008	0	0	8
LA	LAE0132	LAE0132	CARSON, CIT	0	TCM Committed	BUN93	0	PURCHASE A NEW ALTERNATE	12/31/2011	250	5309c	2010/2011	0	0	111
LA	LAE0132	LAE0132	CARSON, CIT	0	TCM Committed	BUN93	0	PURCHASE A NEW ALTERNATE	12/31/2011	250	CITY	2010/2011	0	0	8
LA	LAE0195	LAE0195	LOS ANGELE	0	TCM Committed	TRNH6	0	DESIGN AND CONSTRUCT IMP	10/1/2014	4049	5309c	2006/2007	0	0	394
LA	LAE0195	LAE0195	LOS ANGELE	0	TCM Committed	TRNH6	0	DESIGN AND CONSTRUCT IMP	10/1/2014	4049	BONDL	2006/2007	0	0	99
LA	LAE0195	LAE0195	LOS ANGELE	0	TCM Committed	TRNH6	0	DESIGN AND CONSTRUCT IMP	10/1/2014	4049	5309c	2007/2008	0	0	218
LA	LAE0195	LAE0195	LOS ANGELE	0	TCM Committed	TRNH6	0	DESIGN AND CONSTRUCT IMP	10/1/2014	4049	BONDL	2007/2008	0	0	55
LA	LAE0195	LAE0195	LOS ANGELE	0	TCM Committed	TRNH6	0	DESIGN AND CONSTRUCT IMP	10/1/2014	4049	BONDL	2008/2009	0	0	111
LA	LAE0195	LAE0195	LOS ANGELE	0	TCM Committed	TRNH6	0	DESIGN AND CONSTRUCT IMP	10/1/2014	4049	CITY	2009/2010	0	0	257
LA	LAE0195	LAE0195	LOS ANGELE	0	TCM Committed	TRNH6	0	DESIGN AND CONSTRUCT IMP	10/1/2014	4049	5309c	2010/2011	0	0	443
LA	LAE0195	LAE0195	LOS ANGELE	0	TCM Committed	TRNH6	0	DESIGN AND CONSTRUCT IMP	10/1/2014	4049	CITY	2010/2011	0	0	294
LA	LAE0195	LAE0195	LOS ANGELE	0	TCM Committed	TRNH6	0	DESIGN AND CONSTRUCT IMP	10/1/2014	4049	CITY	2012/2013	0	0	969
LA	LAE0195	LAE0195	LOS ANGELE	0	TCM Committed	TRNH6	0	DESIGN AND CONSTRUCT IMP	10/1/2014	4049	CMAQ	2012/2013	0	0	1208
LA	LAE0332	LAE0332	LONG BEAC	6	TCM Committed	TDN64	0	LONG BEACH PARK AND RIDE	10/1/2011	1002	5309c	2011/2012	0	0	836
LA	LAE0332	LAE0332	LONG BEAC	6	TCM Committed	TDN64	0	LONG BEACH PARK AND RIDE	10/1/2011	1002	PROPA	2011/2012	0	0	166
LA	LAE0364	LAE0364	SANTA MON	24	TCM	TDR64	0	Santa Monica's Big Blue Bus/Sa	12/31/2013	2000	5309c	2010/2011	0	0	836
LA	LAE0364	LAE0364	SANTA MON	24	TCM	TDR64	0	Santa Monica's Big Blue Bus/Sa	12/31/2013	2000	AGENCY	2010/2011	0	0	1164
LA	LAE0388A	LAE0388A	LOS ANGELE	0	TCM Committed	TRNH6	0	DESIGN AND CONSTRUCT IMP	12/31/2010	263	5309c	2007/2008	0	0	153
LA	LAE0388A	LAE0388A	LOS ANGELE	0	TCM Committed	TRNH6	0	DESIGN AND CONSTRUCT IMP	12/31/2010	263	BONDL	2007/2008	0	0	39
LA	LAE0388A	LAE0388A	LOS ANGELE	0	TCM Committed	TRNH6	0	DESIGN AND CONSTRUCT IMP	12/31/2010	263	5309c	2010/2011	0	0	56
LA	LAE0388A	LAE0388A	LOS ANGELE	0	TCM Committed	TRNH6	0	DESIGN AND CONSTRUCT IMP	12/31/2010	263	BONDL	2010/2011	0	0	15
LA	LAE0396	LAE0396	BURBANK	1	TCM Committed	TRRH6	0	CONSTRUCTION OF EMPIRE AR	12/31/2011	1723	5309c	2007/2008	776	0	0
LA	LAE0396	LAE0396	BURBANK	1	TCM Committed	TRRH6	0	CONSTRUCTION OF EMPIRE A	12/31/2011	1723	CITY	2008/2009	189	0	0
LA	LAE0396	LAE0396	BURBANK	1	TCM Committed	TRRH6	0	CONSTRUCTION OF EMPIRE A	12/31/2011	1723	5309c	2010/2011	50	0	556
LA	LAE0396	LAE0396	BURBANK	1	TCM Committed	TRRH6	0	CONSTRUCTION OF EMPIRE A	12/31/2011	1723	CITY	2010/2011	12	0	140
LA	LAE1296	LAE1296	LONG BEACH	0	TCM Committed	ITS12	0	LONG BEACH INTELLIGENT TR	9/30/2012	2880	DEMOSTL	2010/2011	480	0	1920
LA	LAE1296	LAE1296	LONG BEACH	0	TCM Committed	ITS12	0	LONG BEACH INTELLIGENT TR	9/30/2012	2880	LTF	2010/2011	96	0	384
LA	LAE2932	LAE2932	CARSON, CIT	0	TCM Committed	NCR27	0	213TH ST. PEDESTRIAN SIDEW	12/31/2012	2200	AGENCY	2009/2010	200	0	0
LA	LAE2932	LAE2932	CARSON, CIT	0	TCM Committed	NCR27	0	213TH ST. PEDESTRIAN SIDEW	12/31/2012	2200	AGENCY	2010/2011	0	0	1200
LA	LAE2932	LAE2932	CARSON, CIT	0	TCM Committed	NCR27	0	213TH ST. PEDESTRIAN SIDEW	12/31/2012	2200	DEMOSTL	2010/2011	0	0	800
LA	LAE3790	LAE3790	PASADENA	0	TCM Committed	ITS08	0	THE PASADENA ITS INTEGRATE	6/30/2011	3545	5309c	2008/2009	0	0	226
LA	LAE3790	LAE3790	PASADENA	0	TCM Committed	ITS08	0	THE PASADENA ITS INTEGRATE	6/30/2011	3545	DEMOSTL	2008/2009	200	0	0
LA	LAE3790	LAE3790	PASADENA	0	TCM Committed	ITS08	0	THE PASADENA ITS INTEGRAT	6/30/2011	3545	LTF	2008/2009	40	0	57
LA	LAE3790	LAE3790	PASADENA	0	TCM Committed	ITS08	0	THE PASADENA ITS INTEGRATE	6/30/2011	3545	DEMOSTL	2009/2010	0	0	1800
LA	LAE3790	LAE3790	PASADENA	0	TCM Committed	ITS08	0	THE PASADENA ITS INTEGRATE	6/30/2011	3545	LTF	2009/2010	0	0	431

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LA	LAF1424	LAF1424	SANTA CLAR	24	TCM	TDN64	0	McBean Regional Transit Cente	10/1/2013	5868	AR-5307	2008/2009	300	0	1136
LA	LAF1424	LAF1424	SANTA CLAR	24	TCM	TDN64	0	McBean Regional Transit Cente	10/1/2013	5868	PROPALR	2008/2009	23	730	709
LA	LAF1424	LAF1424	SANTA CLAR	24	TCM	TDN64	0	McBean Regional Transit Cent	10/1/2013	5868	CMAQ	2009/2010	200	0	2770
LA	LAF1450	1TL104	LOS ANGELE	0	TCM Committed	TDR64	0	Encino Park-and-Ride Facility R	10/1/2013	1295	CMAQ	2008/2009	0	0	1036
LA	LAF1450	1TL104	LOS ANGELE	0	TCM Committed	TDR64	0	Encino Park-and-Ride Facility R	10/1/2013	1295	LTF	2009/2010	0	0	92
LA	LAF1450	1TL104	LOS ANGELE	0	TCM Committed	TDR64	0	Encino Park-and-Ride Facility R	10/1/2013	1295	LTF	2010/2011	0	0	167
LA	LAF1455	LAF1455	BURBANK	24	TCM	BUN94	0	Cross-Town Transit Connector	10/1/2015	811	CITY	2012/2013	0	0	162
LA	LAF1455	LAF1455	BURBANK	24	TCM	BUN94	0	Cross-Town Transit Connector	10/1/2015	811	CMAQ	2012/2013	0	0	649
LA	LAF1501	1NL04	AVALON	0	TCM Committed	NCR31	0	County Club Drive Bikeway Imp	10/1/2013	1802	CITY	2008/2009	0	0	280
LA	LAF1501	1NL04	AVALON	0	TCM Committed	NCR31	0	County Club Drive Bikeway Imp	10/1/2013	1802	CITY	2010/2011	0	0	153
LA	LAF1501	1NL04	AVALON	0	TCM Committed	NCR31	0	County Club Drive Bikeway Imp	10/1/2013	1802	CMAQ	2010/2011	0	0	1369
LA	LAF1502	1NL04	BURBANK	12	TCM Committed	NCN26	0	San Fernando Bikeway. Imple	6/30/2014	8239	CITY	2010/2011	190	54	150
LA	LAF1502	1NL04	BURBANK	12	TCM Committed	NCN26	0	San Fernando Bikeway. Imple	6/30/2014	8239	CMAQ	2010/2011	761	216	1000
LA	LAF1502	1NL04	BURBANK	12	TCM Committed	NCN26	0	San Fernando Bikeway. Imple	6/30/2014	8239	CITY	2011/2012	0	0	552
LA	LAF1502	1NL04	BURBANK	12	TCM Committed	NCN26	0	San Fernando Bikeway. Implem	6/30/2014	8239	CMAQ	2011/2012	0	0	4618
LA	LAF1502	1NL04	BURBANK	12	TCM Committed	NCN26	0	San Fernando Bikeway. Imple	6/30/2014	8239	CITY	2012/2013	0	0	698
LA	LAF1503	1NL04	SAN DIMAS	3	TCM Committed	NCR26	0	Bikeway Improvements on Fo	12/1/2013	2390	CITY	2010/2011	18	0	0
LA	LAF1503	1NL04	SAN DIMAS	3	TCM Committed	NCR26	0	Bikeway Improvements on Fo	12/1/2013	2390	STPE-R	2010/2011	30	0	0
LA	LAF1503	1NL04	SAN DIMAS	3	TCM Committed	NCR26	0	Bikeway Improvements on Foo	12/1/2013	2390	CITY	2011/2012	372	95	0
LA	LAF1503	1NL04	SAN DIMAS	3	TCM Committed	NCR26	0	Bikeway Improvements on Foo	12/1/2013	2390	STPE-R	2011/2012	75	0	0
LA	LAF1503	1NL04	SAN DIMAS	3	TCM Committed	NCR26	0	Bikeway Improvements on Foo	12/1/2013	2390	CITY	2012/2013	300	0	411
LA	LAF1503	1NL04	SAN DIMAS	3	TCM Committed	NCR26	0	Bikeway Improvements on Fo	12/1/2013	2390	STPE-R	2012/2013	0	0	1089
LA	LAF1504	1NL04	EL MONTE	0	TCM Committed	NCR26	0	El Monte: Transit Cycle Friendl	10/1/2013	167	CITY	2010/2011	0	0	56
LA	LAF1504	1NL04	EL MONTE	0	TCM Committed	NCR26	0	El Monte: Transit Cycle Friendl	10/1/2013	167	CMAQ	2010/2011	0	0	111
LA	LAF1506	1NL04	RANCHO PA	0	TCM Committed	NCR26	0	Bike Compatible Rdwy Safety	10/9/2014	788	CITY	2008/2009	14	0	0
LA	LAF1506	1NL04	RANCHO PA	0	TCM Committed	NCR26	0	Bike Compatible Rdwy Safety	10/9/2014	788	CITY	2009/2010	0	0	144
LA	LAF1506	1NL04	RANCHO PA	0	TCM Committed	NCR26	0	Bike Compatible Rdwy Safety	10/9/2014	788	CMAQ	2010/2011	56	0	0
LA	LAF1506	1NL04	RANCHO PA	0	TCM Committed	NCR26	0	Bike Compatible Rdwy Safety a	10/9/2014	788	CMAQ	2011/2012	0	0	574
LA	LAF1507	1NL04	PALMDALE	0	TCM Committed	NCR26	0	Avenue S Bikeway Phase 2. Cla	10/1/2014	1733	CITY	2008/2009	22	31	0
LA	LAF1507	1NL04	PALMDALE	0	TCM Committed	NCR26	0	Avenue S Bikeway Phase 2. Cla	10/1/2014	1733	CITY	2009/2010	25	30	0
LA	LAF1507	1NL04	PALMDALE	0	TCM Committed	NCR26	0	Avenue S Bikeway Phase 2. Cla	10/1/2014	1733	CITY	2010/2011	0	123	636
LA	LAF1507	1NL04	PALMDALE	0	TCM Committed	NCR26	0	Avenue S Bikeway Phase 2. Cla	10/1/2014	1733	CMAQ	2010/2011	48	183	0
LA	LAF1507	1NL04	PALMDALE	0	TCM Committed	NCR26	0	Avenue S Bikeway Phase 2. Cla	10/1/2014	1733	CMAQ	2011/2012	0	0	635
LA	LAF1510	1NL04	CLAREMONT	4	TCM Committed	NCR26	0	Claremont Portion of the Citru	10/1/2012	1794	CITY	2008/2009	0	0	99
LA	LAF1510	1NL04	CLAREMONT	4	TCM Committed	NCR26	0	Claremont Portion of the Citru	10/1/2012	1794	CITY	2010/2011	0	0	447
LA	LAF1510	1NL04	CLAREMONT	4	TCM Committed	NCR26	0	Claremont Portion of the Citru	10/1/2012	1794	CMAQ	2010/2011	0	0	1248
LA	LAF1513	1NL04	LOS ANGELE	4	TCM Committed	NCR26	0	Fiji Way Bicycle Lane Project.	10/9/2014	1007	CMAQ	2009/2010	236	0	0
LA	LAF1513	1NL04	LOS ANGELE	4	TCM Committed	NCR26	0	Fiji Way Bicycle Lane Project.	10/9/2014	1007	CO	2010/2011	59	0	0
LA	LAF1513	1NL04	LOS ANGELE	4	TCM Committed	NCR26	0	Fiji Way Bicycle Lane Project. W	10/9/2014	1007	CITY	2012/2013	0	0	143
LA	LAF1513	1NL04	LOS ANGELE	4	TCM Committed	NCR26	0	Fiji Way Bicycle Lane Project. W	10/9/2014	1007	CMAQ	2012/2013	0	0	569
LA	LAF1524	1NL04	LOS ANGELE	0	TCM Committed	NCN26	0	San Fernando Rd. Bike Path Ph	10/1/2015	10463	LTF	2011/2012	0	0	2093
LA	LAF1524	1NL04	LOS ANGELE	0	TCM Committed	NCN26	0	San Fernando Rd. Bike Path Ph	10/1/2015	10463	STPE-R	2011/2012	0	0	8370

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LA	LAF1529	1NL04	ROLLING HIL	1	TCM Committed	NCR26	0	Palos Verdes Drive North Bike	12/31/2012	2574	CITY	2009/2010	6	0	0
LA	LAF1529	1NL04	ROLLING HIL	1	TCM Committed	NCR26	0	Palos Verdes Drive North Bike	12/31/2012	2574	CITY	2010/2011	44	0	465
LA	LAF1529	1NL04	ROLLING HIL	1	TCM Committed	NCR26	0	Palos Verdes Drive North Bike	12/31/2012	2574	STPE-P	2010/2011	232	0	0
LA	LAF1529	1NL04	ROLLING HIL	1	TCM Committed	NCR26	0	Palos Verdes Drive North Bike	12/31/2012	2574	STPE-R	2011/2012	0	0	1803
LA	LAF1530	1NL04	LONG BEAC	0	TCM Committed	NCR26	0	Bicycle System Gap Closures &	10/1/2014	1231	CMAQ	2010/2011	103	0	0
LA	LAF1530	1NL04	LONG	0	TCM Committed	NCR26	0	Bicycle System Gap Closures &	10/1/2014	1231	LTF	2010/2011	45	0	286
LA	LAF1530	1NL04	LONG	0	TCM Committed	NCR26	0	Bicycle System Gap Closures &	10/1/2014	1231	CMAQ	2011/2012	0	0	759
LA	LAF1530	1NL04	LONG	0	TCM Committed	NCR26	0	Bicycle System Gap Closures &	10/1/2014	1231	LTF	2011/202	0	0	38
LA	LAF1534	1NL04	SANTA MON	1	TCM Committed	NCR26	0	Bike Technology Demonstratio	6/30/2015	399	CITY	2008/2009	5	0	0
LA	LAF1534	1NL04	SANTA MON	1	TCM Committed	NCR26	0	Bike Technology Demonstratio	6/30/2015	399	CMAQ	2008/2009	52	0	0
LA	LAF1534	1NL04	SANTA MON	1	TCM Committed	NCR26	0	Bike Technology Demonstratio	6/30/2015	399	PC10	2008/2009	17	0	0
LA	LAF1534	1NL04	SANTA MON	1	TCM Committed	NCR26	0	Bike Technology Demonstratio	6/30/2015	399	CITY	2009/2010	6	0	0
LA	LAF1534	1NL04	SANTA MON	1	TCM Committed	NCR26	0	Bike Technology Demonstratio	6/30/2015	399	CMAQ	2009/2010	59	0	0
LA	LAF1534	1NL04	SANTA MON	1	TCM Committed	NCR26	0	Bike Technology Demonstratio	6/30/2015	399	PC10	2009/2010	0	0	56
LA	LAF1534	1NL04	SANTA MON	1	TCM Committed	NCR26	0	Bike Technology Demonstratio	6/30/2015	399	CITY	2010/2011	0	0	17
LA	LAF1534	1NL04	SANTA MON	1	TCM Committed	NCR26	0	Bike Technology Demonstratio	6/30/2015	399	CMAQ	2010/2011	0	0	168
LA	LAF1534	1NL04	SANTA MON	1	TCM Committed	NCR26	0	Bike Technology Demonstratio	6/30/2015	399	PC10	2010/2011	19	0	0
LA	LAF1605	1NL04	RANCHO PA	0	TCM Committed	NCR27	0	Pedestrian Safe Bus Stop Linka	12/9/2013	1544	CITY	2009/2010	25	0	115
LA	LAF1605	1NL04	RANCHO PA	0	TCM Committed	NCR27	0	Pedestrian Safe Bus Stop Linka	12/9/2013	1544	CITY	2010/2011	25	0	262
LA	LAF1605	1NL04	RANCHO PA	0	TCM Committed	NCR27	0	Pedestrian Safe Bus Stop Linka	12/9/2013	1544	CMAQ	2010/2011	40	0	0
LA	LAF1605	1NL04	RANCHO PA	0	TCM Committed	NCR27	0	Pedestrian Safe Bus Stop Linka	12/9/2013	1544	CMAQ	2011/2012	0	0	1077
LA	LAF1607	1NL04	ARTESIA	0	TCM Committed	NCR31	0	South Street Pedestrian,	10/1/2014	1457	CITY	2009/2010	49	0	0
LA	LAF1607	1NL04	ARTESIA	0	TCM Committed	NCR31	0	South Street Pedestrian,	10/1/2014	1457	CMAQ	2009/2010	195	0	0
LA	LAF1607	1NL04	ARTESIA	0	TCM Committed	NCR31	0	South Street Pedestrian,	10/1/2014	1457	CITY	2012/2013	0	0	242
LA	LAF1607	1NL04	ARTESIA	0	TCM Committed	NCR31	0	South Street Pedestrian,	10/1/2014	1457	CMAQ	2012/2013	0	0	971
LA	LAF1615	1NL04	LOS ANGELE	0	TCM Committed	TRRH6	0	Eastside Light Rail Pedestrian	6/29/2012	2990	CITY	2008/2009	80	0	0
LA	LAF1615	1NL04	LOS ANGELE	0	TCM Committed	TRRH6	0	Eastside Light Rail Pedestrian	6/29/2012	2990	CMAQ	2008/2009	320	0	0
LA	LAF1615	1NL04	LOS ANGELE	0	TCM Committed	TRRH6	0	Eastside Light Rail Pedestrian	6/29/2012	2990	CITY	2009/2010	0	0	518
LA	LAF1615	1NL04	LOS ANGELE	0	TCM Committed	TRRH6	0	Eastside Light Rail Pedestrian	6/29/2012	2990	CMAQ	2009/2010	0	0	2072
LA	LAF1635	1NL04	LOS ANGELE	0	TCM Committed	TRRH6	0	Florence Avenue Pedestrian	10/1/2014	7988	CO	2008/2009	0	0	668
LA	LAF1635	1NL04	LOS ANGELE	0	TCM Committed	TRRH6	0	Florence Avenue Pedestrian	10/1/2014	7988	STPE-R	2009/2010	0	0	3994
LA	LAF1635	1NL04	LOS ANGELE	0	TCM Committed	TRRH6	0	Florence Avenue Pedestrian	10/1/2014	7988	CO	2011/2012	0	0	3326
LA	LAF1654	1NL04	BALDWIN P	0	TCM Committed	NCN27	0	Baldwin Park Metrolink Pedest	10/1/2015	1810	CITY	2012/2013	0	0	905
LA	LAF1654	1NL04	BALDWIN P	0	TCM Committed	NCN27	0	Baldwin Park Metrolink Pedest	10/1/2015	1810	CMAQ	2012/2013	0	0	905
LA	LAF1657	1NL04	LOS ANGELE	0	TCM Committed	TRRH6	0	Los Angeles Valley College	10/1/2013	2959	BONDL	2008/2009	0	0	335
LA	LAF1657	1NL04	LOS ANGELE	0	TCM Committed	TRRH6	0	Los Angeles Valley College (LA	10/1/2013	2959	5309c	2010/2011	0	0	1625
LA	LAF1657	1NL04	LOS ANGELE	0	TCM Committed	TRRH6	0	Los Angeles Valley College (LA	10/1/2013	2959	CITY	2010/2011	0	0	574
LA	LAF1657	1NL04	LOS ANGELE	0	TCM Committed	TRRH6	0	Los Angeles Valley College (LA	10/1/2013	2959	CMAQ	2010/2011	0	0	425
LA	LAF1659	1NL04	CULVER CITY	2	TCM Committed	TRRH6	0	Pedestrian Improvements for I	6/30/2013	1066	CITY	2010/2011	32	0	0
LA	LAF1659	1NL04	CULVER CITY	2	TCM Committed	TRRH6	0	Pedestrian Improvements for I	6/30/2013	1066	STPE-R	2010/2011	59	0	0
LA	LAF1659	1NL04	CULVER CITY	2	TCM Committed	TRRH6	0	Pedestrian Improvements for I	6/30/2013	1066	CITY	2011/2012	0	0	341
LA	LAF1659	1NL04	CULVER CITY	2	TCM Committed	TRRH6	0	Pedestrian Improvements for I	6/30/2013	1066	STPE-R	2011/2012	0	0	634

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LA	LAF1704	1TL104	LOS ANGELE	3	TCM Committed	TDM24	0	Downtown L.A. Alternative Gre	6/27/2014	1026	CITY	2010/2011	0	0	205
LA	LAF1704	1TL104	LOS ANGELE	3	TCM Committed	TDM24	0	Downtown L.A. Alternative Gre	6/27/2014	1026	CMAQ	2010/2011	0	0	821
LA	LAF1708	1TL104	LOS ANGELE	17	TCM Committed	TDM24	0	Hollywood Integrated Modal I	9/21/2015	3130	AGENCY	2010/2011	167	0	0
LA	LAF1708	1TL104	LOS ANGELE	17	TCM Committed	TDM24	0	Hollywood Integrated Modal In	9/21/2015	3130	CMAQ	2010/2011	274	0	0
LA	LAF1708	1TL104	LOS ANGELE	17	TCM Committed	TDM24	0	Hollywood Integrated Modal In	9/21/2015	3130	AGENCY	2011/2012	0	0	859
LA	LAF1708	1TL104	LOS ANGELE	17	TCM Committed	TDM24	0	Hollywood Integrated Modal In	9/21/2015	3130	CMAQ	2011/2012	0	0	1408
LA	LAF1717	1TL104	CULVER CITY	8	TCM Committed	ITS12	0	Real-Time Motorist Parking Inf	6/30/2011	1072	AGENCY	2008/2009	22	0	0
LA	LAF1717	1TL104	CULVER CITY	8	TCM Committed	ITS12	0	Real-Time Motorist Parking Inf	6/30/2011	1072	CMAQ	2008/2009	41	0	0
LA	LAF1717	1TL104	CULVER CITY	8	TCM Committed	ITS12	0	Real-Time Motorist Parking Inf	6/30/2011	1072	AGENCY	2010/2011	11	0	181
LA	LAF1717	1TL104	CULVER CITY	8	TCM Committed	ITS12	0	Real-Time Motorist Parking Inf	6/30/2011	1072	CMAQ	2010/2011	92	0	725
LA	LAF3109	1AL04	HAWTHORN	12	TCM Committed	NCR91	0	Hawthorne Boulevard Mobility	1/15/2015	8200	CITY	2011/2012	158	0	0
LA	LAF3109	1AL04	HAWTHORN	12	TCM Committed	NCR91	0	Hawthorne Boulevard Mobility	1/15/2015	8200	PC25	2011/2012	100	0	218
LA	LAF3109	1AL04	HAWTHORN	12	TCM Committed	NCR91	0	Hawthorne Boulevard Mobility	1/15/2015	8200	CITY	2012/2013	0	0	444
LA	LAF3109	1AL04	HAWTHORN	12	TCM Committed	NCR91	0	Hawthorne Boulevard Mobilit	1/15/2015	8200	PC25	2012/2013	300	0	214
LA	LAF3109	1AL04	HAWTHORN	12	TCM Committed	NCR91	0	Hawthorne Boulevard Mobilit	1/15/2015	8200	CITY	2013/2014	0	0	510
LA	LAF3109	1AL04	HAWTHORN	12	TCM Committed	NCR91	0	Hawthorne Boulevard Mobilit	1/15/2015	8200	MEA_R	2013/2014	171	0	4000
LA	LAF3109	1AL04	HAWTHORN	12	TCM Committed	NCR91	0	Hawthorne Boulevard Mobilit	1/15/2015	8200	PC25	2013/2014	0	0	2085
LA	LAF3170	1O0707	PORT OF LO	18	TCM Committed	TRN14	0	Port Truck Traffic Reduction Pr	12/1/2014	119079	CMAQ	2011/2012	0	0	7050
LA	LAF3170	1O0707	PORT OF LO	18	TCM Committed	TRN14	0	Port Truck Traffic Reduction Pr	12/1/2014	119079	PORT	2011/2012	0	0	2856
LA	LAF3170	1O0707	PORT OF LOS	18	TCM Committed	TRN14	0	Port Truck Traffic Reduction Pr	12/1/2014	119079	STPL-R	2011/2012	0	0	8584
LA	LAF3170	1O0707	PORT OF LOS	18	TCM Committed	TRN14	0	Port Truck Traffic Reduction P	12/1/2014	119079	TCIF	2011/2012	0	0	250
LA	LAF3170	1O0707	PORT OF LOS	18	TCM Committed	TRN14	0	Port Truck Traffic Reduction P	12/1/2014	119079	TIGGER	2011/2012	0	0	250
LA	LAF3170	1O0707	PORT OF LOS	18	TCM Committed	TRN14	0	Port Truck Traffic Reduction P	12/1/2014	119079	CMAQ	2012/2013	0	0	6503
LA	LAF3170	1O0707	PORT OF LO	18	TCM Committed	TRN14	0	Port Truck Traffic Reduction P	12/1/2014	119079	PORT	2012/2013	0	0	15385
LA	LAF3170	1O0707	PORT OF LO	18	TCM Committed	TRN14	0	Port Truck Traffic Reduction Pr	12/1/2014	119079	TCIF	2012/2013	0	0	23050
LA	LAF3170	1O0707	PORT OF LO	18	TCM Committed	TRN14	0	Port Truck Traffic Reduction Pr	12/1/2014	119079	TIGGER	2012/2013	0	0	8000
LA	LAF3170	1O0707	PORT OF LOS	18	TCM Committed	TRN14	0	Port Truck Traffic Reduction Pr	12/1/2014	119079	PORT	2013/2014	0	0	11471
LA	LAF3170	1O0707	PORT OF LO	18	TCM Committed	TRN14	0	Port Truck Traffic Reduction P	12/1/2014	119079	TCIF	2013/2014	0	0	27930
LA	LAF3170	1O0707	PORT OF LO	18	TCM Committed	TRN14	0	Port Truck Traffic Reduction Pr	12/1/2014	119079	TIGGER	2013/2014	0	0	7750
LA	LAF3419	1TL104	LOS ANGELE	0	TCM Committed	TRNH6	1	Sunset Junction Phase 2. Creat	6/30/2017	5869	STPE-P	2011/2012	0	0	50
LA	LAF3419	1TL104	LOS ANGELE	0	TCM Committed	TRNH6	1	Sunset Junction Phase 2. Creat	6/30/2017	5869	CITY	2012/2013	0	0	27
LA	LAF3419	1TL104	LOS ANGELE	0	TCM Committed	TRNH6	1	Sunset Junction Phase 2. Creat	6/30/2017	5869	STPE-P	2012/2013	0	0	170
LA	LAF3419	1TL104	LOS ANGELE	0	TCM Committed	TRNH6	1	Sunset Junction Phase 2. Creat	6/30/2017	5869	CITY	2013/2014	0	0	28
LA	LAF3419	1TL104	LOS ANGELE	0	TCM Committed	TRNH6	1	Sunset Junction Phase 2. Creat	6/30/2017	5869	CITY	2014/2015	0	0	1119
LA	LAF3419	1TL104	LOS ANGELE	0	TCM Committed	TRNH6	1	Sunset Junction Phase 2. Creat	6/30/2017	5869	CMAQ	2014/2015	0	0	3786
LA	LAF3419	1TL104	LOS ANGELE	0	TCM Committed	TRNH6	1	Sunset Junction Phase 2. Creat	6/30/2017	5869	STPE-P	2014/2015	0	0	689
LA	LAF3434	LAF3434	AZUSA	24	TCM	TDN64	0	Azusa Intermodal Transit Cent	1/30/2015	7832	DEMOSTL	2010/2011	2000	0	0
LA	LAF3434	LAF3434	AZUSA	24	TCM	TDN64	0	Azusa Intermodal Transit Cent	1/30/2015	7832	CITY	2013/2014	40	0	2271
LA	LAF3434	LAF3434	AZUSA	24	TCM	TDN64	0	Azusa Intermodal Transit Cent	1/30/2015	7832	CMAQ	2013/2014	0	0	3521
LA	LAFA141	1TL0703	BALDWIN PA	4	TCM Committed	TRRH6	0	Baldwin Park Metrolink Transp	11/1/2012	8046	CITY	2007/2008	264	0	0
LA	LAFA141	1TL0703	BALDWIN PA	4	TCM Committed	TRRH6	0	Baldwin Park Metrolink Transp	11/1/2012	8046	PC10	2007/2008	300	0	0
LA	LAFA141	1TL0703	BALDWIN P	4	TCM Committed	TRRH6	0	Baldwin Park Metrolink Transp	11/1/2012	8046	PC10	2010/2011	0	0	878

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LA	LAFA141	1TL0703	BALDWIN P	4	TCM Committed	TRRH6	0	Baldwin Park Metrolink Transp	11/1/2012	8046	PC25	2010/2011	0	0	794
LA	LAFA141	1TL0703	BALDWIN PA	4	TCM Committed	TRRH6	0	Baldwin Park Metrolink Transp	11/1/2012	8046	PC10	2011/2012	0	0	3009
LA	LAFA141	1TL0703	BALDWIN P	4	TCM Committed	TRRH6	0	Baldwin Park Metrolink Transp	11/1/2012	8046	PC25	2011/2012	0	0	2801
LA	LAOB416	REG0701	LOS ANGELE	0	TCM Committed	NCR27	101	Route 101: IN LOS ANGELES - D	6/30/2010	3916	LTF	2002/2003	0	0	2696
LA	LAOB416	REG0701	LOS ANGELE	0	TCM Committed	NCR27	101	Route 101: IN LOS ANGELES - D	6/30/2010	3916	STPE-I	2005/2006	0	0	1220
ORA	10254	10254	TCA	0	TCM Committed	CAR63	73	SJHC, 15 MI TOLL RD BETWEEN	12/31/2020	351111	PVT	2006/2007	540	0	0
ORA	10254	10254	TCA	0	TCM Committed	CAR63	73	SJHC, 15 MI TOLL RD BETWEEN	12/31/2020	351111	PVT	2007/2008	960	0	3440
ORA	10254	10254	TCA	0	TCM Committed	CAR63	73	SJHC, 15 MI TOLL RD BETWEE	12/31/2020	351111	PVT	2008/2009	540	0	5460
ORA	10254	10254	TCA	0	TCM Committed	CAR63	73	SJHC, 15 MI TOLL RD BETWEEN	12/31/2020	351111	PVT	2009/2010	90	0	5308
ORA	10254	10254	TCA	0	TCM Committed	CAR63	73	SJHC, 15 MI TOLL RD BETWEEN	12/31/2020	351111	PVT	2010/2011	60	0	0
ORA	10254	10254	TCA	0	TCM Committed	CAR63	73	SJHC, 15 MI TOLL RD BETWEEN	12/31/2020	351111	PVT	2011/2012	0	0	7713
ORA	10254	10254	TCA	0	TCM Committed	CAR63	73	SJHC, 15 MI TOLL RD BETWEE	12/31/2020	351111	PVT	2014/2015	900	0	0
ORA	10254	10254	TCA	0	TCM Committed	CAR63	73	SJHC, 15 MI TOLL RD BETWEE	12/31/2020	351111	PVT	2015/2016	0	0	8100
ORA	10254	10254	TCA	0	TCM Committed	CAR63	73	SJHC, 15 MI TOLL RD BETWEE	12/31/2020	351111	PVT	2017/2018	31800	0	0
ORA	10254	10254	TCA	0	TCM Committed	CAR63	73	SJHC, 15 MI TOLL RD BETWEEN	12/31/2020	351111	PVT	2018/2019	0	0	143100
ORA	10254	10254	TCA	0	TCM Committed	CAR63	73	SJHC, 15 MI TOLL RD BETWEE	12/31/2020	351111	PVT	2019/2020	0	0	143100
ORA	ORA000100	ORA000100	ANAHEIM	2	TCM Committed	CAXT8	5	GENE AUTRY WAY WEST @ I-5	2/28/2012	70984	DEMOT21	2004/2005	0	6333	0
ORA	ORA000100	ORA000100	ANAHEIM	2	TCM Committed	CAXT8	5	GENE AUTRY WAY WEST @ I-5	2/28/2012	70984	CITY	2006/2007	857	5050	0
ORA	ORA000100	ORA000100	ANAHEIM	2	TCM Committed	CAXT8	5	GENE AUTRY WAY WEST @ I-5	2/28/2012	70984	ORA-RIP	2006/2007	0	598	0
ORA	ORA000100	ORA000100	ANAHEIM	2	TCM Committed	CAXT8	5	GENE AUTRY WAY WEST @ I-5	2/28/2012	70984	CITY	2007/2008	938	0	0
ORA	ORA000100	ORA000100	ANAHEIM	2	TCM Committed	CAXT8	5	GENE AUTRY WAY WEST @ I-5	2/28/2012	70984	ORA-RIP	2007/2008	0	7000	0
ORA	ORA000100	ORA000100	ANAHEIM	2	TCM Committed	CAXT8	5	GENE AUTRY WAY WEST @ I-5	2/28/2012	70984	STPL-R	2007/2008	0	17000	0
ORA	ORA000100	ORA000100	ANAHEIM	2	TCM Committed	CAXT8	5	GENE AUTRY WAY WEST @ I-5	2/28/2012	70984	ORA-RIP	2008/2009	0	1003	0
ORA	ORA000100	ORA000100	ANAHEIM	2	TCM Committed	CAXT8	5	GENE AUTRY WAY WEST @ I-5	2/28/2012	70984	STPL-R	2008/2009	0	0	14155
ORA	ORA000100	ORA000100	ANAHEIM	2	TCM Committed	CAXT8	5	GENE AUTRY WAY WEST @ I-5	2/28/2012	70984	CITY	2009/2010	0	0	3900
ORA	ORA000100	ORA000100	ANAHEIM	2	TCM Committed	CAXT8	5	GENE AUTRY WAY WEST @ I-5	2/28/2012	70984	DEMISTE	2009/2010	0	3550	0
ORA	ORA000100	ORA000100	ANAHEIM	2	TCM Committed	CAXT8	5	GENE AUTRY WAY WEST @ I-5	2/28/2012	70984	STPL-R	2009/2010	0	0	10600
ORA	ORA000193	ORA000193	CALTRANS	3	TCM Committed	CAR62	22	HOV connectors from SR-22 to	9/1/2013	119625	CMAQ	2006/2007	12000	0	0
ORA	ORA000193	ORA000193	CALTRANS	3	TCM Committed	CAR62	22	HOV connectors from SR-22 to	9/1/2013	119625	CMAQ	2007/2008	0	12200	0
ORA	ORA000193	ORA000193	CALTRANS	3	TCM Committed	CAR62	22	HOV connectors from SR-22 to	9/1/2013	119625	CMAQ	2008/2009	0	0	25016
ORA	ORA000193	ORA000193	CALTRANS	3	TCM Committed	CAR62	22	HOV connectors from SR-22 to	9/1/2013	119625	AR-RSTP	2009/2010	0	0	49624
ORA	ORA000193	ORA000193	CALTRANS	3	TCM Committed	CAR62	22	HOV connectors from SR-22 to	9/1/2013	119625	CMAQ	2009/2010	0	0	20785
ORA	ORA000194	ORA000193	CALTRANS	3	TCM Committed	CAR62	405	HOV connectors from I-405 to	9/1/2013	159630	CMAQ	2006/2007	14000	0	0
ORA	ORA000194	ORA000193	CALTRANS	3	TCM Committed	CAR62	405	HOV connectors from I-405 to	9/1/2013	159630	CMAQ	2007/2008	0	5000	0
ORA	ORA000194	ORA000193	CALTRANS	3	TCM Committed	CAR62	405	HOV connectors from I-405 to	9/1/2013	159630	CITY	2009/2010	0	0	5200
ORA	ORA000194	ORA000193	CALTRANS	3	TCM Committed	CAR62	405	HOV connectors from I-405 to	9/1/2013	159630	CMIA	2009/2010	0	0	135430
ORA	ORA020113	ORA020113	FULLERTON	10	TCM Committed	TRRH6	0	FULLERTON TRAIN STATION - P	5/31/2012	33385	PTA-IIP	2006/2007	1000	0	0
ORA	ORA020113	ORA020113	FULLERTON	10	TCM Committed	TRRH6	0	FULLERTON TRAIN STATION - P	5/31/2012	33385	CITY	2007/2008	0	0	1500
ORA	ORA020113	ORA020113	FULLERTON	10	TCM Committed	TRRH6	0	FULLERTON TRAIN STATION - P	5/31/2012	33385	PTA-IIP	2007/2008	0	4250	0
ORA	ORA020113	ORA020113	FULLERTON	10	TCM Committed	TRRH6	0	FULLERTON TRAIN STATION -	5/31/2012	33385	PTA-RIP	2007/2008	0	3250	0
ORA	ORA020113	ORA020113	FULLERTON	10	TCM Committed	TRRH6	0	FULLERTON TRAIN STATION - P	5/31/2012	33385	ORA-TRN	2008/2009	0	3150	0
ORA	ORA020113	ORA020113	FULLERTON	10	TCM Committed	TRRH6	0	FULLERTON TRAIN STATION - P	5/31/2012	33385	ORA-TRN	2009/2010	0	0	7576

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ORA	ORA020113	ORA020113	FULLERTON	10	TCM Committed	TRRH6	0	FULLERTON TRAIN STATION -	5/31/2012	33385	P116	2009/2010	0	0	10772
ORA	ORA020113	ORA020113	FULLERTON	10	TCM Committed	TRRH6	0	FULLERTON TRAIN STATION -	5/31/2012	33385	PTA-IIP	2009/2010	0	0	1887
ORA	ORA030612	ORA030612	ORANGE CO	17	TCM Committed	TRNH6	0	PLACENTIA TRANSIT STATION	12/1/2014	23420	AGENCY	2005/2006	650	3500	0
ORA	ORA030612	ORA030612	ORANGE CO	17	TCM Committed	TRNH6	0	PLACENTIA TRANSIT STATION	12/1/2014	23420	STIPACRP	2006/2007	2500	0	0
ORA	ORA030612	ORA030612	ORANGE CO	17	TCM Committed	TRNH6	0	PLACENTIA TRANSIT STATION	12/1/2014	23420	AGENCY	2010/2011	20	0	0
ORA	ORA030612	ORA030612	ORANGE CO	17	TCM Committed	TRNH6	0	PLACENTIA TRANSIT STATION	12/1/2014	23420	CMAQ	2011/2012	50	0	8300
ORA	ORA030612	ORA030612	ORANGE CO	17	TCM Committed	TRNH6	0	PLACENTIA TRANSIT STATION	12/1/2014	23420	PTMISEA	2011/2012	100	0	8300
ORA	ORA041501	ORA041501	ORANGE CO	3	TCM Committed	BUR17	0	PURCHASE (71) STANDARD 30	6/30/2016	8998	TDA	2010/2011	0	0	5351
ORA	ORA041501	ORA041501	ORANGE CO	3	TCM Committed	BUR17	0	PURCHASE (71) STANDARD 30	6/30/2016	8998	TDA	2011/2012	0	0	3647
ORA	ORA050	ORA050	TCA	0	TCM Committed	CAR63	241	ETC (RTE 241/261/133) (RTE 9	12/31/2020	1156097	PVT	2000/2001	4	0	0
ORA	ORA050	ORA050	TCA	0	TCM Committed	CAR63	241	ETC (RTE 241/261/133) (RTE 9	12/31/2020	1156097	PVT	2001/2002	1	0	0
ORA	ORA050	ORA050	TCA	0	TCM Committed	CAR63	241	ETC (RTE 241/261/133) (RTE 9	12/31/2020	1156097	PVT	2004/2005	16	0	0
ORA	ORA050	ORA050	TCA	0	TCM Committed	CAR63	241	ETC (RTE 241/261/133) (RTE 9	12/31/2020	1156097	PVT	2005/2006	7	0	0
ORA	ORA050	ORA050	TCA	0	TCM Committed	CAR63	241	ETC (RTE 241/261/133) (RTE 9	12/31/2020	1156097	PVT	2006/2007	574	0	0
ORA	ORA050	ORA050	TCA	0	TCM Committed	CAR63	241	ETC (RTE 241/261/133) (RTE 9	12/31/2020	1156097	PVT	2007/2008	1700	0	3300
ORA	ORA050	ORA050	TCA	0	TCM Committed	CAR63	241	ETC (RTE 241/261/133) (RTE 9	12/31/2020	1156097	PVT	2008/2009	1500	0	4100
ORA	ORA050	ORA050	TCA	0	TCM Committed	CAR63	241	ETC (RTE 241/261/133) (RTE 9	12/31/2020	1156097	PVT	2009/2010	652	0	3356
ORA	ORA050	ORA050	TCA	0	TCM Committed	CAR63	241	ETC (RTE 241/261/133) (RTE 9	12/31/2020	1156097	PVT	2010/2011	72985	2000	0
ORA	ORA050	ORA050	TCA	0	TCM Committed	CAR63	241	ETC (RTE 241/261/133) (RTE 9	12/31/2020	1156097	PVT	2011/2012	0	0	220954
ORA	ORA050	ORA050	TCA	0	TCM Committed	CAR63	241	ETC (RTE 241/261/133) (RTE 9	12/31/2020	1156097	PVT	2012/2013	0	0	235949
ORA	ORA050	ORA050	TCA	0	TCM Committed	CAR63	241	ETC (RTE 241/261/133) (RTE 9	12/31/2020	1156097	PVT	2015/2016	0	0	86333
ORA	ORA050	ORA050	TCA	0	TCM Committed	CAR63	241	ETC (RTE 241/261/133) (RTE 9	12/31/2020	1156097	PVT	2017/2018	0	0	53667
ORA	ORA050	ORA050	TCA	0	TCM Committed	CAR63	241	ETC (RTE 241/261/133) (RTE 9	12/31/2020	1156097	PVT	2018/2019	0	0	53667
ORA	ORA050	ORA050	TCA	0	TCM Committed	CAR63	241	ETC (RTE 241/261/133) (RTE 9	12/31/2020	1156097	PVT	2019/2020	0	0	70000
ORA	ORA051	ORA051	TCA	0	TCM Committed	CAR63	241	(FTC-N) (OSO PKWY TO ETC) (1	12/31/2020	143517	PVT	2006/2007	700	0	0
ORA	ORA051	ORA051	TCA	0	TCM Committed	CAR63	241	(FTC-N) (OSO PKWY TO ETC) (1	12/31/2020	143517	PVT	2007/2008	1850	0	100
ORA	ORA051	ORA051	TCA	0	TCM Committed	CAR63	241	(FTC-N) (OSO PKWY TO ETC) (1	12/31/2020	143517	PVT	2008/2009	1570	0	6000
ORA	ORA051	ORA051	TCA	0	TCM Committed	CAR63	241	(FTC-N) (OSO PKWY TO ETC) (1	12/31/2020	143517	PVT	2009/2010	313	0	0
ORA	ORA051	ORA051	TCA	0	TCM Committed	CAR63	241	(FTC-N) (OSO PKWY TO ETC) (1	12/31/2020	143517	PVT	2010/2011	0	0	34492
ORA	ORA051	ORA051	TCA	0	TCM Committed	CAR63	241	(FTC-N) (OSO PKWY TO ETC) (1	12/31/2020	143517	PVT	2011/2012	0	0	34492
ORA	ORA051	ORA051	TCA	0	TCM Committed	CAR63	241	(FTC-N) (OSO PKWY TO ETC) (1	12/31/2020	143517	PVT	2012/2013	6400	0	0
ORA	ORA051	ORA051	TCA	0	TCM Committed	CAR63	241	(FTC-N) (OSO PKWY TO ETC) (1	12/31/2020	143517	PVT	2013/2014	0	0	28800
ORA	ORA051	ORA051	TCA	0	TCM Committed	CAR63	241	(FTC-N) (OSO PKWY TO ETC) (1	12/31/2020	143517	PVT	2015/2016	0	0	28800
ORA	ORA052	ORA052	TCA	9	TCM Committed	CAN67	241	(FTC-S) (I-5 TO OSO PKWY) (15	6/15/2030	1509133	PVT	2005/2006	5000	0	0
ORA	ORA052	ORA052	TCA	9	TCM Committed	CAN67	241	(FTC-S) (I-5 TO OSO PKWY) (15	6/15/2030	1509133	PVT	2006/2007	20000	35000	0
ORA	ORA052	ORA052	TCA	9	TCM Committed	CAN67	241	(FTC-S) (I-5 TO OSO PKWY) (15	6/15/2030	1509133	PVT	2007/2008	10000	0	80000
ORA	ORA052	ORA052	TCA	9	TCM Committed	CAN67	241	(FTC-S) (I-5 TO OSO PKWY) (15	6/15/2030	1509133	PVT	2008/2009	0	0	100000
ORA	ORA052	ORA052	TCA	9	TCM Committed	CAN67	241	(FTC-S) (I-5 TO OSO PKWY) (15	6/15/2030	1509133	PVT	2009/2010	0	0	8000
ORA	ORA052	ORA052	TCA	9	TCM Committed	CAN67	241	(FTC-S) (I-5 TO OSO PKWY) (15	6/15/2030	1509133	PVT	2010/2011	925	32190	340506
ORA	ORA052	ORA052	TCA	9	TCM Committed	CAN67	241	(FTC-S) (I-5 TO OSO PKWY) (15	6/15/2030	1509133	DEMOSTL	2011/2012	0	8000	0
ORA	ORA052	ORA052	TCA	9	TCM Committed	CAN67	241	(FTC-S) (I-5 TO OSO PKWY) (15	6/15/2030	1509133	PVT	2011/2012	0	0	348506
ORA	ORA052	ORA052	TCA	9	TCM Committed	CAN67	241	(FTC-S) (I-5 TO OSO PKWY) (15	6/15/2030	1509133	PVT	2012/2013	0	0	348506

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ORA	ORA052	ORA052	TCA	9	TCM Committed	CAN67	241	(FTC-S) (I-5 TO OSO PKWY) (15	6/15/2030	1509133	PVT	2016/2017	0	0	17250
ORA	ORA052	ORA052	TCA	9	TCM Committed	CAN67	241	(FTC-S) (I-5 TO OSO PKWY) (15	6/15/2030	1509133	PVT	2017/2018	0	0	51750
ORA	ORA052	ORA052	TCA	9	TCM Committed	CAN67	241	(FTC-S) (I-5 TO OSO PKWY) (15	6/15/2030	1509133	PVT	2018/2019	0	0	51750
ORA	ORA052	ORA052	TCA	9	TCM Committed	CAN67	241	(FTC-S) (I-5 TO OSO PKWY) (15	6/15/2030	1509133	PVT	2019/2020	0	0	51750
ORA	ORA081618	2TR0704	ORANGE CO	0	TCM Committed	RAO00	0	Metrolink Commuter Rail Prog	5/11/2015	15000	AGENCY	2009/2010	0	0	9432
ORA	ORA081619	2TR0704	ORANGE CO	0	TCM Committed	CON07	0	Station Improvments - suppor	5/11/2015	250	AGENCY	2009/2010	0	0	226
ORA	ORA081622	2TR0712	ORANGE CO	1	TCM Committed	TRRH6	0	Irvine Transit Station - Expansi	5/11/2015	2660	ORA-TRN	2009/2010	310	0	0
ORA	ORA081622	2TR0712	ORANGE CO	1	TCM Committed	TRRH6	0	Irvine Transit Station - Expansi	5/11/2015	2660	STPL-R	2009/2010	2350	0	0
ORA	ora0826016	2TR0703	ORANGE CO	3	TCM Committed	PAN93	0	Purchase (72) Paratransit Expa	6/30/2016	7641	TDA	2009/2010	0	0	1941
ORA	ora0826016	2TR0703	ORANGE CO	3	TCM Committed	PAN93	0	Purchase (72) Paratransit Expa	6/30/2016	7641	TDA	2010/2011	0	0	5700
ORA	ORA082618	2TR0703	ORANGE CO	3	TCM Committed	PAN93	0	Purchase Paratransit vehicles	6/30/2030	3384	TDA	2009/2010	0	0	1059
ORA	ORA082618	2TR0703	ORANGE CO	3	TCM Committed	PAN93	0	Purchase Paratransit vehicles	6/30/2030	3384	TDA	2010/2011	0	0	2325
ORA	ORA085004	2TR0704	ORANGE CO	18	TCM Committed	TRRH6	0	Anaheim Canyon Station proje	6/1/2014	22050	DEV FEE	2009/2010	0	2000	0
ORA	ORA085004	2TR0704	ORANGE CO	18	TCM Committed	TRRH6	0	Anaheim Canyon Station proje	6/1/2014	22050	CMAQ	2010/2011	1250	0	0
ORA	ORA085004	2TR0704	ORANGE CO	18	TCM Committed	TRRH6	0	Anaheim Canyon Station proje	6/1/2014	22050	CMAQ	2011/2012	0	2750	0
ORA	ORA085004	2TR0704	ORANGE CO	18	TCM Committed	TRRH6	0	Anaheim Canyon Station proje	6/1/2014	22050	PTMISEA	2011/2012	0	4000	0
ORA	ORA085004	2TR0704	ORANGE CO	18	TCM Committed	TRRH6	0	Anaheim Canyon Station proje	6/1/2014	22050	CMAQ	2013/2014	0	0	6050
ORA	ORA085004	2TR0704	ORANGE CO	18	TCM Committed	TRRH6	0	Anaheim Canyon Station proje	6/1/2014	22050	PTMISEA	2013/2014	0	0	6000
ORA	ORA110633	ORA110633	ORANGE CO	0	TCM Committed	TDM20	0	RIDESHARE VANPOOL PROGR	9/30/2012	2197	AGENCY	2008/2009	0	0	130
ORA	ORA110633	ORA110633	ORANGE CO	0	TCM Committed	TDM20	0	RIDESHARE VANPOOL PROGR	9/30/2012	2197	LTF	2008/2009	0	0	17
ORA	ORA110633	ORA110633	ORANGE CO	0	TCM Committed	TDM20	0	RIDESHARE VANPOOL PROGRA	9/30/2012	2197	AGENCY	2009/2010	0	0	1800
ORA	ORA110633	ORA110633	ORANGE CO	0	TCM Committed	TDM20	0	RIDESHARE VANPOOL PROGRA	9/30/2012	2197	LTF	2009/2010	0	0	250
ORA	ORA120318	ORA120318	ANAHEIM	21	TCM Committed	TRR14	0	ANAHEIM REGIONAL TRANS IN	6/30/2018	183864	2008EAR	2009/2010	588	0	0
ORA	ORA120318	ORA120318	ANAHEIM	21	TCM Committed	TRR14	0	ANAHEIM REGIONAL TRANS IN	6/30/2018	183864	2009EAR	2009/2010	2613	0	0
ORA	ORA120318	ORA120318	ANAHEIM	21	TCM Committed	TRR14	0	ANAHEIM REGIONAL TRANS IN	6/30/2018	183864	5309a	2009/2010	725	0	0
ORA	ORA120318	ORA120318	ANAHEIM	21	TCM Committed	TRR14	0	ANAHEIM REGIONAL TRANS IN	6/30/2018	183864	ORA-TRN	2009/2010	38080	0	0
ORA	ORA120318	ORA120318	ANAHEIM	21	TCM Committed	TRR14	0	ANAHEIM REGIONAL TRANS IN	6/30/2018	183864	5309c	2010/2011	0	0	5000
ORA	ORA120318	ORA120318	ANAHEIM	21	TCM Committed	TRR14	0	ANAHEIM REGIONAL TRANS IN	6/30/2018	183864	ORAM2TR	2010/2011	0	1129	90571
ORA	ORA120318	ORA120318	ANAHEIM	21	TCM Committed	TRR14	0	ANAHEIM REGIONAL TRANS IN	6/30/2018	183864	ORA-TRN	2010/2011	0	5820	0
ORA	ORA120318	ORA120318	ANAHEIM	21	TCM Committed	TRR14	0	ANAHEIM REGIONAL TRANS IN	6/30/2018	183864	STCASHR	2010/2011	0	0	29219
ORA	ORA120318	ORA120318	ANAHEIM	21	TCM Committed	TRR14	0	ANAHEIM REGIONAL TRANS IN	6/30/2018	183864	5309a	2011/2012	2619	0	0
ORA	ORA120318	ORA120318	ANAHEIM	21	TCM Committed	TRR14	0	ANAHEIM REGIONAL TRANS IN	6/30/2018	183864	5309c	2011/2012	0	0	7500
ORA	ORA120357	ORA120357	ORANGE CO	1	TCM Committed	ITS02	0	ORANGE COUNTY. Traffic Sign	6/15/2012	14673	STP-RIP	2005/2006	3573	0	0
ORA	ORA120357	ORA120357	ORANGE CO	1	TCM Committed	ITS02	0	ORANGE COUNTY. Traffic Sign	6/15/2012	14673	STP-RIP	2007/2008	8310	0	0
ORA	ORA120357	ORA120357	ORANGE CO	1	TCM Committed	ITS02	0	ORANGE COUNTY. Traffic Sign	6/15/2012	14673	5309c	2008/2009	1485	0	0
ORA	ORA120357	ORA120357	ORANGE CO	1	TCM Committed	ITS02	0	ORANGE COUNTY. Traffic Sign	6/15/2012	14673	TDA	2008/2009	305	0	0
ORA	ORA120357	ORA120357	ORANGE CO	1	TCM Committed	ITS02	0	ORANGE COUNTY. Traffic Sign	6/15/2012	14673	CMAQ	2010/2011	0	0	1000
ORA	ORA65002	ORA65002	ORANGE CO	17	TCM Committed	TDM20	0	RIDESHARE SERVICES RIDEGUI	6/30/2016	5223	5307-TR	2007/2008	0	0	735
ORA	ORA65002	ORA65002	ORANGE CO	17	TCM Committed	TDM20	0	RIDESHARE SERVICES RIDEGUI	6/30/2016	5223	CMAQ	2008/2009	0	0	2244
ORA	ORA65002	ORA65002	ORANGE CO	17	TCM Committed	TDM20	0	RIDESHARE SERVICES RIDEGUI	6/30/2016	5223	CMAQ	2012/2013	0	0	2244
ORA	ORA990906	ORA990906	VARIOUS AG	17	TCM Committed	NCN25	0	Grouped Projects for Bicycle a	12/30/2014	35834	CITY	2004/2005	17	0	689
ORA	ORA990906	ORA990906	VARIOUS AG	17	TCM Committed	NCN25	0	Grouped Projects for Bicycle a	12/30/2014	35834	STPE-R	2004/2005	52	0	2066

county	project_id	RTP	agency	amend-ment	conformity category	program code	route	project description	completion date	total project cost	fund type	fiscal year	eng	row	con
ORA	ORA990906	ORA990906	VARIOUS AG	17	TCM Committed	NCN25	0	Grouped Projects for Bicycle a	12/30/2014	35834	CITY	2005/2006	0	0	605
ORA	ORA990906	ORA990906	VARIOUS AG	17	TCM Committed	NCN25	0	Grouped Projects for Bicycle a	12/30/2014	35834	STPE-R	2005/2006	0	0	4361
ORA	ORA990906	ORA990906	VARIOUS AG	17	TCM Committed	NCN25	0	Grouped Projects for Bicycle a	12/30/2014	35834	CITY	2006/2007	0	0	369
ORA	ORA990906	ORA990906	VARIOUS AG	17	TCM Committed	NCN25	0	Grouped Projects for Bicycle a	12/30/2014	35834	STPE-R	2006/2007	0	0	1151
ORA	ORA990906	ORA990906	VARIOUS AG	17	TCM Committed	NCN25	0	Grouped Projects for Bicycle a	12/30/2014	35834	CITY	2007/2008	0	0	3028
ORA	ORA990906	ORA990906	VARIOUS AG	17	TCM Committed	NCN25	0	Grouped Projects for Bicycle a	12/30/2014	35834	STPE-R	2007/2008	0	0	2254
ORA	ORA990906	ORA990906	VARIOUS AG	17	TCM Committed	NCN25	0	Grouped Projects for Bicycle a	12/30/2014	35834	CITY	2008/2009	0	0	6433
ORA	ORA990906	ORA990906	VARIOUS AG	17	TCM Committed	NCN25	0	Grouped Projects for Bicycle a	12/30/2014	35834	STPE-R	2008/2009	0	0	1092
ORA	ORA990906	ORA990906	VARIOUS AG	17	TCM Committed	NCN25	0	Grouped Projects for Bicycle a	12/30/2014	35834	TDA3	2008/2009	0	0	3987
ORA	ORA990906	ORA990906	VARIOUS AG	17	TCM Committed	NCN25	0	Grouped Projects for Bicycle a	12/30/2014	35834	CITY	2009/2010	0	0	384
ORA	ORA990906	ORA990906	VARIOUS AG	17	TCM Committed	NCN25	0	Grouped Projects for Bicycle a	12/30/2014	35834	STPE-R	2009/2010	0	0	1144
ORA	ORA990906	ORA990906	VARIOUS AG	17	TCM Committed	NCN25	0	Grouped Projects for Bicycle a	12/30/2014	35834	TDA3	2009/2010	0	0	1033
ORA	ORA990906	ORA990906	VARIOUS AG	17	TCM Committed	NCN25	0	Grouped Projects for Bicycle a	12/30/2014	35834	5307LA	2010/2011	0	0	1500
ORA	ORA990906	ORA990906	VARIOUS AG	17	TCM Committed	NCN25	0	Grouped Projects for Bicycle a	12/30/2014	35834	CITY	2010/2011	0	0	473
ORA	ORA990906	ORA990906	VARIOUS AG	17	TCM Committed	NCN25	0	Grouped Projects for Bicycle a	12/30/2014	35834	STPE-R	2010/2011	0	0	227
ORA	ORA990906	ORA990906	VARIOUS AG	17	TCM Committed	NCN25	0	Grouped Projects for Bicycle a	12/30/2014	35834	5307LA	2011/2012	0	0	500
ORA	ORA990906	ORA990906	VARIOUS AG	17	TCM Committed	NCN25	0	Grouped Projects for Bicycle a	12/30/2014	35834	CITY	2011/2012	0	0	867
ORA	ORA990906	ORA990906	VARIOUS AG	17	TCM Committed	NCN25	0	Grouped Projects for Bicycle a	12/30/2014	35834	STPE-R	2011/2012	0	0	481
ORA	ORA990906	ORA990906	VARIOUS AG	17	TCM Committed	NCN25	0	Grouped Projects for Bicycle a	12/30/2014	35834	CITY	2012/2013	0	0	592
ORA	ORA990906	ORA990906	VARIOUS AG	17	TCM Committed	NCN25	0	Grouped Projects for Bicycle a	12/30/2014	35834	STPE-R	2012/2013	0	0	2527
ORA	ORA990906	ORA990906	VARIOUS AG	17	TCM Committed	NCN25	0	Grouped Projects for Bicycle a	12/30/2014	35834	STPE-R	2013/2014	0	0	2
RIV	0121D	0121D	CALTRANS	0	TCM Committed	CAX62	215	ON I-215/SR91/SR60, RIV I215	12/30/2012	782720	NH-IIP	1998/1999	2101	0	0
RIV	0121D	0121D	CALTRANS	0	TCM Committed	CAX62	215	ON I-215/SR91/SR60, RIV I215	12/30/2012	782720	NH-RIP	1998/1999	2081	165	0
RIV	0121D	0121D	CALTRANS	0	TCM Committed	CAX62	215	ON I-215/SR91/SR60, RIV I215	12/30/2012	782720	STP-GR	1998/1999	14148	36549	0
RIV	0121D	0121D	CALTRANS	0	TCM Committed	CAX62	215	ON I-215/SR91/SR60, RIV I215	12/30/2012	782720	NH-RIP	1999/2000	4604	747	0
RIV	0121D	0121D	CALTRANS	0	TCM Committed	CAX62	215	ON I-215/SR91/SR60, RIV I215	12/30/2012	782720	CMAQ	2002/2003	0	0	15042
RIV	0121D	0121D	CALTRANS	0	TCM Committed	CAX62	215	ON I-215/SR91/SR60, RIV I215	12/30/2012	782720	STPL	2002/2003	0	0	13327
RIV	0121D	0121D	CALTRANS	0	TCM Committed	CAX62	215	ON I-215/SR91/SR60, RIV I215	12/30/2012	782720	GRV-STP	2003/2004	0	45215	0
RIV	0121D	0121D	CALTRANS	0	TCM Committed	CAX62	215	ON I-215/SR91/SR60, RIV I215	12/30/2012	782720	NH-IIP	2003/2004	0	0	9634
RIV	0121D	0121D	CALTRANS	0	TCM Committed	CAX62	215	ON I-215/SR91/SR60, RIV I215	12/30/2012	782720	NH-RIP	2003/2004	0	1085	33105
RIV	0121D	0121D	CALTRANS	0	TCM Committed	CAX62	215	ON I-215/SR91/SR60, RIV I215	12/30/2012	782720	STP-GR	2003/2004	0	0	18913
RIV	0121D	0121D	CALTRANS	0	TCM Committed	CAX62	215	ON I-215/SR91/SR60, RIV I215	12/30/2012	782720	TCRF	2003/2004	0	0	35274
RIV	0121D	0121D	CALTRANS	0	TCM Committed	CAX62	215	ON I-215/SR91/SR60, RIV I215	12/30/2012	782720	XRIV	2003/2004	0	0	26061
RIV	0121D	0121D	CALTRANS	0	TCM Committed	CAX62	215	ON I-215/SR91/SR60, RIV I215	12/30/2012	782720	GRV-NH	2004/2005	0	0	26304
RIV	0121D	0121D	CALTRANS	0	TCM Committed	CAX62	215	ON I-215/SR91/SR60, RIV I215	12/30/2012	782720	GRV-STP	2004/2005	0	23115	42631
RIV	0121D	0121D	CALTRANS	0	TCM Committed	CAX62	215	ON I-215/SR91/SR60, RIV I215	12/30/2012	782720	GRV-NH	2005/2006	0	0	26305
RIV	0121D	0121D	CALTRANS	0	TCM Committed	CAX62	215	ON I-215/SR91/SR60, RIV I215	12/30/2012	782720	GRV-STP	2005/2006	0	0	70000
RIV	0121D	0121D	CALTRANS	0	TCM Committed	CAX62	215	ON I-215/SR91/SR60, RIV I215	12/30/2012	782720	GRV-NH	2006/2007	0	0	25349
RIV	0121D	0121D	CALTRANS	0	TCM Committed	CAX62	215	ON I-215/SR91/SR60, RIV I215	12/30/2012	782720	GRV-STP	2006/2007	0	0	51219
RIV	0121D	0121D	CALTRANS	0	TCM Committed	CAX62	215	ON I-215/SR91/SR60, RIV I215	12/30/2012	782720	GRV-NH	2007/2008	0	0	26600
RIV	0121D	0121D	CALTRANS	0	TCM Committed	CAX62	215	ON I-215/SR91/SR60, RIV I215	12/30/2012	782720	NH-IIP	2007/2008	0	0	8170
RIV	0121D	0121D	CALTRANS	0	TCM Committed	CAX62	215	ON I-215/SR91/SR60, RIV I215	12/30/2012	782720	STPL	2007/2008	0	0	8853

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RIV	0121D	0121D	CALTRANS	0	TCM Committed	CAX62	215	ON I-215/SR91/SR60, RIV I215	12/30/2012	782720	CMAQ	2008/2009	0	0	8960
RIV	0121D	0121D	CALTRANS	0	TCM Committed	CAX62	215	ON I-215/SR91/SR60, RIV I215	12/30/2012	782720	GRV-NH	2008/2009	0	0	26600
RIV	0121D	0121D	CALTRANS	0	TCM Committed	CAX62	215	ON I-215/SR91/SR60, RIV I215	12/30/2012	782720	STCASHI	2008/2009	0	0	3932
RIV	0121D	0121D	CALTRANS	0	TCM Committed	CAX62	215	ON I-215/SR91/SR60, RIV I215	12/30/2012	782720	STPL	2008/2009	0	0	8860
RIV	0121D	0121D	CALTRANS	0	TCM Committed	CAX62	215	ON I-215/SR91/SR60, RIV I215	12/30/2012	782720	GRV-NH	2009/2010	0	0	26659
RIV	0121D	0121D	CALTRANS	0	TCM Committed	CAX62	215	ON I-215/SR91/SR60, RIV I215	12/30/2012	782720	GRV-STP	2009/2010	0	0	4721
RIV	0121D	0121D	CALTRANS	0	TCM Committed	CAX62	215	ON I-215/SR91/SR60, RIV I215	12/30/2012	782720	GRV-NH	2010/2011	0	0	26658
RIV	0121D	0121D	CALTRANS	0	TCM Committed	CAX62	215	ON I-215/SR91/SR60, RIV I215	12/30/2012	782720	GRV-STP	2010/2011	0	0	1800
RIV	0121D	0121D	CALTRANS	0	TCM Committed	CAX62	215	ON I-215/SR91/SR60, RIV I215	12/30/2012	782720	GRV-NH	2011/2012	0	0	26658
RIV	0121D	0121D	CALTRANS	0	TCM Committed	CAX62	215	ON I-215/SR91/SR60, RIV I215	12/30/2012	782720	GRV-STP	2011/2012	0	0	1299
RIV	0121D	0121D	CALTRANS	0	TCM Committed	CAX62	215	ON I-215/SR91/SR60, RIV I215	12/30/2012	782720	GRV-NH	2012/2013	0	0	26658
RIV	0121D	0121D	CALTRANS	0	TCM Committed	CAX62	215	ON I-215/SR91/SR60, RIV I215	12/30/2012	782720	GRV-NH	2013/2014	0	0	26658
RIV	0121D	0121D	CALTRANS	0	TCM Committed	CAX62	215	ON I-215/SR91/SR60, RIV I215	12/30/2012	782720	GRV-NH	2014/2015	0	0	26660
RIV	RIV010212	RIV010212	CALTRANS	17	TCM Committed	CAX62	91	ON SR91 - ADAMS TO 60/215 I	8/3/2015	278456	TCRF	2003/2004	3193	0	0
RIV	RIV010212	RIV010212	CALTRANS	17	TCM Committed	CAX62	91	ON SR91 - ADAMS TO 60/215	8/3/2015	278456	AGENCY	2004/2005	1694	0	0
RIV	RIV010212	RIV010212	CALTRANS	17	TCM Committed	CAX62	91	ON SR91 - ADAMS TO 60/215 I	8/3/2015	278456	CMAQ	2004/2005	13070	0	0
RIV	RIV010212	RIV010212	CALTRANS	17	TCM Committed	CAX62	91	ON SR91 - ADAMS TO 60/215 I	8/3/2015	278456	AGENCY	2007/2008	0	17587	0
RIV	RIV010212	RIV010212	CALTRANS	17	TCM Committed	CAX62	91	ON SR91 - ADAMS TO 60/215 I	8/3/2015	278456	CMAQ	2007/2008	0	20000	0
RIV	RIV010212	RIV010212	CALTRANS	17	TCM Committed	CAX62	91	ON SR91 - ADAMS TO 60/215	8/3/2015	278456	STCASHR	2007/2008	0	24263	0
RIV	RIV010212	RIV010212	CALTRANS	17	TCM Committed	CAX62	91	ON SR91 - ADAMS TO 60/215	8/3/2015	278456	TCRF	2007/2008	0	507	0
RIV	RIV010212	RIV010212	CALTRANS	17	TCM Committed	CAX62	91	ON SR91 - ADAMS TO 60/215	8/3/2015	278456	AGENCY	2008/2009	998	0	0
RIV	RIV010212	RIV010212	CALTRANS	17	TCM Committed	CAX62	91	ON SR91 - ADAMS TO 60/215 I	8/3/2015	278456	AGENCY	2009/2010	516	900	0
RIV	RIV010212	RIV010212	CALTRANS	17	TCM Committed	CAX62	91	ON SR91 - ADAMS TO 60/215	8/3/2015	278456	CMAQ	2009/2010	3984	0	0
RIV	RIV010212	RIV010212	CALTRANS	17	TCM Committed	CAX62	91	ON SR91 - ADAMS TO 60/215	8/3/2015	278456	CMAQ	2010/2011	0	0	34546
RIV	RIV010212	RIV010212	CALTRANS	17	TCM Committed	CAX62	91	ON SR91 - ADAMS TO 60/215	8/3/2015	278456	CMIA	2010/2011	0	0	157198
RIV	RIV010214	RRC0703	SOUTHERN C	0	TCM Committed	CON93	0	RCTC SHARE OF PURCHASE OF	12/30/2012	15448	5307	2004/2005	0	0	7573
RIV	RIV010214	RRC0703	SOUTHERN	0	TCM Committed	CON93	0	RCTC SHARE OF PURCHASE OF	12/30/2012	15448	5309a	2005/2006	0	0	6300
RIV	RIV010214	RRC0703	SOUTHERN C	0	TCM Committed	CON93	0	RCTC SHARE OF PURCHASE OF	12/30/2012	15448	TDA4	2005/2006	0	0	1575
RIV	RIV010227	RIV010227	CORONA	0	TCM Committed	ITS14	0	CORONA ADVANCED TRAFFIC	12/31/2010	6011	CITY	2008/2009	500	0	0
RIV	RIV010227	RIV010227	CORONA	0	TCM Committed	ITS14	0	CORONA ADVANCED TRAFFIC	12/31/2010	6011	CITY	2009/2010	0	0	1023
RIV	RIV010227	RIV010227	CORONA	0	TCM Committed	ITS14	0	CORONA ADVANCED TRAFFIC	12/31/2010	6011	TLSP	2009/2010	0	0	4488
RIV	RIV011242	RIV011242	SOUTHERN	0	TCM Committed	CON93	0	PURCHASE EXPANSION ROLLIN	12/30/2012	19693	AGENCY	2002/2003	0	0	2693
RIV	RIV011242	RIV011242	SOUTHERN	0	TCM Committed	CON93	0	PURCHASE EXPANSION ROLLIN	12/30/2012	19693	STP-IIP	2006/2007	0	0	17000
RIV	RIV041029	RIV041029	RIVERSIDE T	0	TCM Committed	TRNH6	0	IN RIVERSIDE - CONSTRUCT NE	12/30/2012	7510	TDA4	2004/2005	27	0	96
RIV	RIV041029	RIV041029	RIVERSIDE T	0	TCM Committed	TRNH6	0	IN RIVERSIDE - CONSTRUCT NE	12/30/2012	7510	5309c	2006/2007	742	0	0
RIV	RIV041029	RIV041029	RIVERSIDE T	0	TCM Committed	TRNH6	0	IN RIVERSIDE - CONSTRUCT NE	12/30/2012	7510	WRVTUMF	2006/2007	159	2500	27
RIV	RIV041029	RIV041029	RIVERSIDE T	0	TCM Committed	TRNH6	0	IN RIVERSIDE - CONSTRUCT NE	12/30/2012	7510	WRVTUMF	2007/2008	0	1500	0
RIV	RIV041029	RIV041029	RIVERSIDE T	0	TCM Committed	TRNH6	0	IN RIVERSIDE - CONSTRUCT NE	12/30/2012	7510	5307	2008/2009	0	0	216
RIV	RIV041029	RIV041029	RIVERSIDE T	0	TCM Committed	TRNH6	0	IN RIVERSIDE - CONSTRUCT NE	12/30/2012	7510	5309c	2008/2009	0	0	1806
RIV	RIV041029	RIV041029	RIVERSIDE T	0	TCM Committed	TRNH6	0	IN RIVERSIDE - CONSTRUCT NE	12/30/2012	7510	STA	2008/2009	0	0	54
RIV	RIV041029	RIV041029	RIVERSIDE T	0	TCM Committed	TRNH6	0	IN RIVERSIDE - CONSTRUCT NE	12/30/2012	7510	WRVTUMF	2008/2009	0	0	377
RIV	RIV041029	RIV041029	RIVERSIDE T	0	TCM Committed	TRNH6	0	IN RIVERSIDE - CONSTRUCT NE	12/30/2012	7510	5309c	2009/2010	0	0	5

county	project_id	RTP	agency	amend-ment	conformity category	program code	route	project description	completion date	total project cost	fund type	fiscal year	eng	row	con
RIV	RIV041029	RIV041029	RIVERSIDE T	0	TCM Committed	TRNH6	0	IN RIVERSIDE - CONSTRUCT NE	12/30/2012	7510	WRVTUMF	2009/2010	0	0	1
RIV	RIV041030	3TC04TR6	RIVERSIDE T	0	TCM Committed	TRNH6	0	IN THE CITY OF HEMET - CONS	6/30/2012	1442	5309c	2004/2005	303	0	0
RIV	RIV041030	3TC04TR6	RIVERSIDE T	0	TCM Committed	TRNH6	0	IN THE CITY OF HEMET - CONS	6/30/2012	1442	WRVTUMF	2004/2005	76	0	638
RIV	RIV041030	3TC04TR6	RIVERSIDE T	0	TCM Committed	TRNH6	0	IN THE CITY OF HEMET - CONS	6/30/2012	1442	5309c	2006/2007	340	0	0
RIV	RIV041030	3TC04TR6	RIVERSIDE T	0	TCM Committed	TRNH6	0	IN THE CITY OF HEMET - CONS	6/30/2012	1442	WRVTUMF	2006/2007	85	0	0
RIV	RIV050553	RIV050553	RIVERSIDE T	0	TCM Committed	TRNH6	0	IN TEMECULA - CONSTRUCT N	6/30/2013	8000	5309c	2005/2006	1165	0	0
RIV	RIV050553	RIV050553	RIVERSIDE T	0	TCM Committed	TRNH6	0	IN TEMECULA - CONSTRUCT N	6/30/2013	8000	WRVTUMF	2005/2006	292	0	24
RIV	RIV050553	RIV050553	RIVERSIDE T	0	TCM Committed	TRNH6	0	IN TEMECULA - CONSTRUCT N	6/30/2013	8000	5309c	2006/2007	0	0	95
RIV	RIV050553	RIV050553	RIVERSIDE T	0	TCM Committed	TRNH6	0	IN TEMECULA - CONSTRUCT N	6/30/2013	8000	WRVTUMF	2006/2007	0	0	24
RIV	RIV050553	RIV050553	RIVERSIDE T	0	TCM Committed	TRNH6	0	IN TEMECULA - CONSTRUCT N	6/30/2013	8000	5307	2007/2008	0	0	6
RIV	RIV050553	RIV050553	RIVERSIDE T	0	TCM Committed	TRNH6	0	IN TEMECULA - CONSTRUCT N	6/30/2013	8000	5309c	2007/2008	0	0	100
RIV	RIV050553	RIV050553	RIVERSIDE T	0	TCM Committed	TRNH6	0	IN TEMECULA - CONSTRUCT N	6/30/2013	8000	STA	2007/2008	0	0	2
RIV	RIV050553	RIV050553	RIVERSIDE T	0	TCM Committed	TRNH6	0	IN TEMECULA - CONSTRUCT N	6/30/2013	8000	WRVTUMF	2007/2008	0	0	25
RIV	RIV050553	RIV050553	RIVERSIDE T	0	TCM Committed	TRNH6	0	IN TEMECULA - CONSTRUCT N	6/30/2013	8000	5309c	2008/2009	0	0	109
RIV	RIV050553	RIV050553	RIVERSIDE T	0	TCM Committed	TRNH6	0	IN TEMECULA - CONSTRUCT N	6/30/2013	8000	WRVTUMF	2008/2009	0	0	27
RIV	RIV050553	RIV050553	RIVERSIDE T	0	TCM Committed	TRNH6	0	IN TEMECULA - CONSTRUCT N	6/30/2013	8000	5309c	2009/2010	0	0	113
RIV	RIV050553	RIV050553	RIVERSIDE T	0	TCM Committed	TRNH6	0	IN TEMECULA - CONSTRUCT N	6/30/2013	8000	WRVTUMF	2009/2010	0	0	28
RIV	RIV051201	RIV051201	RIVERSIDE C	0	TCM Committed	TDN64	0	IN CORONA - CONTINUE THE I M	6/30/2013	40	XRIV	2005/2006	0	0	5
RIV	RIV051201	RIV051201	RIVERSIDE C	0	TCM Committed	TDN64	0	IN CORONA - CONTINUE THE I M	6/30/2013	40	XRIV	2006/2007	0	0	5
RIV	RIV051201	RIV051201	RIVERSIDE C	0	TCM Committed	TDN64	0	IN CORONA - CONTINUE THE I M	6/30/2013	40	XRIV	2007/2008	0	0	5
RIV	RIV051201	RIV051201	RIVERSIDE C	0	TCM Committed	TDN64	0	IN CORONA - CONTINUE THE I	6/30/2013	40	XRIV	2008/2009	0	0	5
RIV	RIV051201	RIV051201	RIVERSIDE C	0	TCM Committed	TDN64	0	IN CORONA - CONTINUE THE I	6/30/2013	40	XRIV	2009/2010	0	0	5
RIV	RIV051201	RIV051201	RIVERSIDE C	0	TCM Committed	TDN64	0	IN CORONA - CONTINUE THE I	6/30/2013	40	XRIV	2010/2011	0	0	5
RIV	RIV051201	RIV051201	RIVERSIDE C	0	TCM Committed	TDN64	0	IN CORONA - CONTINUE THE I	6/30/2013	40	XRIV	2011/2012	0	0	5
RIV	RIV051201	RIV051201	RIVERSIDE C	0	TCM Committed	TDN64	0	IN CORONA - CONTINUE THE I M	6/30/2013	40	XRIV	2012/2013	0	0	5
RIV	RIV070303	30M0701	RIVERSIDE C	0	TCM Committed	TDM24	60	ON SR60 IN NW RIV CO: CONT	12/30/2010	751	AGENCY	2006/2007	0	0	37
RIV	RIV070303	30M0701	RIVERSIDE C	0	TCM Committed	TDM24	60	ON SR60 IN NW RIV CO: CONT	12/30/2010	751	ST-CASH	2006/2007	0	0	148
RIV	RIV070303	30M0701	RIVERSIDE C	0	TCM Committed	TDM24	60	ON SR60 IN NW RIV CO: CONT	12/30/2010	751	AGENCY	2007/2008	0	0	37
RIV	RIV070303	30M0701	RIVERSIDE C	0	TCM Committed	TDM24	60	ON SR60 IN NW RIV CO: CONT	12/30/2010	751	ST-CASH	2007/2008	0	0	147
RIV	RIV070303	30M0701	RIVERSIDE C	0	TCM Committed	TDM24	60	ON SR60 IN NW RIV CO: CONT	12/30/2010	751	AGENCY	2008/2009	0	0	37
RIV	RIV070303	30M0701	RIVERSIDE C	0	TCM Committed	TDM24	60	ON SR60 IN NW RIV CO: CONT	12/30/2010	751	ST-CASH	2008/2009	0	0	147
RIV	RIV070303	30M0701	RIVERSIDE C	0	TCM Committed	TDM24	60	ON SR60 IN NW RIV CO: CONT	12/30/2010	751	AGENCY	2009/2010	0	0	40
RIV	RIV070303	30M0701	RIVERSIDE C	0	TCM Committed	TDM24	60	ON SR60 IN NW RIV CO: CONT	12/30/2010	751	ST-CASH	2009/2010	0	0	158
RIV	RIV070304	30M0701	RIVERSIDE C	0	TCM Committed	TDM24	215	ON I-215 IN SW RIV CO: CONT	12/30/2010	791	AGENCY	2006/2007	0	0	40
RIV	RIV070304	30M0701	RIVERSIDE C	0	TCM Committed	TDM24	215	ON I-215 IN SW RIV CO: CONT	12/30/2010	791	ST-CASH	2006/2007	0	0	158
RIV	RIV070304	30M0701	RIVERSIDE C	0	TCM Committed	TDM24	215	ON I-215 IN SW RIV CO: CONT	12/30/2010	791	AGENCY	2007/2008	0	0	40
RIV	RIV070304	30M0701	RIVERSIDE C	0	TCM Committed	TDM24	215	ON I-215 IN SW RIV CO: CONT	12/30/2010	791	ST-CASH	2007/2008	0	0	158
RIV	RIV070304	30M0701	RIVERSIDE C	0	TCM Committed	TDM24	215	ON I-215 IN SW RIV CO: CONT	12/30/2010	791	AGENCY	2008/2009	0	0	39
RIV	RIV070304	30M0701	RIVERSIDE C	0	TCM Committed	TDM24	215	ON I-215 IN SW RIV CO: CONT	12/30/2010	791	ST-CASH	2008/2009	0	0	158
RIV	RIV070304	30M0701	RIVERSIDE C	0	TCM Committed	TDM24	215	ON I-215 IN SW RIV CO: CONT	12/30/2010	791	AGENCY	2009/2010	0	0	40
RIV	RIV070304	30M0701	RIVERSIDE C	0	TCM Committed	TDM24	215	ON I-215 IN SW RIV CO: CONT	12/30/2010	791	ST-CASH	2009/2010	0	0	158
RIV	RIV070307	30M0701	RIVERSIDE C	0	TCM Committed	TDM24	60	ON SR60 IN MORENO VALLEY:	12/30/2010	791	AGENCY	2006/2007	0	0	40

county	project_id	RTP	agency	amend-ment	conformity category	program code	route	project description	completion date	total project cost	fund type	fiscal year	eng	row	con
RIV	RIV070307	30M0701	RIVERSIDE C	0	TCM Committed	TDM24	60	ON SR60 IN MORENO VALLEY:	12/30/2010	791	ST-CASH	2006/2007	0	0	158
RIV	RIV070307	30M0701	RIVERSIDE C	0	TCM Committed	TDM24	60	ON SR60 IN MORENO VALLEY:	12/30/2010	791	AGENCY	2007/2008	0	0	40
RIV	RIV070307	30M0701	RIVERSIDE C	0	TCM Committed	TDM24	60	ON SR60 IN MORENO VALLEY:	12/30/2010	791	ST-CASH	2007/2008	0	0	158
RIV	RIV070307	30M0701	RIVERSIDE C	0	TCM Committed	TDM24	60	ON SR60 IN MORENO VALLEY:	12/30/2010	791	AGENCY	2008/2009	0	0	39
RIV	RIV070307	30M0701	RIVERSIDE C	0	TCM Committed	TDM24	60	ON SR60 IN MORENO VALLEY:	12/30/2010	791	ST-CASH	2008/2009	0	0	158
RIV	RIV070307	30M0701	RIVERSIDE C	0	TCM Committed	TDM24	60	ON SR60 IN MORENO VALLEY:	12/30/2010	791	AGENCY	2009/2010	0	0	40
RIV	RIV070307	30M0701	RIVERSIDE C	0	TCM Committed	TDM24	60	ON SR60 IN MORENO VALLEY:	12/30/2010	791	ST-CASH	2009/2010	0	0	158
RIV	RIV090609	3TL807	RIVERSIDE T	0	TCM Committed	ITS01	0	IN WESTERN RIVERSIDE COUN	12/30/2011	612	5309c	2004/2005	0	0	73
RIV	RIV090609	3TL807	RIVERSIDE T	0	TCM Committed	ITS01	0	IN WESTERN RIVERSIDE COUN	12/30/2011	612	WRVTUMF	2004/2005	0	0	18
RIV	RIV090609	3TL807	RIVERSIDE T	0	TCM Committed	ITS01	0	IN WESTERN RIVERSIDE COUN	12/30/2011	612	5309c	2006/2007	0	0	95
RIV	RIV090609	3TL807	RIVERSIDE T	0	TCM Committed	ITS01	0	IN WESTERN RIVERSIDE COUN	12/30/2011	612	WRVTUMF	2006/2007	0	0	24
RIV	RIV090609	3TL807	RIVERSIDE T	0	TCM Committed	ITS01	0	IN WESTERN RIVERSIDE COUN	12/30/2011	612	5309c	2007/2008	0	0	100
RIV	RIV090609	3TL807	RIVERSIDE T	0	TCM Committed	ITS01	0	IN WESTERN RIVERSIDE COUN	12/30/2011	612	WRVTUMF	2007/2008	0	0	25
RIV	RIV090609	3TL807	RIVERSIDE T	0	TCM Committed	ITS01	0	IN WESTERN RIVERSIDE COUN	12/30/2011	612	5309c	2008/2009	0	0	109
RIV	RIV090609	3TL807	RIVERSIDE T	0	TCM Committed	ITS01	0	IN WESTERN RIVERSIDE COUN	12/30/2011	612	WRVTUMF	2008/2009	0	0	27
RIV	RIV090609	3TL807	RIVERSIDE T	0	TCM Committed	ITS01	0	IN WESTERN RIVERSIDE COUN	12/30/2011	612	5309c	2009/2010	0	0	113
RIV	RIV090609	3TL807	RIVERSIDE T	0	TCM Committed	ITS01	0	IN WESTERN RIVERSIDE COUN	12/30/2011	612	WRVTUMF	2009/2010	0	0	28
RIV	RIV520109	RIV520109	RIVERSIDE C	24	TCM	RAN92	0	RECONSTRUCT & UPGRADE SA	6/1/2014	246827	5307	2004/2005	3657	0	0
RIV	RIV520109	RIV520109	RIVERSIDE C	24	TCM	RAN92	0	RECONSTRUCT & UPGRADE SA	6/1/2014	246827	CMAQ	2004/2005	2907	0	0
RIV	RIV520109	RIV520109	RIVERSIDE C	24	TCM	RAN92	0	RECONSTRUCT & UPGRADE SA	6/1/2014	246827	5307	2006/2007	2500	0	0
RIV	RIV520109	RIV520109	RIVERSIDE C	24	TCM	RAN92	0	RECONSTRUCT & UPGRADE SA	6/1/2014	246827	XRIV	2006/2007	8075	0	0
RIV	RIV520109	RIV520109	RIVERSIDE C	24	TCM	RAN92	0	RECONSTRUCT & UPGRADE SA	6/1/2014	246827	5309b	2007/2008	1960	0	0
RIV	RIV520109	RIV520109	RIVERSIDE C	24	TCM	RAN92	0	RECONSTRUCT & UPGRADE SA	6/1/2014	246827	STPL	2007/2008	500	0	0
RIV	RIV520109	RIV520109	RIVERSIDE C	24	TCM	RAN92	0	RECONSTRUCT & UPGRADE SA	6/1/2014	246827	5307	2009/2010	10000	0	0
RIV	RIV520109	RIV520109	RIVERSIDE C	24	TCM	RAN92	0	RECONSTRUCT & UPGRADE SA	6/1/2014	246827	CMAQ	2009/2010	0	0	4298
RIV	RIV520109	RIV520109	RIVERSIDE C	24	TCM	RAN92	0	RECONSTRUCT & UPGRADE SA	6/1/2014	246827	XRIV	2009/2010	8891	0	0
RIV	RIV520109	RIV520109	RIVERSIDE C	24	TCM	RAN92	0	RECONSTRUCT & UPGRADE SA	6/1/2014	246827	5307	2010/2011	10000	0	0
RIV	RIV520109	RIV520109	RIVERSIDE C	24	TCM	RAN92	0	RECONSTRUCT & UPGRADE SA	6/1/2014	246827	PTA-RIP	2010/2011	0	0	52978
RIV	RIV520109	RIV520109	RIVERSIDE C	24	TCM	RAN92	0	RECONSTRUCT & UPGRADE SA	6/1/2014	246827	5309b	2011/2012	0	0	73040
RIV	RIV520109	RIV520109	RIVERSIDE C	24	TCM	RAN92	0	RECONSTRUCT & UPGRADE SA	6/1/2014	246827	AGENCY	2011/2012	0	0	15000
RIV	RIV520109	RIV520109	RIVERSIDE C	24	TCM	RAN92	0	RECONSTRUCT & UPGRADE SA	6/1/2014	246827	CMAQ	2011/2012	0	0	11450
RIV	RIV520109	RIV520109	RIVERSIDE C	24	TCM	RAN92	0	RECONSTRUCT & UPGRADE SA	6/1/2014	246827	XRIV	2011/2012	0	18814	16753
RIV	RIV520109	RIV520109	RIVERSIDE C	24	TCM	RAN92	0	RECONSTRUCT & UPGRADE SA	6/1/2014	246827	CMAQ	2012/2013	0	0	3128
RIV	RIV520109	RIV520109	RIVERSIDE C	24	TCM	RAN92	0	RECONSTRUCT & UPGRADE SA	6/1/2014	246827	CMAQ	2013/2014	0	0	2876
RIV	RIV520111	RIV520111	RIVERSIDE C	0	TCM Committed	TDM20	0	REGIONAL RIDESHARE - CONT	12/30/2011	10157	STP-RIP	2003/2004	0	0	1220
RIV	RIV520111	RIV520111	RIVERSIDE C	0	TCM Committed	TDM20	0	REGIONAL RIDESHARE - CONTI	12/30/2011	10157	XRIV	2004/2005	0	0	1600
RIV	RIV520111	RIV520111	RIVERSIDE C	0	TCM Committed	TDM20	0	REGIONAL RIDESHARE - CONTI	12/30/2011	10157	XRIV	2005/2006	0	0	1449
RIV	RIV520111	RIV520111	RIVERSIDE C	0	TCM Committed	TDM20	0	REGIONAL RIDESHARE - CONTI	12/30/2011	10157	STPL	2006/2007	0	0	820
RIV	RIV520111	RIV520111	RIVERSIDE C	0	TCM Committed	TDM20	0	REGIONAL RIDESHARE - CONT	12/30/2011	10157	XRIV	2006/2007	0	0	1591
RIV	RIV520111	RIV520111	RIVERSIDE C	0	TCM Committed	TDM20	0	REGIONAL RIDESHARE - CONT	12/30/2011	10157	XRIV	2007/2008	0	0	1559
RIV	RIV520111	RIV520111	RIVERSIDE C	0	TCM Committed	TDM20	0	REGIONAL RIDESHARE - CONT	12/30/2011	10157	XRIV	2008/2009	0	0	1884
RIV	RIV520111	RIV520111	RIVERSIDE C	0	TCM Committed	TDM20	0	REGIONAL RIDESHARE - CONT	12/30/2011	10157	XRIV	2009/2010	0	0	30

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RIV	RIV520111	RIV520111	RIVERSIDE C	0	TCM Committed	TDM20	0	REGIONAL RIDESHARE - CONTI	12/30/2011	10157	XRIV	2010/2011	0	0	4
RIV	RIV62029	RIV62029	TEMECULA	24	TCM	TDN64	79	AT HWY 79 SO AND LA PAZ ST	12/31/2015	2374	AB2766	2008/2009	59	0	0
RIV	RIV62029	RIV62029	TEMECULA	24	TCM	TDN64	79	AT HWY 79 SO AND LA PAZ ST	12/31/2015	2374	CITY	2008/2009	85	188	0
RIV	RIV62029	RIV62029	TEMECULA	24	TCM	TDN64	79	AT HWY 79 SO AND LA PAZ ST	12/31/2015	2374	AB2766	2009/2010	70	0	0
RIV	RIV62029	RIV62029	TEMECULA	24	TCM	TDN64	79	AT HWY 79 SO AND LA PAZ ST	12/31/2015	2374	AB2766	2014/2015	0	0	338
RIV	RIV62029	RIV62029	TEMECULA	24	TCM	TDN64	79	AT HWY 79 SO AND LA PAZ ST	12/31/2015	2374	CITY	2014/2015	0	0	1634
SBD	713	713	VARIOUS AG	0	TCM Committed	CAX69	215	I-215 CORRIDOR NORTH - IN S	12/1/2010	718586	STP-RIP	1998/1999	14052	0	0
SBD	713	713	VARIOUS AG	0	TCM Committed	CAX69	215	I-215 CORRIDOR NORTH - IN S	12/1/2010	718586	STP-RIP	2002/2003	0	42651	0
SBD	713	713	VARIOUS AG	0	TCM Committed	CAX69	215	I-215 CORRIDOR NORTH - IN S	12/1/2010	718586	CMAQ	2003/2004	0	14018	0
SBD	713	713	VARIOUS AG	0	TCM Committed	CAX69	215	I-215 CORRIDOR NORTH - IN S	12/1/2010	718586	CMAQ	2004/2005	0	3763	0
SBD	713	713	VARIOUS AG	0	TCM Committed	CAX69	215	I-215 CORRIDOR NORTH - IN SA	12/1/2010	718586	STCASHP	2004/2005	0	38348	0
SBD	713	713	VARIOUS AG	0	TCM Committed	CAX69	215	I-215 CORRIDOR NORTH - IN SA	12/1/2010	718586	XSBD	2004/2005	27594	0	0
SBD	713	713	VARIOUS AG	0	TCM Committed	CAX69	215	I-215 CORRIDOR NORTH - IN SA	12/1/2010	718586	CMAQ	2005/2006	0	21096	0
SBD	713	713	VARIOUS AG	0	TCM Committed	CAX69	215	I-215 CORRIDOR NORTH - IN S	12/1/2010	718586	CMAQ	2006/2007	0	0	13638
SBD	713	713	VARIOUS AG	0	TCM Committed	CAX69	215	I-215 CORRIDOR NORTH - IN S	12/1/2010	718586	PNRS	2006/2007	0	17095	4975
SBD	713	713	VARIOUS AG	0	TCM Committed	CAX69	215	I-215 CORRIDOR NORTH - IN S	12/1/2010	718586	STCASHR	2006/2007	0	0	57096
SBD	713	713	VARIOUS AG	0	TCM Committed	CAX69	215	I-215 CORRIDOR NORTH - IN S	12/1/2010	718586	STPL	2006/2007	0	0	29307
SBD	713	713	VARIOUS AG	0	TCM Committed	CAX69	215	I-215 CORRIDOR NORTH - IN SA	12/1/2010	718586	TCRF	2006/2007	0	0	19483
SBD	713	713	VARIOUS AG	0	TCM Committed	CAX69	215	I-215 CORRIDOR NORTH - IN SA	12/1/2010	718586	XSBD	2006/2007	0	23646	3291
SBD	713	713	VARIOUS AG	0	TCM Committed	CAX69	215	I-215 CORRIDOR NORTH - IN SA	12/1/2010	718586	STCASHP	2007/2008	5390	0	0
SBD	713	713	VARIOUS AG	0	TCM Committed	CAX69	215	I-215 CORRIDOR NORTH - IN S	12/1/2010	718586	STP-RIP	2007/2008	0	23939	0
SBD	713	713	VARIOUS AG	0	TCM Committed	CAX69	215	I-215 CORRIDOR NORTH - IN S	12/1/2010	718586	ARRA-TE	2008/2009	0	0	1732
SBD	713	713	VARIOUS AG	0	TCM Committed	CAX69	215	I-215 CORRIDOR NORTH - IN S	12/1/2010	718586	AR-RSTP	2008/2009	0	0	77212
SBD	713	713	VARIOUS AG	0	TCM Committed	CAX69	215	I-215 CORRIDOR NORTH - IN S	12/1/2010	718586	AR-STP	2008/2009	0	0	49120
SBD	713	713	VARIOUS AG	0	TCM Committed	CAX69	215	I-215 CORRIDOR NORTH - IN SA	12/1/2010	718586	CMAQ	2008/2009	0	0	50185
SBD	713	713	VARIOUS AG	0	TCM Committed	CAX69	215	I-215 CORRIDOR NORTH - IN SA	12/1/2010	718586	CMIA	2008/2009	0	0	59000
SBD	713	713	VARIOUS AG	0	TCM Committed	CAX69	215	I-215 CORRIDOR NORTH - IN SA	12/1/2010	718586	DEMOT21	2008/2009	0	0	2063
SBD	713	713	VARIOUS AG	0	TCM Committed	CAX69	215	I-215 CORRIDOR NORTH - IN S	12/1/2010	718586	PNRS	2008/2009	0	0	33930
SBD	713	713	VARIOUS AG	0	TCM Committed	CAX69	215	I-215 CORRIDOR NORTH - IN SA	12/1/2010	718586	STCASHR	2008/2009	0	0	38853
SBD	713	713	VARIOUS AG	0	TCM Committed	CAX69	215	I-215 CORRIDOR NORTH - IN SA	12/1/2010	718586	STPL	2008/2009	0	0	34850
SBD	713	713	VARIOUS AG	0	TCM Committed	CAX69	215	I-215 CORRIDOR NORTH - IN SA	12/1/2010	718586	TCRF	2008/2009	0	0	5517
SBD	713	713	VARIOUS AG	0	TCM Committed	CAX69	215	I-215 CORRIDOR NORTH - IN S	12/1/2010	718586	XSBD	2008/2009	0	0	6742
SBD	20620	20620	VARIOUS AG	0	TCM Committed	CAX68	210	UPLAND TO SAN BERNARDINO	12/1/2010	482339	CMAQ	2003/2004	0	0	19241
SBD	20620	20620	VARIOUS AG	0	TCM Committed	CAX68	210	UPLAND TO SAN BERNARDINO	12/1/2010	482339	NH-IIP	2003/2004	0	0	2889
SBD	20620	20620	VARIOUS AG	0	TCM Committed	CAX68	210	UPLAND TO SAN BERNARDINO	12/1/2010	482339	STPL	2003/2004	0	0	1393
SBD	20620	20620	VARIOUS AG	0	TCM Committed	CAX68	210	UPLAND TO SAN BERNARDINO	12/1/2010	482339	STP-RIP	2003/2004	5931	111729	121206
SBD	20620	20620	VARIOUS AG	0	TCM Committed	CAX68	210	UPLAND TO SAN BERNARDINO	12/1/2010	482339	XSBD	2004/2005	15636	0	44347
SBD	20620	20620	VARIOUS AG	0	TCM Committed	CAX68	210	UPLAND TO SAN BERNARDINO	12/1/2010	482339	CMIA	2008/2009	0	0	22000
SBD	20620	20620	VARIOUS AG	0	TCM Committed	CAX68	210	UPLAND TO SAN BERNARDINO	12/1/2010	482339	STCASHR	2008/2009	0	0	57967
SBD	200074	200074	SANBAG	0	TCM Committed	NCN25	0	GROUPED PROJECTS FOR TRA	12/1/2011	4071	STPE-R	2004/2005	61	0	2294
SBD	200074	200074	SANBAG	0	TCM Committed	NCN25	0	GROUPED PROJECTS FOR TRA	12/1/2011	4071	STPE-R	2005/2006	690	0	366
SBD	200074	200074	SANBAG	0	TCM Committed	NCN25	0	GROUPED PROJECTS FOR TRA	12/1/2011	4071	STPE-R	2006/2007	0	0	660

county	project_id	RTP	agency	amend-ment	conformity category	program code	route	project description	completion date	total project cost	fund type	fiscal year	eng	row	con
SBD	200431	200431	FONTANA	0	TCM Committed	NCN26	0	INLAND PACIFIC ELECTRIC TRA	12/1/2011	3054	CITY	2004/2005	670	0	0
SBD	200431	200431	FONTANA	0	TCM Committed	NCN26	0	INLAND PACIFIC ELECTRIC TRA	12/1/2011	3054	LTF	2006/2007	0	0	338
SBD	200431	200431	FONTANA	0	TCM Committed	NCN26	0	INLAND PACIFIC ELECTRIC TRA	12/1/2011	3054	STPE-PR	2006/2007	0	0	1796
SBD	200431	200431	FONTANA	0	TCM Committed	NCN26	0	INLAND PACIFIC ELECTRIC TRA	12/1/2011	3054	1112	2008/2009	0	0	250
SBD	200450	200450	RIALTO	3	TCM Committed	TDR64	0	RIALTO METROLINK STATION -	12/1/2011	3356	5307	2009/2010	38	0	0
SBD	200450	200450	RIALTO	3	TCM Committed	TDR64	0	RIALTO METROLINK STATION -	12/1/2011	3356	5307	2010/2011	0	0	2400
SBD	200450	200450	RIALTO	3	TCM Committed	TDR64	0	RIALTO METROLINK STATION -	12/1/2011	3356	5309a	2010/2011	0	0	285
SBD	200450	200450	RIALTO	3	TCM Committed	TDR64	0	RIALTO METROLINK STATION -	12/1/2011	3356	LTF	2010/2011	0	0	633
SBD	200625	200625	OMNITRANS	8	TCM Committed	RAN92	0	E STREET TRANSIT CORRIDOR-	1/1/2014	192236	PTA-RIP	2007/2008	5000	0	0
SBD	200625	200625	OMNITRANS	8	TCM Committed	RAN92	0	E STREET TRANSIT CORRIDOR-	1/1/2014	192236	5307	2008/2009	0	0	33076
SBD	200625	200625	OMNITRANS	8	TCM Committed	RAN92	0	E STREET TRANSIT CORRIDOR-	1/1/2014	192236	5307	2009/2010	0	0	7661
SBD	200625	200625	OMNITRANS	8	TCM Committed	RAN92	0	E STREET TRANSIT CORRIDOR-	1/1/2014	192236	LTF	2009/2010	0	0	13397
SBD	200625	200625	OMNITRANS	8	TCM Committed	RAN92	0	E STREET TRANSIT CORRIDOR-	1/1/2014	192236	PTMISEA	2009/2010	0	0	7473
SBD	200625	200625	OMNITRANS	8	TCM Committed	RAN92	0	E STREET TRANSIT CORRIDOR-	1/1/2014	192236	STA	2009/2010	0	0	10095
SBD	200625	200625	OMNITRANS	8	TCM Committed	RAN92	0	E STREET TRANSIT CORRIDOR-	1/1/2014	192236	XSBD	2009/2010	0	0	483
SBD	200625	200625	OMNITRANS	8	TCM Committed	RAN92	0	E STREET TRANSIT CORRIDOR-	1/1/2014	192236	5307	2010/2011	0	0	6178
SBD	200625	200625	OMNITRANS	8	TCM Committed	RAN92	0	E STREET TRANSIT CORRIDOR-	1/1/2014	192236	5307-TR	2010/2011	0	0	21000
SBD	200625	200625	OMNITRANS	8	TCM Committed	RAN92	0	E STREET TRANSIT CORRIDOR-	1/1/2014	192236	5309a	2010/2011	0	0	32370
SBD	200625	200625	OMNITRANS	8	TCM Committed	RAN92	0	E STREET TRANSIT CORRIDOR-	1/1/2014	192236	PTMISEA	2010/2011	0	0	6864
SBD	200625	200625	OMNITRANS	8	TCM Committed	RAN92	0	E STREET TRANSIT CORRIDOR-	1/1/2014	192236	STA	2010/2011	0	0	1007
SBD	200625	200625	OMNITRANS	8	TCM Committed	RAN92	0	E STREET TRANSIT CORRIDOR-	1/1/2014	192236	XSBD	2010/2011	0	0	1640
SBD	200625	200625	OMNITRANS	8	TCM Committed	RAN92	0	E STREET TRANSIT CORRIDOR-	1/1/2014	192236	5309a	2011/2012	0	0	42630
SBD	200625	200625	OMNITRANS	8	TCM Committed	RAN92	0	E STREET TRANSIT CORRIDOR-	1/1/2014	192236	XSBD	2011/2012	0	0	1664
SBD	200625	200625	OMNITRANS	8	TCM Committed	RAN92	0	E STREET TRANSIT CORRIDOR-	1/1/2014	192236	XSBD	2012/2013	0	0	1698
SBD	981118	981118	OMNITRANS	24	TCM	TRNH6	0	BUS SYSTEM - PASSENGER FA	8/31/2012	1244	STA	2004/2005	0	0	200
SBD	981118	981118	OMNITRANS	24	TCM	TRNH6	0	BUS SYSTEM - PASSENGER FA	8/31/2012	1244	5309c	2010/2011	0	0	191
SBD	981118	981118	OMNITRANS	24	TCM	TRNH6	0	BUS SYSTEM - PASSENGER FA	8/31/2012	1244	STA	2010/2011	0	0	48
SBD	981118	981118	OMNITRANS	24	TCM	TRNH6	0	BUS SYSTEM - PASSENGER FAC	8/31/2012	1244	5309c	2011/2012	0	0	201
SBD	981118	981118	OMNITRANS	24	TCM	TRNH6	0	BUS SYSTEM - PASSENGER FA	8/31/2012	1244	STA	2011/2012	0	0	50
SBD	981118	981118	OMNITRANS	24	TCM	TRNH6	0	BUS SYSTEM - PASSENGER FA	8/31/2012	1244	5309c	2012/2013	0	0	217
SBD	981118	981118	OMNITRANS	24	TCM	TRNH6	0	BUS SYSTEM - PASSENGER FA	8/31/2012	1244	STA	2012/2013	0	0	54
SBD	981118	981118	OMNITRANS	24	TCM	TRNH6	0	BUS SYSTEM - PASSENGER FAC	8/31/2012	1244	5309c	2013/2014	0	0	226
SBD	981118	981118	OMNITRANS	24	TCM	TRNH6	0	BUS SYSTEM - PASSENGER FAC	8/31/2012	1244	STA	2013/2014	0	0	57
SBD	20020802	1O0705	SAN BERNA	0	TCM Committed	TDR64	0	METROLINK ADD'L PARKING ST	6/30/2009	11064	CMAQ	2004/2005	531	0	0
SBD	20020802	1O0705	SAN BERNAR	0	TCM Committed	TDR64	0	METROLINK ADD'L PARKING ST	6/30/2009	11064	LTF	2004/2005	69	0	0
SBD	20020802	1O0705	SAN BERNAR	0	TCM Committed	TDR64	0	METROLINK ADD'L PARKING S	6/30/2009	11064	CMAQ	2008/2009	0	0	6608
SBD	20020802	1O0705	SAN BERNAR	0	TCM Committed	TDR64	0	METROLINK ADD'L PARKING S	6/30/2009	11064	LTF	2008/2009	0	0	856
SBD	20020802	1O0705	SAN BERNA	0	TCM Committed	TDR64	0	METROLINK ADD'L PARKING S	6/30/2009	11064	PVT	2008/2009	0	0	3000
SBD	20061012	4TR0101	SANBAG	18	TCM Committed	RAN92	0	DOWNTOWN SAN BERNARDIN	10/10/2014	66021	5307	2007/2008	800	0	0
SBD	20061012	4TR0101	SANBAG	18	TCM Committed	RAN92	0	DOWNTOWN SAN BERNARDIN	10/10/2014	66021	LTF	2007/2008	200	0	0
SBD	20061012	4TR0101	SANBAG	18	TCM Committed	RAN92	0	DOWNTOWN SAN BERNARDIN	10/10/2014	66021	LTF	2011/2012	0	6587	0
SBD	20061012	4TR0101	SANBAG	18	TCM Committed	RAN92	0	DOWNTOWN SAN BERNARDIN	10/10/2014	66021	XSBD	2011/2012	5331	0	0

county	project_id	RTP	agency	amend ment	conformity category	program code	route	project description	completion date	total project cost	fund type	fiscal year	eng	row	con
SBD	20061012	4TR0101	SANBAG	18	TCM Committed	RAN92	0	DOWNTOWN SAN BERNARDIN	10/10/2014	66021	5307	2012/2013	0	0	12000
SBD	20061012	4TR0101	SANBAG	18	TCM Committed	RAN92	0	DOWNTOWN SAN BERNARDINO	10/10/2014	66021	CMAQ	2012/2013	0	0	10306
SBD	20061012	4TR0101	SANBAG	18	TCM Committed	RAN92	0	DOWNTOWN SAN BERNARDINO	10/10/2014	66021	CTSGP	2012/2013	0	0	3389
SBD	20061012	4TR0101	SANBAG	18	TCM Committed	RAN92	0	DOWNTOWN SAN BERNARDINO	10/10/2014	66021	LTF	2012/2013	0	0	7997
SBD	20061012	4TR0101	SANBAG	18	TCM Committed	RAN92	0	DOWNTOWN SAN BERNARDINO	10/10/2014	66021	PTMISEA	2012/2013	0	0	5000
SBD	20061012	4TR0101	SANBAG	18	TCM Committed	RAN92	0	DOWNTOWN SAN BERNARDINO	10/10/2014	66021	XSBD	2012/2013	0	0	14411
SBD	SBD031505	SBD031505	SANBAG	0	TCM Committed	NCN25	0	GROUPED PROJECTS FOR LTF	12/1/2010	7900	TDA3	2005/2006	0	0	4900
SBD	SBD031505	SBD031505	SANBAG	0	TCM Committed	NCN25	0	GROUPED PROJECTS FOR LTF	12/1/2010	7900	TDA3	2006/2007	0	0	3000

Numbers in the last three columns of the table are in thousands of nominal dollars.

TABLE E-2

SCAG TCM Funding Sources

Fund Name	Jurisdiction	Remarks
1112	Federal	Federal
5307	Federal	Gas Tax
5339	Federal	Gas Tax
5394	Federal	
2008EAR	Federal	
2009EAR	Federal	
5307LA	Federal	It is a formula-based allocation to urban areas - thus LA/LB/SA is one of the areas in the SCAG region; Gas Tax
5307-TR	Federal	Gas Tax
5309a	Federal	Gas Tax
5309b	Federal	Gas Tax
5309c	Federal	Gas Tax
AB2766	State	Vehicle Registration Surcharge
AGENCY	Local	Various - use local agency general funds
AR-5307	State	Gas Tax
ARRA-TE	State	Gas Tax
AR-RSTP	Federal	
AR-STP	Federal	
BONDL	Local	Local bonds
CITY	Local	Local agency general funds
CMAQ	Federal	
CMIA	State	State bonds - Prop 1B
CO	Local	Various - use local agency general funds
CRD	State	Gas Tax
CTSGP	State	General Fund-California Transit Security Grant Program
DEMISTE	Federal	
DEMOSTL	Federal	
DEMOT21	Federal	
DEV FEE	Local	Developer Fees--land subdividers
FEE	Local	Developer Impact Fee
GEN	Local	Local agency general funds
GRV-NH	Federal	Federal GARVEE
GRV-STP	Federal	
LTF	Local	Sales Tax-0.025 cent
MEA_R	Local	Sales Tax 0.5 cent
MR02	Local	Measure R Sales Tax 0.5 cent
MR20H	Local	Measure R Sales Tax 0.5 cent
MR35	Local	Measure R Sales Tax 0.5 cent
NH	Federal	
NH-IIP	Federal	
NH-RIP	Federal	
ORAM2TR	Local	Orange County Measure M2 Sales Tax 0.5 cent
ORA-RIP	Local	Orange County Measure M2 Sales Tax 0.5 cent
ORA-TRN	Local	Orange County Measure M2 Sales Tax 0.5 cent
P116	State	State Bond
PC10	Local	Propositions Sales Tax Los Angeles County Metro
PC20	Local	Propositions Sales Tax Los Angeles County Metro
PC25	Local	Propositions Sales Tax Los Angeles County Metro
PC40	Local	Propositions Sales Tax Los Angeles County Metro
PC5	Local	Propositions Sales Tax Los Angeles County Metro
PNRS	Federal	
PORT	Local	Port of LA or LB - general funds

TABLE E-2 (Continued)

Fund Name	Jurisdiction	Remarks
PROPA	Local	Sales Tax 0.5 cent
PROPALR	Local	Prop A Local Return Sales Tax 0.5 cent
PTA-IIP	State	Sales Tax on Diesel Fuel
PTA-RIP	State	Sales Tax on Diesel Fuel
PTMISEA	State	State bonds - Prop 1B
PVT	Private Funds	Private source Development Agreements
SLP	State	State bonds - Prop 1B
STA	State	Sales Tax on Diesel Fuel
STA-1B	State	Bond
STA-BLA	Local	Sales Tax on Diesel Fuel
STAL-S	State	Gas Tax
STCASGI	State	Gas Tax
ST-CASH	State	Gas Tax
STCASHI	State	Gas Tax
STCASHP	State	Gas Tax
STCASHR	State	Gas Tax
STC-RIPP	State	Gas Tax
STIPACIP	State	Gas Tax
STIPACRP	State	Gas Tax
STPE-I	Federal	
STPE-P	Federal	
STPE-PR	Federal	
STPE-R	Federal	
STP-GR	Federal	
STP-IIP	Federal	
STPL	Federal	
STPL-R	Federal	
STP-RIP	Federal	
TCIF	State	State bonds - Prop 1B
TCRF	State	State general fund
TDA	Local	Sales Tax and Sales Tax on Diesel Fuel
TDA3	Local	Sales Tax and Sales Tax on Diesel Fuel
TDA4	Local	Sales Tax and Sales Tax on Diesel Fuel
TIFIA	Local	Federal low-interest loans
TIGER	Federal	
TIGGER	Federal	
TLSP	State	State bonds - Prop 1B
UNIV	State	State general fund
WRVTUMF	Local	Regional development impact fees
XRIV	Local	Riverside Co Sales Tax
XSBD	Local	San Bernardino Measure I Sales Tax

APPENDIX F

COMMENTS FROM PEER REVIEW ECONOMISTS

INTRODUCTION

Several economists have peer-reviewed the District's Draft Socioeconomic Report. Specifically, Professor J.R. DeShazo assisted in reviewing the value of a statistical life used for the PM2.5 mortality assessment. Professor Gloria González-Rivera, Professor Lisa M. Grobar, Professor Emeritus Jane Hall, Mr. Stephen Levy, Professor Paul Ong, Dr. Frederick R. Treyz, and Professor Karen R. Polenske have reviewed the entire Draft report. All of their comments received as of the publication date of the Draft Report are included in their entirety in this appendix.

BIOGRAPHIES

Professor **J.R. DeShazo** is Professor Public Policy, Vice Chair of the Department of Public Policy, and Director of the Luskin Center for Innovation at UCLA. His expertise includes public finance, organizational governance, and the willingness-to-pay for health risk reductions. He has several recent peer-reviewed publications on the willingness-to-pay subject. His other research covers environmental issues such as greenhouse gases and solar power. Professor DeShazo holds a Ph.D. in Urban Planning from Harvard University. He was a Rhodes Scholar while completing his M.Sc. at Oxford University.

Professor **Gloria González-Rivera** is Professor of Economics at the University of California Riverside. Professor González-Rivera is a Fulbright Scholar. Her research focuses on the development of econometric and forecasting methodology with applications in financial markets, volatility forecasting, risk management, and agricultural markets. She is Associate Editor for the International Journal of Forecasting, and has been elected to the Board of Directors of the International Institute of Forecasters. Professor González-Rivera received her Ph.D. in economics from the University of California, San Diego where she wrote her dissertation under the tutelage of 2003 Nobel Laureate Professor Robert F. Engle.

Professor **Lisa M. Grobar** is Professor of Economics at California State University, Long Beach and serves as Director of the CSULB Economic Forecast Project. She is a regional economist with specialization in southern California economy. Dr. Grobar has co-run the annual forecasting conference for the Long Beach economy and southern California counties since 1990. Her recent research focuses on the various sectors in the Long Beach economy, including Long Beach airport, nonprofits, overnight tourism, and downtown Long Beach. Professor Grobar received her Ph.D. in economics from the University of Michigan.

Professor Emeritus **Jane Hall** of California State University, Fullerton has performed extensive research on the economics of regulation and the environment. Her research covers a broad range of topics, including national economic policy, the Asian economic crisis, and the economic costs of pollution. She has conducted studies on the valuation of health effects of ozone and particulates for various regions in California, including southern California, the San Joaquin Valley, and the Bay Area. Professor Hall earned her Ph.D. in energy and resources from the University of California, Berkeley.

Mr. **Stephen Levy** is Director and Senior Economist of the Center for Continuing Study of the California Economy (CCSCE) in Palo Alto. CCSCE provides an independent assessment of economic and demographic trends in California. Mr. Levy works with public institutions and

private companies on various issues (such as long-term planning challenges) related to the California growth trends, including county and sectoral projections. Mr. Levy is the principal author of CCSCE's annual report series on the California economy. Mr. Levy has a master's degree in economics from the Massachusetts Institute of Technology (MIT).

Professor **Paul Ong** is Professor of Urban Planning and Social Welfare at the University of California, Los Angeles. Professor Ong has conducted studies based on sub-county demographic statistics from the census data. The study subjects include differential impacts on race and ethnicity of various events such as job and industry turnover, urban traffic, and other social issues. He served as an advisor to the U.S. Bureau of the Census, the California Department of Social Services, and the California Department of Employment Development. Professor Ong earned his Ph.D. in economics from the University of California, Berkeley.

Dr. **Frederick R. Treyz** is CEO of Regional Economic Models, Inc. (REMI). As CEO of REMI, Dr. Treyz is responsible for research, development, consultation, and management of regional forecasting and policy analyses with clients across U.S. and Europe. During his time as CEO, Dr. Treyz has overseen the annual data update and delivery of over 100 economic models that are used for energy, environmental, economic development, and other policies that affect various economies. Dr. Treyz holds a Ph.D. in Regional Science from the University of Pennsylvania.

Professor **Karen R. Polenske** is Professor of Regional Political Economy and Planning at MIT. She has performed numerous researches on using input-output models for economic impact analyses. Her current research includes comparative analyses of energy use, pollution generation, and industrial-technology options in the People's Republic of China (China), Brazil, and India; and regional implications of fuel use on food security in the United States. She is a past President of the International Input-Output Association. She won the 1996 North American Regional Science Distinguished Scholar Award. Professor Polenske holds a Ph.D. in economics from Harvard University and worked under the tutelage of 1973 Nobel Laureate Professor Wassily W. Leontief.

AQMD RESPONSES TO COMMENTS FROM ECONOMISTS

Table F-1 has a summary of major comments from the peer-review economists and AQMD responses.

TABLE F-1
AQMD Responses to Comments from Peer-Review Economists

Peer Review Economists	Comments	Responses
Professor J. R. DeShazo, UCLA	1. Support Dr. Deck's recommendation of the value of a statistical life (VSL) estimate based on Kochi et al. (2006).	1. The comment is noted.
	2. Consider VSLs associated with health risks in future years of a person's life.	2. The recommendation will be one of the future enhancements as indicated on pp. 8-3 to 8-4 in Chapter 8.
	3. Include illness-specific VSLs.	3. Please see the response to Comment 2 above.
Professor Gloria González-Rivera, UC Riverside	1. Recommend sensitivity analyses for different scenarios and/or the use of probabilistic confidence intervals.	1. Sensitivity analyses performed in the Draft Socioeconomic Report included premature deaths relative to the federal $PM_{2.5}$ standard, avoided cases of non-fatal heart attacks, VHT reduction benefit associated with personal trips, and CEQA alternatives in Chapter 7. Many of the model applications for the clear air benefit assessment were based on peer-reviewed publications where confidence intervals were available for probabilistic models. These publications are cited in the reference section of the Report. The District applications, in many cases, reflect the middle estimates. This recommendation is also listed as one of the future enhancements in Chapter 8.
	2. Recommend uniformity in table presentation; clarify the concept of job impacts; and include more disaggregated numbers in the presentation of CEQA alternatives.	2. Appendix D has been added to provide annual costs and benefits from 2013 to 2035 for major components of clean air benefits and costs, as well as jobs impacts. An average annual line has been added to the time-series charts in Chapters 3 and 4. A paragraph below Figure 4-1 has been added to clarify the concept of jobs.
	3. Recommend monitoring of projections from models such as REMI, BenMAP, and CMAQ	3. This recommendation is also listed as one of the future enhancements in Chapter 8.
	4. Report trends for industries other than manufacturing and include more discussions on why other regions are more successful in achieving standards.	4. The 1st paragraph on p. 2-5 and the last sentence in the 1st paragraph on p. 2-10 have been added as a result.

TABLE F-1
(Continued)

Peer Review Economists	Comments	Responses
Professor Gloria González-Rivera, UC Riverside (cont'd)	5. Add the attractiveness of clean air to high wage earners and provide explanations on why certain sectors in Tables 6-2 and 6-3 in Chapter 6 are more or less impacted.	5. Please see the last sentence in the 1st paragraph on p. 6-1 and the revised last paragraph on p. 6-2.
Professor Lisa Grobar, Cal State Long Beach	1. Examine possible feedback effects of clean air on population, jobs, and congestion. 2. Check the GDP number of $768 billion for South Coast in 2010 & include details on regional differences between LA-OR & RS-SB. 3. An average annual job gain of 37,043 from 2013 to 2035 is not an insignificant number in light of the increase in baseline jobs of 90,240. 4. Include leisure trips in the VHT benefit calculation and add it to the total VHT benefit; and provide justifications on why one-half of wage rate was used to monetarily quantify reductions in VHT from commute trips. 5. Include a table showing health benefit by age cohort. Health benefits may benefit low income households more.	1. The baseline economic forecast provided by SCAG already assumed that the region would continue to make necessary investments in air quality. For this reason, the baseline forecast includes the 2012 AQMP. Please see the discussion on p. 1-6. 2. The $768 billion number is in 2005 constant dollars. The 2nd paragraph on p. 2-5 noted that there would be differences in regional economies. 3. A paragraph below Figure 4-1 has been added to clarify the concept of job impacts, which is a reference to the difference between two different projections as opposed to baseline jobs in one projection. Also, please refer to the summary section on p. 4-7 for a more refined presentation. 4. On p. 3-14, the District made an attempt to quantify the VHT reduction benefit associated with personal trips. However, the District has elected to present a more conservative estimate for this segment by not including it in the total congestion relief benefit. 5. The 2nd to the last paragraph on p. 3-8 noted that the elderly are more susceptible to premature deaths. Table 2-2 has a distribution of the elderly by sub-region. By and large, health effect functions do not vary by age group except for a few categories. The last two sentences in the 2nd paragraph on p. 3-9 addressed the potential for more benefits to low income households resulting from reductions in morbidity.

TABLE F-1
(Continued)

Peer Review Economists	Comments	Responses
Professor Lisa Grobar, Cal State Long Beach, (cont'd)	6. The government sectors would also be beneficiaries of reduced health expenditures. Include more details on simulation methodologies of health benefits in REMI in Chapter 4. Provide citations on the migration functions used to capture the amenity effect.	6. The government sector's beneficiary role in reduced health expenditures is discussed in the footnote on p. 4-3. The 1st paragraph on p. 4-3 has more details on the simulation methodologies of health benefits. Please see the reference section and p. 4-1 for the citation on migration functions.
	7. Revise the disposable income section to make it more readable. Provide more discussions on Tables 5-5 and 5-6 regarding the lowest earning group and the lowest quintile of households. Also, clarify the significant level of these impacts.	7. The Report has noted the slight differences across different income groups from year to year. Also, in the summary section of Chapter 6, the Report noted the small magnitude of these metrics given the size of South Coast economy and additional analyses may be required during rulemaking when control measures are moved to the rule development phase.
	8. Include the effect of air pollution on property values & concentration of low-income households in the environmental justice (EJ) analysis.	8. The recommendation on EJ analysis is included as one of the future enhancements in Chapter 8.
Professor Emeritus Jane Hall, Cal State Fullerton	1. Include benefits to agriculture and horticulture.	1. Reductions in damages to plants due to cleaner air are mostly related to ozone. These reductions will be assessed in 2015 when the ozone attainment plan is due.
	2. Include ozone-related morbidity and mortality effects.	2. See discussions in Paragraph 3 on p. 1-1 and the response to Comment 1 above.
	3. Clarify the basis for PM2.5 mortality value (VSL) and specific refinements to the selection of health effects.	3. Please see additional discussions in the 2nd to the last paragraph on p. 3-8 and 2nd to the last paragraph on p. 8-1.
	4. Discuss distributional effects on ethnic group.	4. Due to resource constraints, health effects on ethnic population will be conducted for the next AQMP, as stated in Chapter 8.
	5. Report distributional impact by sub-region on a per-capita basis.	5. Please see per capita clean air benefit and cost in Table 5-4.

TABLE F-1
(Continued)

Peer Review Economists	Comments	Responses
Mr. Steven Levy, CCSCE	1. Request that the District make a comparison between 2007 and 2012 AQMP Socioeconomic Reports because of the differences in major components of costs and benefits.	1. The magnitude of costs and benefits depends on the emission reductions required to achieve the federal clean air standards. $PM_{2.5}$ levels have improved dramatically over the past two decades. In 2011, both the annual $PM_{2.5}$ standard and the 24-hour $PM_{2.5}$ standard were exceeded at only one air monitoring station, Mira Loma, in northwestern Riverside County. As such, compared with the 2007 AQMP, the 2012 AQMP requires much smaller emission reductions beyond today's control level in order to achieve the $PM_{2.5}$ standard in 2014, thus leading to smaller costs and benefits than the 2007 AQMP when only non-TCMs are considered.
	2. Question the large size of the congestion relief benefit and the small size of the health benefit.	2. The congestion relief benefit in the September 2012 release of the Draft Socioeconomic Report was for all the TCMs in the 2012 RTP. The SIP-committed TCMs in the 2012 AQMP has an estimated benefit of $519 million annually, which is incorporated in Appendix H. The size of health benefit is reflected by the amount of controls required to attain the federal $PM_{2.5}$ standard, which was discussed in Table 3-1.
	3. Recommend that the District reduce references to REMI model descriptions of the economy; question the District's description of data sources of SCAG's population projections; and dispute the District's characterization of the BEA/BLS employment concepts.	3. SCAG uses the BLS employment concept for economic projections. In presenting the economic analysis of the 2012 RTP, SCAG used IMPLAN (https://implan.com/v4/index.php?option=com_multicategories&view=article&id=634:634&Itemid=71) and REMI, both of which are based on the BEA employment concept. Mixing BLS/BEA concepts in one presentation will create inconsistency. SCAG uses multiple data sources and procedures to fine-tune its populations and employment projections. The intent of the Report was not to follow all the steps that SCAG had taken, but rather to focus on SCAG's starting and ending points, which was verified by SCAG staff. For differences between BEA and BLS employment, please refer to http://www.bea.gov/faq/index.cfm?faq_id=104. The major source of the BLS employment statistics is the Quarterly Census of Employment and Wages (QCEW) Program. According to http://www.bls.gov/cew/cewfaq.htm#Q14,

TABLE F-1
(Continued)

Peer Review Economists	Comments	Responses
Mr. Steven Levy, CCSCE (cont'd)		"Because the QCEW data is based on an establishment census which counts only filled jobs, it is likely that a multi-job holder will be counted two or more times in QCEW data." Also refer to http://www.bea.gov/regional/pdf/spi2006/11%20Employment.pdf for the relationship between the BLS and BEA employment statistics.
	4. Include impacts of the 2012 AQMP on population and unemployment rate.	4. The baseline demographic forecast provided by SCAG assumed continuation of federal highway funding that would be necessary for the four-county area to make the infrastructure investments for implementation of the 2012 RTP in order to keep the region competitive nationally and globally. For this reason, the baseline forecast reflects the full implementation of the 2012 RTP. Please see the discussion on p. 1-6. Population changes are already reflected in the baseline forecast. Job impacts in REMI are job counts, not head counts. The unemployment rate has to be calculated based on head counts.
	5. Add a caveat on the cost distribution to reflect that costs may be borne by company headquarters located elsewhere.	5. Please see Footnote 2 on p. 3-1. In cases where company headquarters (located elsewhere) pay for control costs, the costs in the Report would be more conservative.
	6. Which parts of the AQMP create competitiveness changes?	6. Please refer to pp. A-8 to A-9 in Appendix A, Footnote 2 on p. 4-1, and Footnote 4 on p. 4-3 for the competitiveness impact.
Professor Paul Ong, UCLA	1. Provide ex post evaluation of REMI projections.	1. This recommendation is one of the future enhancements, as stated in Chapter 8.
	2. Define race and ethnicity used in Chapter 2 and include a discussion on a lag in job recovery after the Great Recession.	2. The 2nd sentence in the last paragraph on p. 2-1 defines race and ethnicity concepts used to compile estimates in Table 2-1 and Figure 2-1. The lag in job recovery is noted in the 1st paragraph on p. 2-11.

TABLE F-1
(Continued)

Peer Review Economists	Comments	Responses
Professor Paul Ong, UCLA (cont'd)	3. Transportation mode shifts may reduce congestion relief benefits.	3. TCM and TCM-like projects have led to overall reductions in trips, including very small amount of reductions in transit and non-motorized trips. Thus, potential risk from increases in journey time of other modes is minimal. Additionally, extra wait time or inconvenience due to carpool is considered in mode choice utility equations. Relative to the overall journey time, carpool wait time tends to be relatively small. Finally, the estimated PHT (person hours travelled) reductions from modeling results are higher than the VHT (vehicle hours travelled) reductions.
	4. Clarify work versus residence site in Table 5-4	4. Please refer to the last paragraph on work site on p. 5-6.
	5. Discuss why the biggest reduction in relative prices would occur in the transportation and warehousing sector.	5. Please refer to the last paragraph on p. 6-2.
	6. Expand EJ analysis.	6. An EJ analysis of the PM2.5 concentration changes in 2014 is included on pp. 5-3 to 5-4. AQMD staff will continue to explore ways to further enhance the analysis.
Dr. Fred Treyz	1. Include reductions in damage to plants and animals as well as the value of reduced vehicle hours.	1. Reductions in damages to plants due to cleaner air are mostly related to ozone. These reductions will be assessed in 2015 when the ozone attainment plan is due. The value of reduced vehicle hours is discussed on pp. 3-11 to 3-13.

Memorandum

To: Sue Lieu, PhD, Program Supervisor, Socioeconomic Section
South Coast Air Quality Management District

From: Dr. J.R. DeShazo, Professor and Research Center Director, UCLA

Date: 9/22/2012

Subject: Review of Dr. Leland Deck's Recommendation for the Value of a Statistical Life in the 2012 Air Quality Management Plan Analysis

The South Coast Air Quality Management District (AQMD) wishes to quantify the value of health improvements that individuals receive as a result improved air quality. Individuals may value improved air quality for a variety of reasons. However, the vast majority of the quantifiable benefits come from risk reductions that individuals will experience premature death from air-pollution related illnesses. The approach most frequently used by regulatory agencies, such EPA and DOT to value mortality risk reduction, is to estimate the value of a statistical life (VSL). The AQMD asked Dr. Leland Deck of Stratus Consulting Inc. to review and update the VSL estimate to be used in the 2012 Air Quality Management Plan (AQMP).

The purpose of this memorandum is to review Dr. Deck's recommendation of using the VSL approach and his more specific recommendation of employing an average estimated VSL of $6,730,000 based on Kochi et al. (2006).

1. Understanding how the Value of Statistical Life (VSL) is constructed

The VSL is constructed by measuring the collective willingness to pay for small risk reductions for large numbers of people. A purely hypothetical example may help to illustrate this. If an air pollution policy reduces the probability of death for a group of a million people from 5 in 1,000,000 → 4 in 1,000,000, then we would say that risk reduction of one in a million ($\Delta\Pi = 0.000005 - 0.000004 = 0.000001$). And it saves one "statistical life" with certainty among this group of one million people.

Next, we want to value of the collective risk reduction attributed to this policy. If these 1,000,000 people are each willing to pay $6 for this policy that reduces the group's statistical risk by one in a million, then we can calculate a VSL of $6,000,000 (i.e., $6×1,000,000). Critical to this VSL calculation is knowing that, in this hypothetical example, people were willing to pay an average of $6 in return for a one in million risk reduction. Policy applications of the *VSL* typically involve one of two cases. In most policy evaluation contexts the *VSL* is multiplied by an expected overall number of "deaths avoided" to produce an estimate of overall expected benefits.

20 or even 30 years from the present. This period of time before the future health risk would be realized is call the latency period.

One important innovation in VSL studies since the publication of Kochi et al. (2006) has been their ability to accommodate latency and to measure the value of risk reductions in future years of the individuals' lives. The most systematic treatment of latency in VSL is by: Cameron, Trudy Ann and J.R. DeShazo. 2012. "Demand for Health Risk Reductions." Forthcoming. *Journal of Environmental Economics and Management.*

Table 1 below presents the latency results for Cameron and DeShazo (2012a). They explore the effect of illness latency (the time in the current health state before the illness or injury occurs) on *WTP* to avoid health risks for an individual with an assumed 0.05 discount rate, household income of $42,000 and for whom the lifetime risk is to be reduced from 0.004 to 0.001. In this table, the authors array their five basic examples of different illness profiles across the top of the table. This study estimates the conventional VSL to be about $6.7 million so it is in line the current literature.

What is interesting is how the latency of the risk incidence effects willingness to pay for risk reductions. In the body of the table, they display sets of mean *WTP* estimates (and 90 percent ranges) for one individual aged 35 now, and for another individual aged 65 now. The age at onset of each illness is varied to include immediate onset, as well as onset at decade intervals starting five years from now.

Focusing first on the current period or "sudden death now" scenario in the first column of Table 1, their point estimates suggest that the 65-year-old has a considerably higher *WTP* ($5.91)[1] to reduce the risk of sudden death now than the 35-year-old ($0.72), although the 90 percent intervals overlap. Their results suggest that the sign and size of the difference depends greatly upon the specific age groups that one compares. In looking forward to future illnesses, however, as in the subsequent rows of Table 1, both 35-year-olds and 65-year-olds seem to have a lower *WTP* to avoid the same illness profile when symptoms commence at a later age.

Their selection of disease latency results can be compared to just a small number of extant empirical studies. Hammitt and Liu (2004) find that *WTP* declines at a 1.5 percent annual rate for a twenty-year latency period, while Hammitt and Haninger (2010) (p. 71) find that *WTP* does not vary significantly with latency. From our Table 4, delaying by twenty years the time at which sudden death might occur (from five years to 25 years hence) actually *increases WTP* by 96 percent for 35-year-olds. For 65-year-olds, however, a similar twenty-year delay (postponing the risk of sudden death from five years to 25 years hence) does reduce *WTP*, in this case from $4.37 to essentially zero (not shown in the table). Comparing these results to the existing empirical literature on latency, Alberini et al. (2006) find that for respondents aged 40 to 60 years, delaying the "time at which the risk reduction occurs" from 10 years to 30 years reduces *WTP* by more than 60 percent in samples from both Canada and the U.S. This may reflect the fact that their youngest respondents are forty years old, whereas ours range down to 25 years of age.

[1] Their micro-risk results can be converted to VSLs by multiplying by 1,000,000.

An entire sub-field within environmental economics is devoted to trying to provide valid and accurate estimates of people's willingness to pay for mortality reductions for use in VSL estimates. Dr. Deck's memo provides a useful review of the history of studies upon which regulators have relied in the past. The EPA's 1997 VSL estimate was based on an average individual willingness to pay of $7.88 for a one in a million risk reduction for VSL of 7.87 million (2005$ and 2010Y) (U.S. EPA, 2010). This estimate of willingness to pay came from Viscusi's (1992) survey of 26 studies, including 21 wage hedonic studies, and 5 stated preference (contingent valuation method) studies published between 1974 and 1991.

2. Dr. Deck's recommended VSL

Dr. Deck recommends rejecting the EPA's proposed approach in favor of a meta-analysis performed by Kochi et al. (2006). Dr. Deck argues that the advantages of relying on Kochi et al.'s VSL estimate of $6,730,000 involve the "simplicity" of choosing only one study, and that it lies in the middle of the other meta VSL estimates. While I do not find these convincing advantages, I do agree with him that it is a well done meta-study and has several advantages over the EPA's approach. First, the Kochi et al. study contains many more published studies. Second, it includes more recent studies that have been able to utilize much better valuation methods and techniques than studies completed before 1991. Third, Kochi et al. includes studies that valued risk reductions from a wider array of health hazards, beyond only workplace injuries which comprised the majority of studies used by EPA.

Thus, if AQMD wants an average VSL estimate based broadly on a set of studies that is both reasonably contemporary, diverse methodologically and diverse across types of mortality risk, the Kochi et al. estimate is a very reasonable choice. This diversity does have a small drawback in that the variance of estimated mean VSL in Kochi et al. is slightly larger and produces slightly wider confidence intervals, which generally is less desirable. However, the study's other noted strengths outweigh this one small less desirable aspect of their VSL estimate.

3. AQMD Plan for coming refinements in health risk valuation

The U.S. EPA is actively grappling with how to better refine its own use of the VSL. In order to help AQMD anticipate some of these changes for the future, I briefly discuss the role of latency in VSL analysis and illness-specific VSLs.

A. Incorporating health risks latencies into VSLs

All of the studies upon which Kochi et al. is based estimate the individuals' willingness to pay for risk reduction in the current period only. For example, wage-risk studies estimate the individuals' willingness to pay to reduce their risk of death during that current year of employment. When AQMD achieves a reduction in air pollution exposures, it benefits some individuals (especially children and elderly) in the current period as well individuals in future years. Indeed, most individuals (children, adults and seniors) benefit by reducing their risk of illness onset in future years of their life. For example, many will benefit from lower risk by avoiding or deferring the onset of respiratory illnesses, heart disease or lung cancer 5, 10,

TABLE 1
VSL (IN $MILLIONS) FOR DIFFERENT DISEASE LATENCIES
(BASE ON TABLE 4. CAMERON AND DESHAZO, 2012)

Illness profile:	1.	2.	3.	4.	5.
Age no; onset	Sudden death	1 years sick, nonfatal	5 years sick, nonfatal	1 year sick, then die	5 years sick, then die
Now 35 years old – symptoms start:					
now	$ 0.72	$ 1.92	$ 2.68	$ 4.47	$ 9.66
	(-4.30, 5.92) [a]	(-0.29, 4.27)	(0.50, 4.89)	(-0.13, 9.06)	(5.12, 14.86)
at age 40	1.17	1.74	2.42	4.07	8.49
	(-2.79, 5.14)	(-0.30, 3.87)	(0.44, 4.41)	(0.55, 7.65)	(4.88, 12.61)
at age 50	1.91	1.38	1.92	3.55	6.48
	(-0.61, 4.44)	(-0.26, 3.11)	(0.35, 3.49)	(1.52, 5.79)	(4.46, 8.88)
at age 60	2.30	1.06	1.45	3.13	4.77
	(0.32, 4.37)	(-0.17, 2.35)	(0.34, 2.59)	(1.46, 5.01)	(3.22, 6.60)
at age 70	2.19	0.77	1.01	2.54	3.10
	(0.43, 4.00)	(-0.05, 1.62)	(0.33, 1.72)	(0.87, 4.28)	(1.67, 4.67)
at age 80	1.40	0.47	0.60	1.42	1.04
	(0.21, 2.63)	(0.11, 0.86)	(0.31, 0.90)	(0.34, 2.53)	(0.47, 1.63)
Now 65 years old – symptoms start:					
Now	$ 5.91	$ 3.83	$ 3.85	$ 3.67	$ 0.15
	(1.61, 10.24)	(1.70, 6.24)	(1.77, 6.07)	(-0.45, 8.06)	(-4.45, 4.52)
at age 70	4.37	3.33	3.28	2.73	-0.05 [a]
	(1.40, 7.29)	(1.42, 5.44)	(1.51, 5.16)	(-0.04, 5.45)	(-2.98, 2.90)
at age 80	1.73	2.14	1.81	.98	-0.28
	(-0.07, 3.49)	(0.86, 3.52)	(0.77, 2.90)	(-0.51, 2.54)	(-1.78, 1.16)

Notes: See notes to Table 2. Assumes discount rate = 0.05, income = $42,000. Signs of parameter estimates are unconstrained.
[a] Negative simulated values of the *WTP* for a micro-risk reduction can be interpreted as zero. Negative values can result when there is a random draw from the fitted distribution of the marginal utility of income that is negative, or for the marginal (dis)utility of an adverse health state that is positive. The quadratic-in-age forms for marginal (dis)utilities of adverse health states also do not preclude negative draws for extreme values of age. To keep the estimation algorithm simple, we do not attempt to impose sign restrictions on the utility parameters (many of which are systematically varying).

B. Illness-specific VSLs

Dr. Deck's proposed approach is to use the average of many studies, most of which focus estimating individual willingness to pay to avoid a current period risk in dying at work. However, reducing individuals' air pollution exposures reduces their risk of dying of respiratory diseases, lung cancers and heart disease. There is no reason to expect that people's willingness to pay to avoid a death on job to be same as their willingness to pay to reduce of risk of dying from one of these three broad types of illnesses.

It should not be surprising that individuals value different illness risk reductions differently. These estimates of *WTP* are simply measures of individuals' inverse demands for different "goods." Each illness represents a different prospective illness profile that involves a sequence of future health states including pre-illness years, sick-years, potential recovered years, and potential lost life-years. Massive strokes or heart attacks and major accidents may involve no morbidity and sudden mortality. In contrast, the vast majority of cancers, heart diseases, respiratory illnesses and other threats, as targeted by health and environmental policies, involve systematically differing health states: the individual's status quo health state before illness onset, some number of partial or whole sick-years, potential recovered/remission years and lost life-years if the illness or injury leads to premature mortality.[2]

Several authors have estimated specific illness VSLs[3], however, the following paper provided the most comprehensive and consistent comparison across illnesses.

Willingness to Pay for Health Risk Reductions: Differences by Type of Illness." (2012 b) T.A. Cameron and J.R. DeShazo. *Journal of Health Economics.*

Cameron and DeShazo (2012) provide estimates of VSLs associated with the prospect of dying from each of eleven major illnesses, plus traffic accidents, using a representative sample of the U.S. population and a common methodological framework. The results are presented below in Table 2.

For illness (respiratory disease, lung cancer and heart disease) that AQMD reduces the risks for, we see is very different magnitude of willingness to pay to reduce those illness specific risks among the U.S. population. These estimates range from a high of $7.2-$8.3 million of heart disease and heart attack, to $3.4 and $9.6 for lung cancer for non-smokers and smokers respectively and to a low of $2 million for respiratory disease.

[2] Inverse demand for a given disease risk will also differ with the individual's ability to mitigate that particular risk as well as perceptions of the timing and size of competing health risks that might strike first.
[3] Other researchers have provided single-illness estimates and a few have even valued two or more illnesses within a single study (Ian Savage (1993); James K. Hammitt and Jin-Tan Liu (2004); Sujitra Vassanadumrongdee and Shunji Matsuoka (2005); George Van Houtven et al. (2008)).

Table 2
VSL by Illness Type (Cameron and DeShazo, 2012b)

Disease	*WTP* by 45-year olds	Weighted average [a]
Heart Disease/ Heart Attack	$7.02/$8.28	
Breast Cancer	8.91	
Prostate Cancer	8.01	
Stroke	7.30	
Colon Cancer	5.03	
Lung Cancer	3.46	$5.02
- Smokers	9.07	
Traffic Accidents	1.53	
Skin Cancer	1.12	
Respiratory Disease	2.00	3.13
- Smokers	6.06	

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COMMENTS TO THE DRAFT 2012 AQMP

GENERAL ASSESSMENT

The Draft 2012 AQMP aims to achieve the federal PM2.5 standard by 2014 and partially implement state measures towards the 8-hour ozone standard by 2024. The Draft offers a detailed description and evaluation of the costs and benefits associated with the controls and measures to improve air quality in the South Coast Basin, which includes the four counties of Los Angeles, Orange, Riverside, and San Bernardino. In addition, it provides an assessment of the socioeconomic impacts as they relate to the creation/destruction of jobs, competitiveness of the local industries, production costs and production prices, and local imports and exports. Costs and benefits are projected over 22 years from 2013 to 2035.

The District should be praised for a superior execution of such a complex and important mandate. The evaluation of costs and benefits is a difficult exercise because of the inherent uncertainty that is involved in such a long term forecast which, in this particular case, is compounded by the absence of market prices for intangible goods such as human health, visibility, and relief of traffic congestion. Nevertheless, the analysis is sound as it relies on a set of cautious assumptions, state-of-the-art systems such as REMI, BenMAP, and CMAQ, official databases such as Census data, the ACS survey, BEA and BLS data, and access to experts in the local community and academic institutions. The Draft is subject to the limitations imposed by the current research frontier in engineering systems, medical science, and socioeconomic models, and by the current resources to construct extensive data sets. Given the geographical and economic heterogeneity of the Basin, it is noteworthy the effort to assess the economic impacts within a finer geography (21 sub-regions) than that of the county line.

I provide three general recommendations that aim to improve the understanding of projected costs and benefits and the uncertainty of these projections. I will follow with some specific comments for each chapter of the Draft.

R1. Quantification of uncertainty in the projections

The Draft provides estimates of costs and benefits. Since these estimates rely on a set of assumptions, it would be advisable to provide a measure of uncertainty. I would recommend two options: sensitivity analysis or/and probabilistic confidence intervals. With sensitivity analysis, it would be possible to create a set of scenarios. Three scenarios, e.g. conservative, average, liberal, could provide a range of costs and benefits, which is much more informative than a single figure.

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The benefits of such an approach are the provision of risk in the estimates, the attenuation of biases towards under or overestimated figures, and a better guide for monitoring the estimates over time. When possible, the range of estimates may be reported with a probability statement. This approach may not be feasible for all the components of the evaluation process given the nonlinear nature of the REMI model. However, some intermediate inputs, mainly those that rely in econometric analysis, e.g. MWTP, could be presented in a format such as 90% or 95% confidence intervals.

It seems that the REMI model could be exploited further to provide a range of socioeconomic impacts because the inputs to REMI would be also provided in a range format.

If it is not possible to implement the scenario approach in this Draft because of limited resources and time constraints, I will recommend implementing it in future AQMPs and listing it in the "Future Enhancements" section of the Draft 2012 AQMP.

R2. Time series information and averages

I would recommend providing time series plots from 2013 to 2035 for all the projections in the Draft. Figure 3-2 (Control Cost by Year) and Figure 4-1 (Job Impacts of Clean Air Benefits and Measures) are good examples. Similar figures for quantifiable benefits and other quantifiable impacts will be desirable as they will offer a more complete picture of the projections and an immediate visualization of trends, if any.

I would recommend uniformity in the tables of the Draft. Some tables contain figures for 2014 and 2023, some others add 2030 or 2035. All tables should contain information for the three benchmark years of 2014, 2023, and 2030 (or 2035).

Most tables contain a last column with average annual figures either for costs or benefits or other impacts. The Draft focuses the analysis on these annual averages. However, this average should be interpreted with care for those time series with an obvious trend (downward or upward). In the following figures, Figure 3-2 (downward trend) and Figure 4-1 (upward trend), I have plotted the annual averages provided in the Draft.

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FIGURE 3-2
Control Cost by Year*

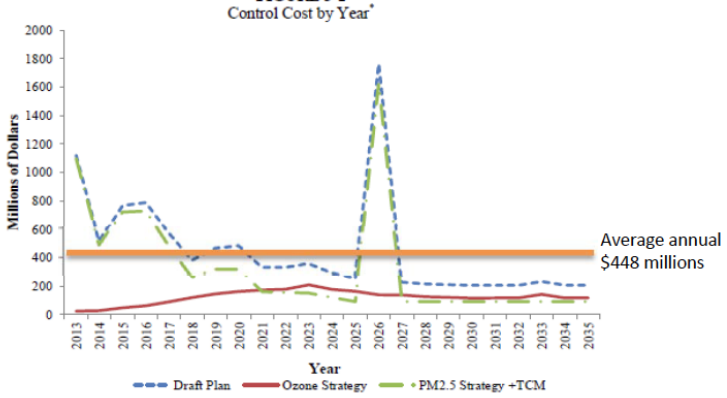
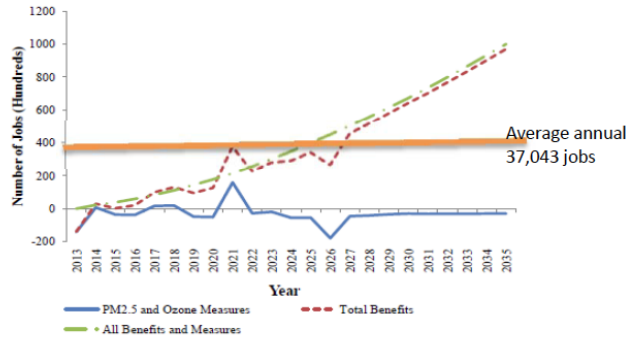


FIGURE 4-1
Job Impacts of Clean Air Benefits and Measures



The reported average annual cost is $448 million and the average annual number of jobs is 37,043. These numbers are not "average" in the statistical sense as they do not represent a measure of central tendency; over the forecasting period, they occur mostly once in time, i.e. the average cost happens in 2019-2020 (omitting the outlier year of 2026), and the average number of jobs happens around 2024. Given the trends in these time series, the costs will be much higher than the provided average before 2019 and much lower after 2020 (with the exception of those in 2026); and the job impact will be much lower than the provided average before 2024 and much larger after 2024. I would recommend explaining the meaning of these averages in the Draft, stating that the presence of trends implies that the reduction in costs or the benefits in job creation will accrue over time according to an estimated average annual growth rate.

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R.3 Monitoring of the projections

Since the forecasts span a long period of 22 years, it would be advisable to establish a dynamic monitoring mechanism to track the projections every few years. How often will be determined by the resources available but intervals of 2 years seem reasonable. Monitoring will bring more flexibility to the long-term forecast by making it adaptive to the ever-changing macroeconomic conditions, updated data sets, updating of models and econometric estimates, revision of assumptions, and advances in the engineering, medical, and economic sciences.

I would recommend a periodic assessment of the projections provided by the systems, i.e. REMI, BenMAP, and CMAQ models. It would be of interest to track the performance of these systems over time because they are fundamental tools in the analysis of the Draft AQMP. I also recommend including a small section in the Draft commenting on the projections and their corresponding realizations as well as achievements and disappointments of the previous 2007 AQMP.

SPECIFIC COMMENTS PER CHAPTER

Chapter 1. Introduction

Page 1-3. In Figure 1-1, the column for 2008-2012, item 21 should read 2000 and 2010 Census SF Data.

Page 1-4. There is political uncertainty about the future of the ACS survey; the House Budget Bill passed in May 2012 included the elimination of ACS. As a precautionary measure, the District should start thinking about a good substitute for the information provided by ACS.

Chapter 2. Economy and Air Quality

Page 2-1. Report the percentage of the four-county South Coast Basin GDP in relation to California GDP.

Page 2-5. Similar to Figure 2-2, it would be informative to report the trends in the largest industries in the Basin in addition to manufacturing: Real Estate, Government, Retail, and Information.

Page 2-7. The section "Other Economies" is very informative but it begs the question why these areas (Bay Area, San Diego, and Houston) have less severe air quality problems. This section needs more discussion on the differences/similarities among their economies and why they are more successful on achieving the standards of air quality. Roughly, it seems that there are two important factors: population and larger coastal areas (geography and topography). Regression

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September 2012

models could help to understand the cross-sectional differences in air quality across different economies.

Page 2-10. In Figure 2-3, it seems that ozone changes stabilized after 1999. Some explanation is needed to understand whether this is somehow a technical barrier, or lack of measures, or unsuccessful initiatives aiming to lower ozone levels.

Page 2-11. In the last paragraph, first line, it should say "….. projected sectoral share of employment for 2020, and 2035……" (remove 2008).

Chapter 3. Costs and Benefits

I would advise adding commentary on how plausible the assumptions are and whether they are more or less conservative. It will be helpful to explain the assumptions within some context such as standard practice or scientific literature.

Page 3-6. The information in Table 3-3 is too aggregated. I would recommend providing more detail on the large items "Reduction in Mortality" and "Congestion Relief". These are huge benefits and it is difficult to judge how realistic these figures are. The average benefit over 2014-2035 may not be informative enough if all gains are projected to happen by the end of the forecasting period. Please provide a time series of these benefits to judge the accrual rate over time.

Page 3-10. In Table 3-10, the benefits figure for 2014 ($948 millions) is not in agreement with the discussion in the chapter. In Chapter 4, page 4-1, the benefits are stated as $5.95 billion in 2014.

Chapter 4. Employment Effects

Page 4-3. State the projection of total number of jobs from 2013 to 2035 due to clean air benefits. It seems that this figure is around 800,000. The REMI prediction is over 2.4 million net jobs created between 2009 and 2035. Given the actual state of the local and national economy, a figure of 800,000 (30% of REMI prediction) may be a bit optimistic. This is an instance where a range figure will make more sense.

Chapter 5. Impact on Economic Groups and Communities

The information provided in this chapter is too aggregated as it focuses only on average numbers. Please see my recommendation R2. There may be data limitations that preclude a more detailed assessment, if so please state it.

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September 2012

Chapter 6. Impacts on Competitiveness

Clean air has also indirect effects on the quality of the work force. Good air quality will be attractive to highly qualified professionals, which in general are also high wage earners.

Pages 6-3 and 6-4. In Tables 6-2 and 6-3, explain in more detail why the Real Estate, Rental, and Leasing industry will be the most negatively impacted and the Transportation and Warehousing industry the most positively impacted.

Chapter 7. Assessment of CEQA Alternative

The analysis is too aggregated. Time series of impacts, costs, and benefits for each alternative will provide a better comparison among alternatives because we could evaluate intertemporal substitution effects.

Comments on the Draft Socioeconomic Report for the Draft 2012 AQMP

Lisa M. Grobar, Ph. D.
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California State University, Long Beach

I. General Comments

Page ES-2 of the report outlines the key results, including the annual benefits attributable to the Draft 2012 AQMP. Of the total $10.7 billion in benefits, $7.7 billion is attributable to congestion relief, $2.2 billion is attributable to health impacts, $0.7 billion is attributable to visibility improvements and $0.014 billion to reduced damage to materials.

Given the overwhelming importance of the congestion relief estimate, I feel that the report should place more emphasis on the relatively important congestion and health benefits, and less on the relatively unimportant visibility and materials impacts.

For example, the report mentions a number of transportation projects, or transportation control measures (TCMs), embedded in the Draft 2012 AQMP that are designed to reduce congestion, including arterials, grade crossing improvements, high occupancy vehicle lanes, etc. These measures will serve to reduce congestion in the region.

However, one of the anticipated and estimated benefits of the cleaner air that will result from the AQMP will also be faster growth in regional population and jobs, as migration flows respond to the region's improved environment. In Chapter 4, these benefits are quantified as an incremental annual average net gain of 37,043 jobs from 2013-2035, a figure that is not insignificant given that the baseline projection is an annual gain of 90,240 jobs.

It does not appear that the report incorporates the incremental effect that this faster population growth and job growth would have on traffic congestion. Faster population and job growth would feed back into the congestion calculations, reducing the net congestion benefit. It would be interesting to know how much of the benefit might be offset by faster population and job growth in the region. Figure 1-3 on page 1-8 suggests there is not an attempt to capture this feedback effect.

On the other hand, congestion benefits may be significantly understated in the report for several reasons. First, benefits from congestion relief for leisure (or non-business) trips are not included. This seems no more difficult (and the methodologies no more controversial) than the efforts made in the report to estimate the value of improved visibility. I would urge the researchers to try to estimate the value of these benefits and add them to the net total.

Second, the value of reductions in daily vehicle hours traveled for commuting purposes is estimated at an hourly wage of half the average wage rate (EDD). There is no discussion of how this particular value was arrived at – for example, why only half of the average wage, versus the entire average wage? The value of reductions in daily vehicle hours traveled for business trips is estimated at an hourly wage rate of $21.84 for truck drivers, but certainly there are drivers in many occupations that are driving for business purposes. Why choose that particular wage?

Given the importance of the congestion benefits in this report relative to the total estimated benefits, I think that their measurement deserves more sophisticated analysis and a better justification for the underlying assumptions.

By contrast, the health benefits attributable to the Draft 2012 AQMP are analyzed using sophisticated modeling techniques (the BenMAP model).

One suggestion I have in this area would be to include a table showing the health impacts by age cohort. On page A-5, the report mentions that these calculations were made in the process of generating the report. It might be helpful for policy-makers to see these results as they might, for example, place a higher weight on health benefits to children than for other age groups. An examination of impacts on children might also help to differentiate between some of the alternative measures discussed in Chapter 7.

The report mentions that efforts will be taken in the future to refine the Socioeconomic Report. One enhancement is to expand sub-regional analysis to include environmental justice (EJ) areas classified by income or race. I would suggest a slightly different but related approach. The report could attempt to break out areas of the region that suffer particularly high levels of baseline pollution, and then analyze the benefits of the proposed projects to these areas. These areas will be highly correlated with income, because the high baseline pollution will make these areas less attractive, driving down home values and rents.

An example of this can be found in my research (Grobar (2008))[1], that analyzed the characteristics of the populations residing within 7.5 miles of the 10 largest US container ports. I found that in these "port districts," poverty and unemployment rates were significantly higher than in the surrounding metropolitan areas. This suggests that the negative externalities generated by the ports, such as pollution and congestion, have driven down property values and rents in these areas so that they attract more low-income households.

This is also likely to be true of the corridors running along the busiest freeways, and other pockets of real estate that are unusually impacted by pollution from other local transportation or manufacturing activities. Once a large set of these areas are identified within the region, the differential impact of projects in the AQMP on these areas could be analyzed.

With regard to Chapter 4:

In this section, the report identifies the two main ways in which cleaner air will generate expanded economic activity in the region. The first is a switch in consumer expenditures from health care (100% local production) to general consumer purchases (which includes expenditures on goods imported into the region). The second is the improved quality of life, which will lead to increased migration into the region, increasing the labor supply and local demand.

Regarding the first channel, I think the discussion in Chapter 4 is incomplete. On page 4-2, it states that "reductions in out-of-pocket health expenditures are used as a proxy for the quality-of-life value of morbidity benefits (reduced illness)." This suggests that the measured impact of health improvements is limited to the reduced out-of-pocket costs that consumers will pay for health care in an environment with better air quality.

However, in the methodology explained in Appendix A on page A-9, the report states that "it was assumed that reductions in morbidity would lead to reduced health care expenditures by the general public and employers. It was assumed that 60 percent of the reduced expenditures would benefit the employers as a reduction

[1] Grobar, L. "The Economic Status of Areas Surrounding Major US Container Ports: Evidence and Policy Issues," Growth and Change, Vol. 29, No. 3, 2008, pp. 497-516.

in the cost of doing business and the remaining 40 percent would flow back to the economy in the form of additional spending on all consumption categories." If, in fact, this does describe how these impacts are calculated, then the impact to businesses from reduced morbidity should be discussed and explained in Chapter 4.

Another problem is that the report ignores the potential benefits to the government sector resulting from decreased healthcare costs. The National Health Expenditure Accounts break out US health care expenditures by payer. For 2010, total health expenditures were $2.6 trillion, and these expenditures were made by the following payers[2]:

Payer	Percent of Total Health Consumption Expenditures
Households	28%
Private Businesses	21%
Federal Government	29%
State & Local Government	16%
Other	6%

Thus, private businesses and the government sectors would be the main beneficiaries of the reduced health care expenditures resulting from reduced morbidity and mortality attributable to cleaner air, whereas the impact on consumers would be relatively small.

Taking this into account, it is likely that the draft report is overestimating the "expenditure switching" impacts of the 2012 AQMP. As federal, state and local governments experience a reduction in health care costs, they could allocate those resources in other ways (for example, increase spending on local education, or on local infrastructure). Thus, employment might be reallocated from one local use (health care) to another (schools).

It is possible that the government might rebate the savings back to taxpayers in the form of a tax cut, which would then cycle back into consumer expenditures.

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[2] Source: http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/Downloads/tables.pdf

However, if even part of the government savings on health care is reallocated to other local government activities, the result will be a greater net positive impact on jobs than is described in the Draft Socioeconomic Report.

Another interesting issue to explore is the potential impact that this reduction in health care costs could have on different income groups. A study by Holahan and Zedlewski (1992) [3] explores this topic. They find that persons in the lowest income deciles devote nearly 20% of cash income to health expenditures, compared to about 8% for persons in the highest income decile. Higher income households consume more health care, but much of their care is paid for by private insurance that is paid for by their employers.

Since this article was published some time ago, these figures may not represent the current reality. But the article does suggest that the burden of household health care expenditures falls disproportionately on the poor. Thus, improvements in air quality that reduce health care spending might be expected to have a progressive impact, by easing the health expenditure burden on poor households.

In terms of the second channel of job benefits stemming from greater migration into the region, the report is short on specifics, even in the methodology appendix. It references "migration functions" used in the generation of the estimates. But these functions are never explained. It would be useful to provide some detail on the way that these functions are constructed, at least in Appendix A.

II. Specific Comments

Page 2-4 For some reason, the report cites a four-county GDP of $768 billion in 2010, where the BEA is reporting $845 billion. Perhaps the report is citing an older number for private industries that got slightly revised, because the BEA currently reports private industry GDP at $762 billion. But given that the text and Table 2-3 report the contribution to the economy of the government sector, it seems that the $845 billion should be reported as the total GDP.

Also, I get slightly different GDP shares than Table 2-3, possibly for this reason. Based on the latest numbers, the government share should be 10% of GDP, the real estate, rental and leasing share should be 18%, the wholesale share should be 7%,

[3] Holahan, J. and S. Zedlewski, "Who Pays for Health Care in the United States? Implications for Health System Reform," Inquiry, Vol. 29, No. 2, (1992), pp. 231-48.

and the accommodation and food services share should be 3%. I'm also wondering why the construction and transportation/warehousing sectors are left off of the table, since employment and output numbers are available for both of these sectors.

In addition, I think it would be useful to break out Table 2-3 into LA-Orange and Riverside-San Bernardino, because the results are quite different. Compared to LA/Orange, the GDP of Riverside-San Bernardino is much more concentrated in areas such as retail, transportation & warehousing, and government, and less concentrated in areas such as real estate renting and leasing, professional/scientific &technical services, and finance.

I find the section of Chapter 2 entitled "Other Economies" to be a bit perplexing. There are a lot numbers presented here, but not much analysis, and I'm not sure what point is trying to be made here. I guess we could conclude that it is reassuring that these other areas also have a high proportion of their workforce in the government sector, although San Diego is a special case with its high proportion of federal government workers.

Otherwise, the distribution of employment is quite different from area to area, and it's not clear how to assess the impact that air quality rules have had on these differences.

Page 5-6 - The discussion about disposable income is difficult to understand, and I would recommend that this segment be re-written for clarity. For example, I think the sentence:

"The decrease in per capita disposable income from cleaner air is because of the higher growth rate of population than that of total real disposable income. "

means to say that real disposable income is growing more slowly than the population. This would imply that the migrants attracted to the region have lower average incomes than the residents in the baseline plan. Why is this the case? Do we know anything about these migrants that would explain this result (perhaps they are younger than the residents in the baseline plan)? I think this section of the report needs to be better explained.

Page 5-8: Here it claims there are no significant differences in impacts expected for high versus low-paying jobs, and that the same is observed for impacts on the price of consumption goods from one household group to another.

Yet in Table 5-5, the lowest earning group suffers a net decline in employment in 2014 while all other groups experience a net gain. This seems to me to be an important difference.

Also, in Table 5-6 the lowest quintile of households (in terms of income) experiences the biggest increase in the price index of consumption goods as a result of the pass-through of additional control costs by industries affected by control measures, more than twice the impact on households in the 4th (next-to the top) quintile.

Perhaps what the authors want to convey is that none of the impacts in Tables 5-5 and 5-6 are significantly large to worry about. If so, they need to make a stronger case for this (at what point would the impacts be large enough to be considered "significant"?)

Page 6-1: This section on regional competitiveness looks at how these benefits and control measures will affect the region's share of national jobs. It seems like the underlying assumption here is that air quality in the rest of the nation is held constant as regional air quality improves, thus causing an improvement in relative air quality for the region. This relative improvement drives the increase in economic migration into Southern California.

However, the end of the chapter acknowledges the possibility that other regions are moving forward with air pollution controls as well. If this is the case, the benefits to regional competitiveness may be even smaller than those estimated, as air quality will be improving in the rest of the nation as well as in the region. On the plus side, as noted, the extra costs may also have less impact on regional competitiveness because other regions will also be incurring these costs.

To the extent that other regions are implementing similar air quality controls, the impacts on relative competitiveness will be even smaller than those estimated in this chapter.

Page 8-4: I think the idea of trying to identify significant pollution thresholds could potentially be very useful in future modeling. It is likely that some of the impacts being estimated (such as the relationship of economic migration to regional pollution) are not linear. Understanding these thresholds could help policy-makers to better understand the trade-offs between costs and benefits of control measures.

Review of the *Draft Socioeconomic Report* for the Draft 2012 AQMP for the South Coast Air Quality Management District, 17 September 2012, Jane V. Hall, California State University, Fullerton.

In general the draft report is clearly written and presented. Most of the specific questions and comments that follow relate to chapters 3 and 5, which focus, respectively, on expected benefits and distributional impacts.

Specific questions and comments:

1. Page A-3: Since most of the quantifiable benefits of standard attainment are related to human health, it would make more sense to reorder this sentence and list that benefit first. Benefits to agriculture and horticulture should also be listed. (Also page 3-5.)

2. Table 3.3 appears to present results that do not always match those mentioned in the text. This might be the result of some estimates being reported for different years, some for specific years and others for annual averages across the time frame of the analysis.

3. Page 3-9: What does the first sentence mean? I think that it means the benefit was analyzed down to the level of the NAAQS rather than to the level of the stricter state standard. That is, the NAAQS is effectively the threshold. This should be clarified, and if the NAAQS is the threshold, why is that the case?

4. Ozone-related morbidity effects are omitted from the health benefits assessment, which is baffling given that such effects are well documented, can be quantified and impose significant detrimental impacts on exposed populations. No clear explanation for this is given in the Executive Summary, or in chapter 3. Nor is this point discussed in chapter 8 where it might be discussed as a future enhancement. Granted, PM 2.5-related effects are much more significant in economic terms, primarily because of the much larger mortality effect, but the ozone-related effects are not trivial in either economic or human terms. The USEPA 2011 draft RIA for the NAAQS ozone revision can be found at http://www.epa.gov/glo/pdfs/201107_OMBdraft-OzoneRIA.pdf

5. Ozone-related mortality is also omitted. It is possible to justify this based on how small the effect might be, but USEPA now includes this in its RIAs and the NRC report on ozone-related mortality recommended that it be included in benefit analyses. Some mention should be made that this is a potentially important effect, and why it is not included should be explained since it no longer fits into the cannot-be-quantified category. (National Research Council 2008. *Estimating Mortality Risk Reduction and Economic Benefits from Controlling Ozone Air Pollution*. National Academies Press. Washington, DC.)

6. What is the basis for the PM2.5 mortality value? What base value was used and how was it adjusted for income and inflation? I can assume this comes from Deck and Chestnut (2006), since that is the only likely source cited in the references. USEPA has done significant work since then that could be referred to (see point 8 below).

7. Similarly, I am unsure what RR factor was used for mortality, given that Laden et al. (2006) and Jerrett et al. (2005) are cited, but there is no discussion.

8. In line with point 7, was consideration given to using Krewski et al. (2009) which extended the time frame and updated the previous ACS studies? USEPA relied significantly on this in the 2012 RIA of the proposed PM2.5 NAAQS: *Regulatory Impact Analysis for the Proposed Revisions to the National Ambient Air Quality Standards for Particulate Matter* June 2012
http://www.epa.gov/ttn/ecas/regdata/RIAs/PMRIACombinedFile_Bookmarked.pdf

9. As far as I know, the most recent work on ozone and PM2.5-related health benefits in the SoCAB was published in 2011: "Valuing Health Effects: the Case of Ozone and Fine Particles in Southern California," Victor Brajer, Jane Hall, and Frederick Lurmann, 2011, *Contemporary Economic Policy,* 29(4), 524-535, based on a 2008 study *The Benefits of Meeting Federal Clean Air Standards in the South Coast and San Joaquin Air Basins*, 2008, with Victor Brajer and Frederick Lurmann, Institute for Economic and Environmental Studies at California State University Fullerton, research funded by the William and Flora Hewlett Foundation.

   There are of course differences between the draft socio-economic assessment of the 2012 AQMP and that study since there are differences in assumptions, base years, etc. Nonetheless it might be useful to be familiar the study since comparisons could be made.
   http://business.fullerton.edu/centers/iees/reports/Benefits_of_Meeting_Clean_Air_Standards_11-13-08.pdf

10. Chapter 8 indicates that since the last socioeconomic analysis several new approaches to health benefit assessment have been included, but again it is impossible to figure out what these are precisely, or how they were carried out. Generally, there is more precision in explaining how visibility and travel time benefits were assessed than is the case for health benefits.

11. The discussion and analysis of the potential distributional impacts of the AQMP does not address impacts by ethnic group. This is an important aspect of assessing potential effects on environmental justice and should be addressed. Chapter 8 notes that this is an enhancement to be considered in future assessments, but it would be helpful to include such an assessment sooner.

12. Distributional impacts by sub-region and income levels should also be reported as per-capita values.

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DATE: September 16, 2012

TO: Sue Lieu

FROM: Stephen Levy

SUBJECT: Review of Socioeconomic Report—Part One

The Draft Socioeconomic Report for the draft 2012 Air Quality Management Plan has two principal components:

- An analysis of the draft plan's costs and benefits
- An analysis of the economic impacts of the draft plan

This memo reviews the analysis of costs and benefits. A second memo will address the analysis of economic impacts.

Overview

The estimation of costs and benefits for the draft plan show a large difference between benefits and costs with the benefits much higher than the costs.

The cost-benefit analysis is comprehensive given the tools available to the District and should be the primary tool for assessing the overall impact of the plan on residents and the economy within the South Coast Air Quality Management District.

The economic impacts discussed in the second memo are small relative to the size of the economy (usually much less than 1%) and can guide the District in understanding how the plan affects jobs and income within different parts of the region and for different groups.

I have two principal recommendations for revising the discussion of costs and benefits of the draft 2012 AQMP:

- Include a discussion of the differences between the final 2007 socioeconomic report and the draft 2012 findings since the differences are

quite large for some components of costs and benefits. Explain the reasons for these differences.

- Provide a more complete discussion of how the SCAG Regional Transportation Plan (RTP) was used in the socioeconomic analysis including which components of the plan are included as TCMs in the socioeconomic analysis and how the cost estimates were developed. Collaborate with SCAG to ensure that the socioeconomic analysis of transportation measures is consistent with SCAG plans and findings.

Estimation of Total Costs and Benefits

Although both the 2007 Socioeconomic Report and the draft 2012 Socioeconomic Report show a large margin of total benefits to total costs, the composition of costs and benefits are quite different between analyses of the 2007 and 2012 AQMPs. The overall results are compared below after which I pose a number of questions seeking clarification of the methodologies and results.

Plan Costs

From the 2012 draft report:

The average annual control cost of all $PM_{2.5}$ and ozone control measures is projected to be approximately $448 million from 2013 to 2035, of which TCMs have an annualized cost of $326 million.

From the 2007 report

The cost for implementing the Plan was estimated for both quantified and unquantified measures. The projected cost for 33 quantified short-term measures is approximately $1.8 billion per year. Transportation control measures alone account for 24 percent of the total quantified cost. The cost of unquantified measures is projected to be approximately $523 million per year.

This seems like a large difference in annual costs. Moreover, in the 2012 analysis the transportation control measures (TCMs) account for 73% of the annual costs while in the 2007 plan they account for 24% of quantified costs.

Are these cost differences the result of 2007 plan measures that have been adopted already, a difference in discounting the costs or the base year for converting to constant dollars or differences in cost estimation methodology.

TCM Costs

The SCAG Regional Transportation Plan identifies costs of $524.7 billion or approximately $21 billion per year while the draft report identifies $326 million per year. The draft says that the TCMs include "large infrastructure projects". If that is true, how can the annual costs be so much lower than the SCAG estimate even if one accounts for discounting into constant 2005 dollars?

Is it possible that the AQMD analysis did not include all of the TCM costs on the theory that they will not be paid directly by region residents and businesses? If so, that should be disclosed so readers can assess the reasonableness of such an assumption. This is an important area to relate to assumptions made by SCAG in developing cost estimates for their RTP.

It would be helpful to see a list of the SCAG RTP projects that were considered as relevant TCMs in the cost analysis. The gap between $326 million and $21 billion per year requires some explanation. Which parts of the SCAG RTP are included in the AQMP control measures and which are excluded and what are the relative costs.

Distribution of Costs

I would note more clearly in reference to Table 3-1 on annual costs by industry that in nearly all cases, the AQMP costs are less than one tenth of one percent of total industry costs. In addition I would add a caveat to the estimation of costs by county or sub-region. The methodology appears to allocate costs according to where facilities reducing emissions are located. Yet, many facilities are owned by companies headquartered elsewhere and the costs may not come directly from anyone in the county where the facility is located. As a result, I am not sure the geographical allocation of costs makes much sense to pursue as a socioeconomic indicator.

Plan Benefits

From the 2012 report:

TABLE 3-3
Quantifiable Benefits of Draft 2012 AQMP
(millions of 2005 dollars)

Benefit	Average Annual (2014 to 2035)
Reduction in Morbidity	$23
Reduction in Mortality	2,225
Visibility Improvement	696
Reduced Materials Expenditures	14
Congestion Relief	7,712
Total	$10,670

3

From the 2007 socioeconomic report:

The 2007 Plan is projected to comply with the federal $PM_{2.5}$ and ozone standards with a quantified average annual benefit of $14.6 billion between 2007 and 2025. The $14.6 billion includes approximately $9.8 billion for averted illness and higher survival rates, $3.6 billion for visibility improvements, $966 million for congestion relief, $204 million for reduced damage to materials, and $18 million for increased crop yields.

The overall magnitude of annual benefits ($10.7 billion versus $14.6 billion is somewhat similar **but the composition of total benefits between the 2007 and 2012 plan analyses is markedly different.**

The 2007 annual health benefits were estimated at $9.8 billion compared to $2.2 billion in the 2012 analysis while the congestion relief benefits were estimated at $966 million per year in 2007 compared to $7.7 billion per year in the 2012 analysis.

The report provides an excellent explanation of how the 2012 health benefits were derived. What were the changes in methodology or other factors that account for the much smaller annual benefit estimates in the current AQMP analysis?

Congestion Relief Benefits

The report provides a good explanation of how congestion relief benefits were calculated. They are the result of reduced driving (fewer vehicle miles traveled) and time savings from reduced congestion delays.

In the year 2014 an estimated $161 million of savings on vehicle operation and maintenance is expected, as shown in Table 3-8. By the year 2035, the estimated savings would rise to $739 million.

The operating and maintenance costs for passenger and light duty vehicles were assumed to be 19.6¢ per mile (AAA, 2012). Operating and maintenance costs for medium-duty and heavy-duty trucks were assumed to be 61¢ per mile (ATRI, 2011).

TABLE 3-8
Reduced Vehicle Operating and Maintenance Costs by Type of Vehicle
(millions of 2005 dollars)

Type of Vehicle	2014	2020	2035	Average Annual (2014-2035)
Autos	$130	523	901	598
Trucks	31	123	212	141
Total	161	646	1,113	739

4

Daily VHT reductions associated with commute trips were multiplied by an annual conversion rate of 250 and an hourly wage rate of $10.78, which is half of the average wage rate (EDD, 2012), to arrive at the annual benefit of spending less time on commuting. Daily VHT reductions from business trips were also multiplied by an annual conversion rate of 250 and an hourly wage rate of $21.84 for truck drivers (ATRI, 2011) to arrive at the annual benefit from VHT reductions for business trips. Savings from reduced travel time for business and commute trips is estimated at $358 million for 2014 and at $13.8 billion for 2035, respectively, as shown in Table 3-9.

TABLE 3-9
Savings from Reduced Travel Time by Trip Type
(millions of 2005 dollars)

Type of Trip	2014	2020	2035	Average Annual (2014-2035)
Business	$59	$657	$2,291	$1,156
Commute	299	3,305	11,529	5,817
Total	$358	$3,962	$13,820	$6,973

I have several questions with regard to these estimates.

- Can the District and SCAG be more specific about what measures create the reductions in VMT and VHT? Is it infrastructure investment, people switching from driving to transit, more people living closer to work as a result of land use policies or other factors?

- The savings from VHT reduction are much larger than the savings from VMT reduction. What is the cause of these differences in terms of TCMs and/or behavior change?

- The congestion relief benefits ($7.7 billion per year on average) are quite large compared to the estimated annual costs ($326 million per year). Can you provide more explanation as to why this is so and why the ratios are so much different than in the 2007 analysis?

Four Final Thoughts

I would place the summary at the beginning of each chapter. The summaries are well written and help readers focus on the important results. Often large amounts of each section address impacts that are very small in relation to the size of the region. But the summaries focus attention on the big picture results.

5

In all relevant chapters I would strengthen the use of SCAG forecasts and findings. In many ways the AQMP rests on the SCAG economic and demographic forecasts and, in the case of costs and benefits, on the SCAG Regional Transportation Plan and Sustainable Communities Strategy.

Approximately 40% of the RTP funding is not in place currently. Although the SCAG RTP identifies potential sources for these funds as in Table 2 of the RTP executive summary, there is some uncertainty regarding these funds and I suggest including this uncertainty in the list of AQMP caveat and uncertainties, particularly since the congestion relief benefits are such a large portion of overall draft plan benefits.

I would consider addressing benefits before costs and perhaps placing Table 3-1 in an appendix or at the end of the chapter.

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DATE: September 18, 2012

TO: Sue Lieu

FROM: Stephen Levy

SUBJECT: Review of Draft Socioeconomic Report—Part Two

This memo focuses on the analysis of economic impacts discussed in Chapters 4, 5 and 6 and the issues in describing the economy between REMI and SCAG discussed in Chapter 2 and Appendix C.

Overview

I suggest major revisions to the framing of the economic impact findings and revisions to individual chapters.

My areas of concern at the big picture level are:

- Most reported impacts are tiny in comparison to the size of the economy, especially when you consider we are talking about impacts in 10 to 25 years from now. While in some cases impacts are compared to the size of the economy, this is not true consistently throughout the report. If you look carefully in the text (but not found in the executive summary) you can find that total changes in job levels from the AQMP are approximately .4% of the regional job total.

  The negligible impact on the overall economy is the principal finding of the AQMP socioeconomic analysis as it was for AB 32 and the economic impact analysis by CCS of SCAG's emission reduction policies.

  In addition the draft is clear in places that the REMI theory of added jobs is that they will induce population growth, which will also be tiny if you show the numbers. It is implicit but never stated that these jobs will not reduce unemployment or raise real income. In this context the 37,000 added jobs are even tinier. Read the discussion later in the memo about the report's disposable income findings.

Finally, there is a possible inconsistency between the job impact analysis of the 2012 RTP (174,500 jobs on average) and the socioeconomic report estimate. Is it true that the socioeconomic analysis included only approximately 25% of the RTP costs? I recommend that the District and SCAG discuss a consistent narrative about job impacts.

- The narrative goes back and forth between how SCAG describes the economy and how the REMI model describes the economy. Since the SCAG growth rates are used by AQMD and the SCAG actual job estimates and forecasts are used in the RTP analysis, which is the critical component of benefits and costs, using any REMI numbers to describe the economy is confusing and potentially misleading. I would sharply reduce any references to REMI model descriptions of the economy or forecast growth, especially since the REMI definition of jobs is not only different and confusing in the report context but basically out of sync with how other organizations describe the number of jobs.

  See the discussion below of Chapter 2 and Appendix C.

- The discussion of the baseline is confusing. I believe the REMI baseline is the REMI forecast adjusted to reflect the SCAG growth forecast. Is that correct? And then the impacts of the AQMP would be the difference between if the control measures are adopted and if not—is this correct? On the other hand, I believe the position of the draft is that the SCAG growth forecast anticipated and incorporated the RTP and AQMP. Is this correct?

  So, what exactly does it mean that the plan "creates" 37,000 jobs? Is this more than SCAG forecast or would it be less than the SCAG forecast if the plan were not adopted?

  But the real challenge is that everything is **tiny at the aggregate regional level** and the report does not help readers to that conclusion. Moreover, the net benefits are also tiny compared to regional GDP which will be over $1.5 trillion by 2035.

- There are a number of small mistakes and inconsistencies that, while they do not change any of the major findings, could damage the credibility of the report.

Now I go chapter by chapter.

Chapter 4 on Employment Impacts

It took me four times to read this paragraph below at the beginning of the chapter to see that the last date here was 2023, not 2035, and that is why both the benefit and cost estimates were different from the average annual estimates reported in Chapter 3. It is a confusing and perhaps unnecessary paragraph.

> Implementation of the Draft 2012 AQMP will reduce morbidity and mortality; improve visibility; decrease expenditures on household cleaning and refurbishing building surfaces; and provide relief to congestion, as discussed in Chapter 3. The total quantifiable benefit of the Draft 2012 AQMP amounts to approximately $5.95 billion in 2014 and $9.1 billion in 2023. The $PM_{2.5}$ and ozone measures would result in an annual cost of approximately $510 million in 2014 and $357 million in 2023. Both benefits and costs will affect the employment base in the four-county economy.

I would find a way to add a column for the percentage change in job levels in each time period. Is there some reason why you are not showing 2035 on Table 4-1 below?

Job Impacts of Quantified Clean Air Benefits and Measures

Category	2014	2023	Average Annual
Clean Air Benefits & Measures (2013-2035)	2,988	28,187	37,043
Clean Air Benefits (2014-2035)	2,262	30,146	42,174
Congestion Relief	348	20,371	32,986
Visibility Improvements	1,008	5,313	4,947
Reduced Materials Expenditures	133	191	179
Health Benefits	774	4,146	3,910
Control Measures (2013-2035)	731	-1,929	-3,257
TCMs	715	537	-1,611
District $PM_{2.5}$	7	-10	-4
Ozone Strategy	26	-2,457	-1,639

Results from modeling all the categories are slightly different from the sum of results from modeling each category one at a time because of nonlinearity of the REMI model.

This paragraph from 4-3 will be confusing to readers trying to reconcile the AQMD reports to published SCAG growth forecasts.

According to the REMI baseline forecast (adjusted to reflect SCAG projections) there would be 11.5 million jobs in 2035 in the four-county area. There would be over 2.4 million net jobs created between 2009 and 2035 with an annual rate of growth at 0.92 percent.

When this summary section gets cleaned up, I would place it at the beginning of the chapter as I would with all summary sections.

It is important to note that the 90,240 jobs per year are NOT equivalent to the 37,043 jobs annually. The 90,240 jobs per year are cumulative while the 37,043

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are not. A careful reader could figure this out from the comparison of growth rates but otherwise it is confusing since 37,043 looks like a big jump from 90,240.

Is there a way to turn the paragraph into a table? Again I don't like the reference to REMI's 11.5 million jobs. I would use the SCAG growth forecast numbers. While you have to use the REMI framework for analysis using their model, you do not have to use their numbers in the narrative.

Finally, at some point you should have a table that shows the population change associated with the job change. The draft mentions increased migration several times but never that I saw quantifies the population change. That would also be a good place to include the unemployment rate.

> Without the 2012 AQMP, jobs in the four-county area are projected to grow at an annual rate of about 0.922 percent between 2009 and 2035, which would be approximately 90,240 jobs per year. Clean air benefits and control measures would result in a net gain of 37,043 jobs annually, which translates to an increase in the annual job growth rate by 0.033 percent relative to the baseline projected growth rate between 2009 and 2035. Cleaner air from the 2012 AQMP would result in an additional 42,714 jobs created per year. This would increase the job growth rate by 0.034 percent and bring it to an annual rate of 0.96 percent from 2009 to 2035. On the other hand, the quantified measures would result in 3,257 jobs forgone, thereby slowing down the job growth rate by 0.001 percent, to 0.921 percent. The four-county region is projected to have 11.5 million jobs in 2035. The jobs created from clean air benefits would amount to 0.4 percent of the baseline jobs, on average. The jobs forgone from control measures would be 0.03 percent of the baseline jobs, on average.

Chapter 5 on the Allocation of Economic Impacts to Communities and Groups.

In my opinion this chapter is misleading by not reminding readers that the impacts discussed are small compared to relevant regional totals. The draft takes pages and pages to disaggregate small numbers into even smaller numbers. See below for suggestions on how to clarify the relative magnitude of numbers.

TABLE 5-1
Cost Share by Sub-region for Control Measures

Sub-Region	$PM_{2.5}$ Measures		Ozone Measures		All Measures	
	Millions $	%	Millions $	%	Millions $	%
LA CO Beach & Catalina	$16	5%	$12	10%	$28	6%
LA CO Burbank	16	5%	3	3%	19	4%
LA CO Central	32	10%	7	6%	39	9%
LA CO North	18	5%	4	3%	22	5%
LA CO San Fernando	32	10%	7	6%	39	9%
LA CO SG Valley East	17	5%	4	3%	21	5%

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LA CO SG Valley West	26	8%	5	4%	31	7%
LA CO South	23	7%	7	6%	30	7%
LA CO South Central	26	8%	5	4%	32	7%
LA CO Southeast	32	10%	7	6%	39	9%
LA CO West	23	7%	5	4%	29	6%
Orange Central	16	5%	7	6%	23	5%
Orange North	8	2%	4	3%	11	3%
Orange South	15	5%	6	5%	21	5%
Orange West	12	4%	5	4%	17	4%
Northwest Riverside	3	1%	8	6%	11	2%
Other Riverside	3	1%	4	3%	7	2%
Southwest Riverside	2	1%	4	4%	7	2%
San Bernardino City	3	1%	8	7%	11	2%
Other San Bernardino	2	1%	3	3%	5	1%
Southwest San Bernardino	2	1%	6	5%	8	2%
Total	**$327**	**100%**	**$122**	**100%**	**$448**	**100%**

On the cost allocation to industry tables in Chapter 3, the draft helpfully adds a column that shows the impacts as a percent of total output. A similar column would be personal income of each sub-region.

I don't think the allocation of costs using the methodology in the text is either helpful or accurate. On the other hand the allocation of benefits by sub-region makes some sense.

If you are committed to publishing these numbers I would add a % of baseline jobs column to table 5-4.

I find the discussion of disposable income counterintuitive and confusing. At the very minimum if it is true, it wipes out any rationale for mentioning job gains as if they were a positive factor.

IMPACTS ON Disposable Income

Without the Draft 2012 AQMP, real disposable income is projected to grow at an annual rate of 2.245 percent between 2009 and 2035.[1] Clean air benefits of the Draft AQMP could bring the annual growth rate to 2.281 percent. Per capita real disposable income (total real disposable income divided by population) would decrease by $891 in 2035 relative to the baseline projection. On the other hand, the PM2.5 and ozone measures would lower the projected growth rate of the real disposable income slightly to 2.244 percent annually relative to the baseline projection in 2035. This would result in a minor increase in per capita real disposable income by $8 in 2035.

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> The decrease in per capita disposable income from cleaner air is because of the higher growth rate of population than that of total real disposable income. The annual population growth rate from 2009 to 2035 is projected to be 0.9 percent with clean air benefits alone as opposed to the baseline annual growth rate of 0.792 percent. Implementation of quantified control measures is projected to decrease the annual population growth rate to 0.79 percent.

Let's start with the population. I recommend a table hat supports the final paragraph. I confirm that going from 16.9 million residents in 2008 to 20.9 million in 2035 is a 0.790% average annual growth rate (the 0.792% figure must use unrounded numbers??). So what is the population growth related to clean air benefits alone that gets you to .9%? I get 21.3 million people in 2035 to reach this percentage. Are you arguing that the approximately 120,000 added jobs in 2035 raise the population by 433,000 residents? That seems large.

I see the implication on population of the clean air measures and from the control measures but do not see the population impact of both combined. I really think a table would help that includes the 2035 population and 2008-2035 growth rates.

Then I would want to see and have explained why this relatively small increase in average population (probably less than 100,000 given the ratio of 2 people per job) would outweigh the gain in real disposable income.

For now the report is saying 1) there are net benefits, 2) there are small job increases and then 3) real income goes down. Is that really true?

The price index section illustrates the challenge of giving some context to the results. The first problem is that without a table it is hard to see how the two components—clean air benefit impacts and control measure impacts—add up. The paragraph starts by saying reduced prices then goes to increased prices. A table would help and the overall conclusion should be stated first and then the two components broken out.

But the real problem is that these are just difficult numbers to read without an example. For example, if an iPad cost $500, then a .06 percent increase would increase the cost to $500.30.

> The change here is relative to the baseline index of consumption goods. The price of consumption goods is projected to decrease by 0.007 percent in 2014 across all household income groups and by 0.013 to 0.028 percent in 2023 due to the attainment of the $PM_{2.5}$ standard. Implementation of control measures is projected to increase the price of consumption goods from 0.039 to 0.06 percent for these same years across all household income groups. All household groups would experience increases in prices of consumption goods resulting from combined impacts of control measures and clean air benefits. The projected increase in the price is due to the pass-through of additional control costs by industries that are affected by a number of control measures.

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Before I do the competitiveness chapter, I want to review Chapter 2 and Appendix C as the report does not accurately characterize the differences between the SCAG and REMI forecasts and methodology.

Appendix C

The statement below is not accurate and will affect some other parts of the report such as the first table in Chapter 6.

This version of the REMI model has the same U.S. population projections as the SCAG model (Census, 2008). REMI's U.S. employment growth is based on the BLS 2018 employment projection, which is the same data source as SCAG's employment projection. Therefore, no further adjustment to the REMI U.S. forecast is needed.

SCAG did not use Census 2008 population while REMI did and, as a result, the initial forecast U.S. job levels in 2035 are not the same. SCAG used lower U.S. immigration and population projections, a result confirmed by Dowell Myers in newly released U.S. population projections based on the 2010 Census and lower immigration trends than were included in the 2008 Census baseline.

The statement below is technically not accurate but the important message is that most of the difference between the SCAG/BLS/EDD estimates and REMI job estimates are in the estimate of self employed.

The BEA data include federal military jobs and a much higher estimate of the self-employed than the BLS data.

This is technically inaccurate because the number of self employed people is not much, if any, higher in the REMI forecast but, rather, the number of Schedule C, form 1040 jobs per person is higher. If the number of self employed were higher in the REMI forecast, than the unemployment rate would be lower and the labor force participation rates would be higher—all of which is not true.

Here is another point.

Below are the adjustment tables from Appendix C. I believe the adjustment was done in accordance with CCSCE earlier suggestions but do note the large differences in pre-adjustment growth rates for population and employment. These would be worth discussing so if anyone asks, the District could have a better answer than "that's what the models show".

Table C-1
Unadjusted and Adjusted REMI versus SCAG Population Comparison
(in percent growth rate)

	2008-2020	2020-2035

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	Unadjusted REMI	Adjusted REMI	SCAG	Unadjusted REMI	Adjusted REMI	SCAG
Los Angeles	8.60%	6.80%	6.40%	10.30%	9.10%	9.10%
Orange	13.50%	9.50%	9.30%	13.60%	5.00%	4.60%
Riverside	28.70%	23.50%	23.00%	22.90%	29.10%	29.20%
San Bernardino	11.50%	12.90%	13.20%	13.40%	20.60%	20.50%
4-County Total	12.30%	10.10%	9.80%	13.10%	12.50%	12.60%

TABLE C-2
Unadjusted and Adjusted REMI versus SCAG Employment Comparison
(in percent growth rate)

	2008-2020			2020-2035		
	Unadjusted REMI	Adjusted REMI	SCAG	Unadjusted REMI	Adjusted REMI	SCAG
Los Angeles	17.70%	5.30%	5.00%	13.90%	6.20%	5.90%
Orange	18.70%	0.10%	0.10%	14.90%	8.80%	9.40%
Riverside	24.20%	39.10%	40.20%	20.60%	33.20%	32.80%
San Bernardino	16.30%	17.20%	16.90%	14.60%	28.60%	29.30%
4-County Total	18.40%	8.40%	8.20%	14.80%	12.10%	12.20%

Now part of the answer is that REMI began with higher U.S. growth rates, which brings us to the first table in Chapter 6.

Chapter 6 on Competitiveness

There are two important positive contributions of the chapter. The first is the sentence below, which in my opinion, should be replicated throughout the report as in the executive summary and employment chapters.

> Due to the extremely small values presented here, neither the quantified benefits nor the quantified measures are expected to result in discernible differences in the four-county region's share of national jobs over the analysis period.

The second contribution is

The actual effects of the Draft 2012 AQMP (including control measures and benefits) on regional competitiveness could deviate from the projected effects. First, the analysis assumes that all control costs are "extra" costs when compared to air pollution control costs in other regions. This ignores the fact that competing regions tend to follow the District's lead and adopt control measures with objectives similar to those proposed in the District or at a minimum have some level of control with its consequent costs. For example, a number of eastern states have adopted the California vehicle exhaust

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standards. The Draft Socioeconomic Report underestimates the benefits from clean air that would increase regional attractiveness.

As in other chapters, the summary would be more helpful at the front.

Let's look now to Table 6-1. REMI has the region losing a share of national jobs.

SCAG has the region gaining a share of national jobs from 5.16% in 2010 to approximately 5.30% in 2035. This is just another example of why the REMI numbers should not be used in the report. In addition in the SCAG forecast manufacturing jobs rise from 5.6% of the national total to 5.7%. However the increase in the REMI forecast seems strange particularly since they have the regional share of total jobs declining. I don't think whether Imperial or Ventura counties are in or out will affect the results.

TABLE 6-1
Impacts on Region's Share of U.S. Jobs for
Clean Air Benefits and Control Measures (percent)

	Percent Share of U.S. Jobs for Benefits		Percent Share of U.S. Jobs for All Measures		Percent Share of U.S. Jobs for Combined Benefits & Measures	
	2014	2023	2014	2023	2014	2023
Total Jobs						
With Benefits & Measures					5.127	4.962
With Benefits	5.126	4.963				
With All Measures			5.126	4.948		
Without Draft 2012 AQMP	5.125	4.949	5.125	4.949	5.125	4.949
Difference	0.001	0.014	0.001	-0.001	0.002	0.013
Manufacturing Jobs						
With Benefits & Measures					5.654	7.305
With Benefits	5.656	7.306				
With All Measures			5.654	7.29		
Without Draft 2012 AQMP	5.655	7.292	5.655	7.292	5.655	7.292
Difference	0.001	0.014	-0.001	-0.002	-0.001	0.013

Some numbers are rounded.

I don't understand why the year 2035 never appears on tables and 2023 is usually the end date.

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I don't understand the discussion of delivered prices. Are you arguing that the AQMP will reduce imports and therefore reduce the cost of goods sold in the region?

I would think the statement below might be controversial statement and might need some more explanation.

> The combined impact of clean air benefits and control measures shows a downward trend in the cost of doing businesses for the majority of industries.

How does table 6-3 relate to the earlier table (5-6) on price impacts?

Finally, I could use more explanation of exactly what parts of the AQMP create competitiveness changes. For example, what is the relative weight of visibility impacts, congestion relief and control measure costs?

Chapter 2

You start out fine citing EDD, not REMI estimates of wage and salary jobs.

> Los Angeles, Orange, Riverside, and San Bernardino Counties collectively constitute one of the largest regional economies in the United States. The jurisdiction of the SCAQMD includes all or the majority of the populated portions of these four countries. In 2010, the four-county area's gross domestic product (GDP) was $768 billion (2005 dollars), which was 5.9 percent of the nation's gross domestic product (U. S. BEA, 2012). These counties had 17.1 million people in 2010, which was 45.8 percent of California's total population or 5.5 percent of the U.S. population. In addition, there were 6.3 million wage and salary workers in the four-county area in 2011, a 44 percent share of the state's total wage and salary workforce (EDD, 2012b).

There are numerous examples of potential confusion with the use of REMI job estimates and forecasts as opposed to the EDD/BLS data used by SCAG and every other major forecasting firm.

I understand the need to use REMI data to do the impact analysis but I recommend using plain vanilla SCAG/EDD/BLS data to describe the job base in the region.

More than 8.9 million jobs supported the $768 billion GDP in 2010. The sectors that had the highest shares of jobs were government (12 percent), retail trade (10 percent), health care and social assistance (10 percent), professional, scientific, and technical services (8 percent), manufacturing (7 percent), accommodation and food services (7 percent), and administrative and waste management services (7 percent).

The paragraph below is good and would be helpful in clarifying and interpreting the baseline and resulting changes in job levels.

SCAG projections (which form the baseline projections for the Draft 2012 AQMP) assumed that the four-county area would continue making the necessary infrastructure investments in air quality and transportation improvements to keep it competitive nationally and globally. For this reason, SCAG projections reflect the full implementation of the 2012 RTP and the necessary air quality programs that would be in compliance with the federal Clean Air Act (CAA). In other words, the baseline forecast does not represent a scenario of no further air quality control regulations or programs beyond what is already adopted, or the potential consequences of not meeting the federal air quality standard (e.g., 2 to 1 offset ratio for new and modified major sources and withheld highway funding under the CAA).

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Evaluation of

"DRAFT SOCIOECONOMIC REPORT FOR THE DRAFT 2012 AQMP"

Consulting Report For
South Coast Air Quality Management District

Paul Ong with assistance from Jonathan Ong[1]

Ong and Associates Consulting

September 17, 2012

[1] Jonathan Ong extracted, assembled, verified and analyzed the data for Part III (Example of EJ Analysis), and contributed to the final writing of the report.

Evaluation of AQMD's Draft Socioeconomic Report by Paul Ong

Introduction

This report presents an assessment of "Draft Socioeconomic Report for the Draft 2012 AQMP," dated September 2012 and prepared by the South Coast Air Quality Management District (a.k.a. AQMD or District). For the purpose of this report, the District's draft will be referred as the DRAFT. The evaluation is conducted by Paul Ong, who has been contracted as a private consultant. Dr. Ong is a professor at UCLA's School of Public Affairs, trained as an economist and urban planner, and an expert on the study of socioeconomic inequality. He previously contributed to the District's socioeconomic analysis and served on several AQMD advisory committees. The author is solely responsible for all analyses, interpretations and opinions, and retains intellectual ownership of the ideas. As a product funded by a public agency, the content of this report is considered to be in the public domain. Due to limited resources and time, the assessment is not comprehensive. Instead, it focuses on key points identified by the by the author, with a focus on issues related to environmental justice.

AQMD is commended for conducting an extensive socioeconomic analysis of its 2012 Air Quality Management Plan (AQMP or Plan). The Plan will have significant impacts, and it is critically important to estimate the costs and benefits to the region's people and economy. It is equally important to estimate how those outcomes are distributed among groups of stakeholders, economic sectors and communities. The Plan is judged to achieve a greater degree of economic efficiency when the benefits outweigh costs, and this is achieved mainly by promoting collective action that reduces environmental externalities. The Plan projects a sizeable monetized net gain. Some estimates of individual components are problematic and perhaps overly optimistic, particularly regarding the benefit from congestion relief, which will be discussed later. Despite these potential flaws, the author's opinion is that the Plan would produce an overall improvement.

The distributional outcomes, however, are less obvious because AQMD's socioeconomic analysis has severe limitations in addressing equity. This is particularly true in the analysis of environmental justice (EJ), which revolves around environmental inequality along racial and economic lines, and policies and programs to redress differential burden. AQMD has made marginal improvements since 1989, but failed to incorporate analytical advances in the field, leading to an incomplete an imprecise EJ evaluation of the potential future impacts of AQMP.

The remainder of this report is divided into three parts. Part I contains general feedback in the form of comments, questions and recommendations on points identified by the author as being problematic, ambiguous or in need of further work. Again, this is not a comprehensive review of the entire report, only select items that stood out within the limited time available to conduct a review. Part II critiques the report in terms of its limited EJ analysis. It includes a discussion on EJ concepts and practices, which provide a framework to assess the Plan. Part III provides an example of how an EJ analysis could be conducted using data from the AQMP. For this report, more emphasis is placed on evaluating EJ related issues since others are able to cover the non-EJ elements. The report

concludes with some recommendations, with the most important one being a rapid implementation of a full and detailed EJ analysis of the Plan.

Part I: General Feedback

This section contains comments, questions and recommendations on points that are deemed to be problematic, ambiguous or incomplete. Where appropriate, the location is identified.

Page ES-2 contains imbalanced handling of "unquantifiable" elements of costs and benefits due to omission. The DRAFT explicitly points out that there are "benefits which are still unaccounted." This is true, but the DRAFT does not acknowledge there are likely unaccounted costs. This is a problem that also appears later in the DRAFT.

Page ES-3 uses the term "southwest" but this geographic area does match any of the sub-regions used in the DRAFT.

Page 1-7 states that REMI was assessed as being "technically sound", but that is based on a 1992 assessment. There should be an ex-post evaluation of previous projections to establish performance. Clearly, it is important to decompose any divergence between the projections and subsequent observed outcomes (job levels and growth) into at least three components: those due to unexpected exogenous changes (e.g., national economic driver taken from projections from other sources), assumptions about key inputs, and model parameters. This exercise would help understand REMI's overall performance, and gauge the District's overall confidence in relying on this tool for policy purposes.

Page 2-1 introduces the use of race and ethnicity as important categories but does not give a definition. The Census collects separate information on race and Hispanic origins, categories that can overlap. For example, there are African Americans who are of Hispanic origins, but it is unclear how they are classified in the DRAFT. It is also unclear how multi-racial individuals are classified, although I assume that they fall into the "other" category. The classification scheme should be made explicit.

Page 2-10 discusses the "great recession." While it correctly states NBER's declaration of the recession ending in 2009IIQ, it would be useful to acknowledge that there is a lag in the recovery of the job market. This is "normal" for most business cycles, but the lag in jobs creation and reduction in the unemployment rate is more pronounced and protracted this time. Moreover, it is important to point out that California and Southern California in particular lag the nation in both business and labor-market recovery, due in part to the drag from the severe housing foreclosure crisis.

Page 3-3 shows a sharp peak in costs. Please provide an explanation. Also, the overwhelming concentration of the project costs in a single year raises the questions about adjustments costs during and after the peak. Are there possible short-run price distortions in affected markets?

Evaluation of AQMD's Draft Socioeconomic Report by Paul Ong

Page 3-5 should include a section on unquantified costs, parallel to that on unaccounted benefits discussed in later sections of the DRAFT.

Page 3-5 contains Table 3-2, which should include a breakdown of costs by major program interventions (PM v. Ozone, or TCM v. other). Are all PM reductions related only to TCM?

Page 3-6 includes benefits from congestion relief from SCAG's TCM. TCM should also produce other benefits; therefore, it would be useful to have separate columns listing the benefits from TCM and the other proposed interventions.

Page 3-13 contains calculated benefits from congestion relief that appears problematic. There are two issues because of the proposed travel related interventions, which includes mode shift. One, the calculation does not account for non-travel times (wait time in particular, but also adjustment to schedule to coordinate joint travel), which increases if travel shifts from solo automobile travel to other modes. The second is that the appropriate travel time should be measured in hours of passenger travel and not VHT (vehicle hours traveled). The mode-shift interventions (to the degree that they effective) would increase average persons per vehicle, and the benefit calculations do not account for this, at least as far as I can figure. Both of the two mentioned factors would reduce the benefits.

Page 4-2 shows that a major source of projected job gains (89%) will come from congestion relief, and Page 4-3 claims that the improved environment "would induce in-migration." Pages 6-2 and 6-3 state that the biggest reduction in relative prices would occur in transportation and warehousing, but that sector only accounts for a small percent of the job gains. It is very difficult to judge the reasonableness of these projections (particularly induced in-migration) because there is not sufficient detail on how the estimates were generated. The appendices provide only a skeletal discussion on how inter-regional competition is modeled. There is also no information about the "baseline" for the rest of the nation, which should also have plans to improve air quality. There is too much of a black box. Moreover, there is also the potential problem of over estimating benefits from congestion relief mentioned above.

Finally, it is unclear if Table 5-4 is referring to jobs by work site or by residence of workers. This can make huge difference.

PART II: Evaluation of EJ Analysis

This section reviews the DRAFT's EJ analysis, or more correctly stated, this section comments on the DRAFT's neglect of this critical element. Environmental justice revolves around environmental inequality along racial and economic lines, and policies and programs to redress differential burden. Much of the early EJ battles were directed at the role of government in locating activities that place a greater burden on disadvantaged communities. In more recent years, public agencies have attempted to address this problem. At the federal level, President Clinton's 1994 Executive Order 12898 directed

federal agencies to incorporate EJ in their programmatic activities, and there has been a proliferation of EJ related policies and programs at the state, regional and local levels, with California and its regional air districts being among the most active. EJ concerns at AQMD predated the Executive Order, and some progress has been made. This includes, for example, the establishment of an Ethnic Community Advisory Committee, which has been reconfigured as the Environmental Justice Committee.

Given this context, it is rather disappointing that the AQMP socioeconomic analysis is so limited, failing to incorporate analytical practices developed in recent years. The socioeconomic analysis fails to establish a baseline by not identifying EJ geographic areas, not determining the current and projected cumulative environmental (including health) burdens by EJ categories, and not fully estimating the EJ-related distribution of costs and benefits. The DRAFT implicitly acknowledges shortcomings in this area because it makes a vague recommendation to "Expand sub-regional analyses to include environmental justice (EJ) areas" that "may be classified by income or race." In other words, it is postponing a serious EJ analysis until some unspecified future time.

To better understand the reasoning for the above opinion, it is useful to offer a conceptual and analytical framework. For purposes of assessing the potential implication of the AQMP, the appropriate unit of analysis should be defined as geographic areas that have the following characteristics:

(1) Socially and politically disadvantaged, specifically those who have relatively less influence in decision making, leading to being vulnerable to disproportionate adverse environmental impacts. In practice, the relevant populations are the racial and ethnic groups protected by civil rights laws.

(2) Low economic status, which makes an area more susceptible to market forces, such as lower land values, less financial ability to "purchase" environmental amenities, and less able to overcome costly-information barriers.

(3) Suffer from previous adverse environment related decisions, leading to higher cumulative negative health and other outcomes.

The geographic area is a spatial unit that is a "community of common interest," including traditional elements, such as common demographic and SES characteristics, shared localized institutions and networks, recognized as an identifiable place by internal stakeholders and external groups. This concept is used in political redistricting based on judicial rulings. For EJ purposes, CIC should also include common environmental liability. Observed spatial environmental inequality is the product of selective settlement patterns, that is, income constraints force disadvantaged households to purchase lower priced housing in environmentally degraded areas (compensating variation). Spatial environmental inequality also includes post-establishment actions, for example, when governments and firms target disadvantaged areas as dumping grounds.

Evaluation of AQMD's Draft Socioeconomic Report by Paul Ong

EJ policies and practices are designed to address the gap in environmental quality. This includes having a more inclusive decision-making process that provides meaningful participation for EJ communities. This can be accomplished through open public forums, active solicitation of input, establishment of EJ advisory committees, and representation on key committees. A second practice involves changing organizational practices that integrate explicit EJ concerns into policies and programs with quantifiable objectives. Technical capacity should be enhanced with EJ expertise through both internal staffing and consultation with external experts. Finally, the organization should actively monitor and evaluate its activities and efforts to refine policy and programmatic interventions, and to improve effectiveness in achieving EJ goals and objectives.

The fundamental EJ goal should be closing the absolute and relative gap in cumulative environmental burdens. Improving air quality for all is a desirable outcome, but is not sufficient to ensure progress toward environmental equity. For example, it is possible that an intervention could generate improvements for both EJ and non-EJ communities, but disproportionately benefit the latter. The consequence is that the environmental gap actually increases. This is analogous to the popular economic concept of a rising tide lifts all boats. If the more affluent vessels gain much more, then economic inequality will grow. A necessary criterion for promoting EJ is that net benefits should disproportionately favor the most disadvantaged. A possible operational definition for the most disadvantaged communities would be a category that includes neighborhoods that are among the top quintile in terms of overall environmental risk (due to the multiple factors described earlier). Moreover, EJ neighborhoods should be among the bottom third or quartile along individual dimensions denoting relative advantage.

The above framework can be use to evaluate the DRAFT AQMP and the associated process. In terms of EJ participation, AQMD has consulted its Ethnic Community Advisory Committee, which has been replaced by the Environmental Justice Committee. It is questionable whether the Committee has enough technical expertise to fully understand the nuances and complexities involved in conducting the socioeconomic analysis. This was the case for the Environmental Justice Committee based on the author's participation and observation of that group. Its members were mostly community representatives, advocates and laypersons; therefore, they were dependent on AQMD staff to inform them about the details. Without independent sources of expertise, it is difficult for the Committee to effectively question or challenge the staff. This can reduce participation to being merely token and symbolic. The author does not have any knowledge to whether the District consulted with external EJ experts during the analysis, but if that was done, it was not evident in the DRAFT.

The DRAFT does not contain EJ explicit goals and objectives. Their absence would make it difficult to assess whether AQMP would promote environmental justice. One could argue that EJ concerns are implicit since AQMD has expressed its support for the general principles through past statements by the Board and staff. However, broad principles need to be implemented concretely and integrated throughout the District's operation, including the Plan.

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The DRAFT fails to adequately operationalize the EJ concept into analytical units. The sub-areas do not have the spatial resolution to differentiate EJ neighborhoods from non-EJ neighborhoods within each sub-area and to identify localized hot-spots. Another problem is the set of criteria defining an EJ area. There is nothing stated in the DRAFT, but the District does have a definition used for other programs. One criterion that can be evaluated is the one related to economic status. According to AQMD, an EJ area should have a poverty rate (the percent of the population living under the federal poverty line) of at least 10%. This rate appears to be arbitrary and unrealistically low. When applied to the sub-areas listed in the DRAFT, 16 of 21 would qualify, accounting for 81% of the region's population. This may be an over estimate since the poverty rates reported in the DRAFT were rounded to whole percentage points. Even with a threshold of greater than 10%, 14 sub-areas would qualify, housing 73% of the population. This extraordinary high proportion of the total population certainly would not identify the truly disadvantaged.

Without a detailed technical analysis, it would be difficult to implement the EJ component of Figure 1-2, "Assessment Tool Kit," displayed on page 1-6. The available tools do not produce the information needed to reasonably estimate the "Ethnic and Community Impacts" in terms of environmental justice; consequently, any "policy consideration" would most likely be incomplete and imprecise, and possibly inappropriate.

PART III: Example of EJ Analysis

This report goes beyond a critique, which finds serious shortcomings in terms of addressing EJ concerns, by offering an example of how an EJ analysis could be implemented. It uses data from the DRAFT. It is important to note that the exercise is very partial due to limited information, inadequate spatial units, and simplifying assumptions. Moreover, the methods used are not definitive, and there can be other appropriate analytical approaches. There are two parts to the exercise. The first is to compare the proportionate share of the costs and benefits for geographic units defined by EJ-related. The second is a rough estimate of the proportionate share of the costs and benefits for "disadvantaged" and "advantaged" populations.

Since EJ is spatial (both the population and environmental risks are defined by location and place), a critical analytical technique is to examine the geographic distribution of environmental burdens and improvement relative to the distribution of the population. This is done by creating a modified benefit to cost ratio. More specifically, the index is defined as a sub-area's share of the estimated total benefits divided by its share of the estimated total costs. Using this index rather than a simple benefit-to-cost ratio has the advantage of not directly relying on the estimated dollar amounts (which may have some biases on the benefit side, as discussed earlier) and is easier to interpret. This modified ratio, a benefit-to-cost parity index, is consistent with the concept that disadvantaged areas should receive a disproportionately greater share of the outcomes of a policy and/or programmatic intervention. Values greater than one for EJ areas would indicate that the desired EJ objective is being achieved. Values of less than one indicate that the proposed

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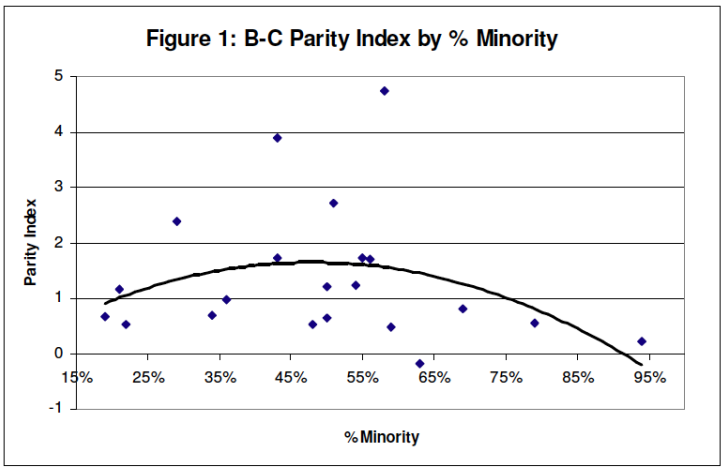
action or actions could increase the gap, even if it improves environment quality in those areas. (Additional calculations are needed to determine how the outcome affects the absolute and relative cumulative environmental and health gap.)

The following two graphs plot the benefit-to-cost parity index against two criteria frequently used to identify possible EJ areas, the minority proportion of the population (minority defined as the combined total of African Americans and Latinos) and the poverty rate. The other major criterion is some measure of cumulative environmental risk, but the Plan does provide such data. It should be noted that the term "minority" refers to disadvantaged racial and ethnic groups rather than their numerical share of the population. Southern California has become a "majority minority" region, so the combined disadvantaged groups comprises a numerical majority.

Figures 1 and 2 summarize the results of the first part of the analytical exercise. To achieve positive EJ outcomes, the parity index should be relatively higher for disadvantaged areas. The points do not indicate a simple linear pattern, with the values in the middle being higher than at the two ends. Both graphs are fitted with a second-order curve, which indicates that the more disadvantaged sub-areas gain proportionately less from the Plan. Interestingly, the inflexion points are roughly at values equal to the minority share of the region's total population (52%) and average poverty rate (14%).The most disadvantaged sub-areas have indices of less than one. The results indicate that EJ objectives are not being met through the Plan.



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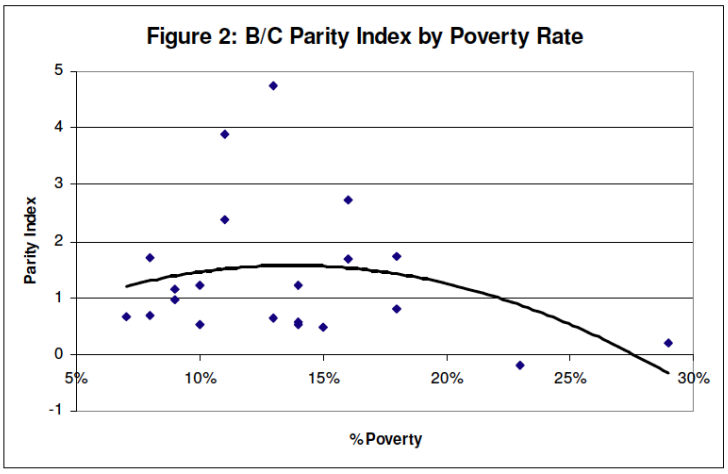
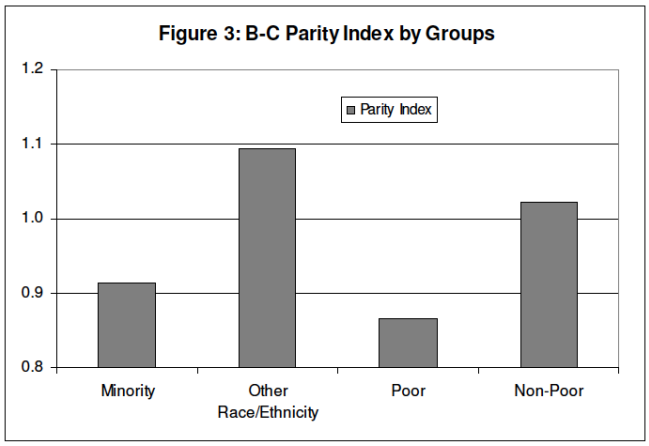


The second part of the exercise is to construct a benefit-to-cost parity index for minorities and people below poverty, which can be defined as the ratio of a group's share population relative to the group's share of an outcome. The basic calculations are the same as those discussed for sub-areas, but we replace spatial units with socio-economic groups. The first step is to estimate a group's share of estimated benefits. This is done by multiplying the group's share of the population in a given sub-area times the estimated benefits for that sub-area. The second step is to sum across the 21 sub-areas to derive an estimated total benefit for the group. The group specific sum is then divided by the estimated total benefits for the District, resulting in the group's share. These steps are repeated on for estimated costs, and the two resulting group shares are used to calculate the benefit-to-cost parity index. This process is applied to all relevant groups (minority and non-minority, poor and non-poor). The interpretation of the index is the same as above, values greater than one for EJ areas would indicate that the desired EJ objective is being achieved.

Figure 3 reports the results of the second part of the analytical exercise. Overall, the outcomes are consistent with those from the first part of the analytical exercise, that is, EJ objectives are not being met. The index is lower than one for both minorities and poor people, indicating that disadvantaged populations gain less than advantaged populations, thus failing to close the environmental gap.



Despite its crudeness, the analytical exercise in this section points to what is possible. The hope is that this example would serve as a rough roadmap for improving the socioeconomic analysis with respect to environmental justice.

CONCLUSION

The District is to be commended for undertaking an extensive assessment of the potential socioeconomic impacts of the Plan. In many areas, AQMD uses well established procedures and techniques within the profession. There is room for improvement, and many of my recommendations are listed in Part I. Of particular concern are the estimated benefits from congestion relief, both in terms of the calculations related time savings and job generations.

In my opinion, the major and most serious flaw is the lack of a systematic and detailed environmental-justice analysis. Given that various stakeholders have advocated for this for decades, it is disappointing (and frustrating) to see so little progress. In fact, there is only a vague commitment to possibly conducting such an analysis in some unspecified future. It is my strong recommendation that AQMD fast-track the integration of a sophisticated EJ analysis into the socioeconomic assessment of the AQMP.

Although there will be many challenges to implementing the recommendation, it is feasible. Given the critical importance of EJ in developing a fair plan that improves the region's air and redresses past inequalities, an EJ analysis should be a high priority in terms of allocating resources. Moreover, there appears to be good reason to conduct the analysis because the findings from Part III are troubling. Of course, they should not be considered definitive, and a more refined EJ analysis with appropriate geographic scale

and data could produce different findings. But if the results hold, then the District should find ways to modify the Plan so it can achieve EJ goals and objectives, or develop other actions to offset any negative EJ outcomes. Sound decision making on this issue will require further analysis and better information.

Frederick R. Treyz, CEO of Regional Economic Models, Inc.

Useful extensions of the analysis would include consideration of reduction of illness, reduction of building deterioration, reduction of damage to plants and animals and the value of reduced vehicle hours. By not including these factors, the AQMP understates the benefits of the plan. Thus the economic study should be seen as a conservative estimate.

The most important extension would be inclusion of the value of reduced vehicle hours. Transportation improvements often have economic effects in terms of transportation-related issues such as businesses' access to employees with specialized skills and talents, and business transportation costs and competitiveness; and at the same time have environmental effects, in particular changes in vehicle hours travelled which changes the level of emissions and other factors.

Beyond this, no further comments are necessary.

APPENDIX G

NO TCM SCENARIO

No TCM Benefit Scenario

No TCM and Related Benefit Scenario

INTRODUCTION

The average annual congestion relief benefit of $7.7 billion from 2014 to 2035 in the Draft Socioeconomic Report for the Draft 2012 AQMP is for all TCM-type projects in the 2012 Regional Transportation Plan (RTP). However, committed TCMs in the 2012 AQMP are comprised of only the first two years of TCM-type projects in the 2012 RTP. In response to stakeholders' comments, a No TCM Benefit Scenario was conducted. It excluded the potential commensurate congestion relief benefit associated with the committed TCMs in the 2012 AQMP.

Another scenario—No TCM and Related Benefit—removed costs of TCMs and related congestion benefits from the 2012 AQMP. This scenario focused on the costs of District's measures and their related benefits.

NO TCM BENEFIT SCENARIO

All the tables related to control measures for this scenario show contribution of TCM projects to $PM_{2.5}$ strategy in terms of costs and job impacts. Also, the $7.7 billion congestion relief benefit is removed from the clean air benefit estimation in the Socioeconomic Report. All other related tables that are affected by exclusion of the congestion relief benefit in the Socioeconomic Report are updated below. All the table numbers are preceded with a "G" and end with an "A."

TABLE G-3-1A

Average Annual Control Cost by Industry in Millions of 2005 Dollars (2013-2035)

Industry	NAICS	$PM_{2.5}$		Ozone	All	
		District	TCM		Millions of $	% of Output
Agriculture, Forestry, Fishing and Hunting	113-115	$0.000	$0.00	$0.16	$0.16	0.016%
Oil and Gas Extraction, Mining and Support	211-213	0.000	0.00	0.45	0.45	0.002%
Utilities	22	-0.191	0.00	7.01	6.82	0.027%
Construction	23	0.000	43.19	8.27	51.46	0.081%
Wood Product Mfg.	321	0.013	0.00	0.00	0.02	0.000%
Nonmetallic Mineral Product Mfg.	327	-0.148	0.00	1.79	1.64	0.039%
Primary Metal Mfg.	331	0.004	0.00	0.01	0.01	0.000%
Fabricated Metal Product Mfg.	332	0.024	0.00	2.47	2.50	0.011%
Machinery Mfg.	333	-0.007	0.00	0.01	0.01	0.000%
Computer and Electronic Product Mfg.	334	0.004	0.00	0.24	0.24	0.000%
Electrical Equipment and Appliance Mfg.	335	0.011	0.00	0.01	0.02	0.000%
Motor vehicle and Transportation Equipment Mfg.	3361-3369	-0.004	0.00	1.21	1.21	0.004%
Furniture and Related Product Mfg.	337	0.000	0.00	0.01	0.01	0.000%
Miscellaneous Mfg.	339	0.000	0.00	0.04	0.04	0.000%
Food Mfg.	311	0.004	0.00	0.03	0.04	0.000%
Beverage and Tobacco Product Mfg.	312	0.000	0.00	0.01	0.01	0.000%
Textile and Textile Products Mills	313-314	0.008	0.00	0.00	0.01	0.000%
Apparel Mfg.	315	0.000	0.00	0.01	0.01	0.000%
Leather and Allied Product Mfg.	316	0.000	0.00	0.00	0.00	0.000%
Paper Mfg.	322	0.044	0.00	0.01	0.05	0.001%
Printing and Related Support Activities	323	0.004	0.00	0.01	0.01	0.000%
Petroleum and Coal Products Mfg.	324	0.200	0.00	11.99	12.19	0.034%
Chemical Mfg.	325	0.019	0.00	0.14	0.16	0.001%
Plastics and Rubber Products Mfg.	326	0.001	0.00	2.30	2.31	0.016%
Wholesale Trade	42	-0.003	0.00	0.44	0.44	0.000%
Retail Trade	44-45	0.000	0.00	1.10	1.10	0.001%
Air Transportation	481	0.010	0.00	0.01	0.02	0.000%
Rail Transportation	482	0.000	0.00	7.36	7.36	0.298%
Water Transportation	483	0.000	0.00	0.00	0.00	0.000%
Truck Transportation, Couriers and Messengers	484,492	0.000	0.00	7.76	7.76	0.030%
Transit and Ground Passenger Transportation	485	0.000	0.00	6.82	6.82	0.319%
Pipeline Transportation	486	0.006	0.00	0.14	0.14	0.022%
Scenic and Sightseeing Transportation	487-488	0.000	0.00	6.83	6.83	0.107%
Warehousing and Storage	493	0.000	0.00	1.35	1.35	0.039%
Publishing Industries except Internet	511	0.000	0.00	0.02	0.02	0.000%
Motion Picture and Sound Recording Industries	512	0.000	0.00	0.07	0.07	0.000%
Internet Services and Data Processing	516,518,519	0.000	0.00	0.02	0.02	0.000%
Broadcasting except Internet; Telecomm.	515,517	0.000	0.00	0.06	0.06	0.000%
Monetary Authorities	521,522,525	0.000	0.00	0.08	0.08	0.000%

TABLE G-3-1A (Continued)

Industry	NAICS	$PM_{2.5}$		Ozone	All	
		District	TCM		Millions of $	% of Output
Securities, Commodity Contracts, Investments	523	0.000	0.00	0.05	0.05	0.000%
Insurance Carriers and Related Activities	524	0.000	0.00	0.04	0.04	0.000%
Real Estate	531	0.001	0.00	0.26	0.26	0.000%
Rental and Leasing Services	532-533	0.000	0.00	0.68	0.68	0.002%
Professional and Technical Services	54	0.000	0.00	0.13	0.13	0.000%
Management of Companies and Enterprises	55	0.000	0.00	0.05	0.05	0.000%
Administrative and Support Services	561	0.002	0.00	1.52	1.52	0.003%
Waste Management and Remediation Services	562	0.000	0.00	2.40	2.40	0.041%
Educational Services	61	0.000	0.00	0.01	0.01	0.000%
Ambulatory Health Care Services	621	0.000	0.00	0.06	0.06	0.000%
Hospitals	622	0.000	0.00	0.04	0.04	0.000%
Nursing and Residential Care Facilities	623	0.000	0.00	0.01	0.01	0.000%
Social Assistance	624	0.000	0.00	0.01	0.01	0.000%
Performing Arts and Spectator Sports	711	0.000	0.00	0.02	0.02	0.000%
Museums, Historical Sites, Zoos and Parks	712	0.000	0.00	0.00	0.00	0.001%
Amusement, Gambling and Recreation	713	0.000	0.00	0.01	0.01	0.000%
Accommodation	721	0.001	0.00	0.01	0.01	0.000%
Food Services and Drinking Places	722	0.000	0.00	0.05	0.05	0.000%
Repair and Maintenance	811	0.000	0.00	0.02	0.02	0.000%
Personal and Laundry Services	812	0.016	0.00	0.01	0.03	0.000%
Membership Associations and Organizations	813	0.000	0.00	0.01	0.01	0.000%
Private Households	814	0.000	0.00	0.00	0.00	0.000%
Government	92	0.102	10.12	7.77	17.99	0.010%
Consumer		0.000	273.13	40.19	313.32	
Total		$0.123	$326.44	$121.60	$448.16	

TABLE G-3-3A
Quantifiable Benefits of 2012 AQMP
(millions of 2005 dollars)

Benefit	Average Annual (2014 to 2035)
Reduction in Morbidity	$23
Reduction in Mortality	2,225
Visibility Improvement	696
Reduced Materials Expenditures	14
Total	$2,958

TABLE G-3-10A
Total Costs and Benefits of the Plan
(millions of 2005 dollars)

	2014	**2023**	**Average Annual**
Total Costs	$510	$357	$448
Total Benefits	$5,429	$2,358	$2,958

TABLE G-4-1A
Job Impacts of Quantified Clean Air Benefits and Measures

Category	2014	2023	2035	Average Annual
Clean Air Benefits & Measures (2013-2035)	2,641	7,717	8,873	5,378
Clean Air Benefits (2014-2035)	1,913	9,656	11,838	9,037
Visibility Improvements	1,008	5,313	6,445	4,947
Reduced Materials Expenditures	133	191	181	179
Health Benefits	774	4,146	5,214	3,910
Control Measures (2013-2035)	731	-1,929	-2,955	-3,257
TCMs	715	537	-813	-1,611
District $PM_{2.5}$	7	-10	-3	-4
Ozone Strategy	26	-2,457	-2,142	-1,639

Results from modeling all the categories are slightly different from the sum of results from modeling each category one at a time because of nonlinearity of the REMI model.

TABLE G-4-2A

2012 AQMP Employment Impacts by Industry for Clean Air Benefits

Industry	NAICS	2014	2023	Average Annual (2014-2035)	
				Jobs	% Baseline
Agriculture, Forestry, Fishing and Hunting	11	0	3	6	0.027%
Mining	21	5	29	29	0.065%
Utilities	22	10	50	47	0.147%
Construction	23	166	678	622	0.115%
Transportation Equipment Mfg.	336	0	8	7	0.009%
Petroleum and Coal Products Mfg.	324	1	5	5	0.069%
Other Manufacturing	31-33 ex. 324 & 336	29	306	271	0.041%
Wholesale Trade	42	40	281	269	0.057%
Retail Trade	44-45	163	1,120	1,057	0.105%
Truck Transportation	484, 492	7	63	61	0.036%
Transit Transportation	485	9	40	36	0.111%
Other Transportation and Warehousing	48-49 ex. 484-485 & 492	7	60	54	0.035%
Information	51	17	137	140	0.042%
Finance and Insurance	52	27	172	187	0.030%
Real Estate, Rental and Leasing	53	246	930	853	0.152%
Professional and Technical Services	54	93	510	488	0.060%
Management and Support Services	55-56	106	583	554	0.064%
Education, Health and Social Services	61-62	160	1,138	1,141	0.095%
Arts, Entertainment and Recreation	71	57	278	262	0.083%
Accommodation and Food Services	72	361	1,483	1,318	0.192%
Other Services	81	87	407	382	0.056%
Government	92	323	1,375	1,247	0.099%
Total		**1,913**	**9,656**	**9,037**	**0.086%**

TABLE G-4-3A

2012 AQMP Employment Impacts by Industry for Measures

Industry	NAICS	2014			2023			Average Annual (2013-2035)	
		$PM_{2.5}$		Ozone	$PM_{2.5}$		Ozone	Plan	% Baseline
		District	TCM		District	TCM			
Agriculture, Forestry, Fishing and Hunting	11	0	-1	0	0	-3	-1	-4	-0.020%
Mining	21	0	-40	1	0	-12	-15	-35	-0.081%
Utilities	22	0	-15	10	0	-3	41	22	0.068%
Construction	23	1	4635	3	-2	1982	-205	1,357	0.253%
Transportation Equipment Mfg.	336	0	-23	24	0	-14	1	-7	-0.009%
Petroleum and Coal Products Mfg.	324	0	-6	0	0	-3	-5	-8	-0.122%
Other Manufacturing	31-33 ex. 324 & 336	-1	-203	12	-3	-103	-39	-153	-0.023%
Wholesale Trade	42	0	-183	13	0	-63	-57	-203	-0.043%
Retail Trade	44-45	1	-855	-118	-1	-196	-620	-1,010	-0.101%
Truck Transportation	484, 492	0	-17	4	0	-9	-44	-57	-0.034%
Transit Transportation	485	0	-22	20	0	-10	-84	-114	-0.350%
Other Transportation and Warehousing	48-49 ex. 484-485 & 492	0	-81	12	0	-45	-114	-153	-0.099%
Information	51	1	-114	1	0	-27	-21	-71	-0.021%
Finance and Insurance	52	0	-407	1	0	-95	-69	-257	-0.041%
Real Estate and Rental and Leasing	53	1	-143	-1	0	99	-134	-168	-0.030%
Professional and Technical Services	54	0	397	7	0	-216	-116	98	0.012%
Management and Support Services	55-56	1	-398	9	-1	-199	-220	-446	-0.052%
Education, Health and Social Services	61-62	1	-524	-4	-1	-171	-107	-531	-0.045%
Arts, Entertainment and Recreation	71	0	-85	0	0	-4	-28	-75	-0.024%
Accommodation and Food Services	72	0	-564	1	0	-193	-113	-440	-0.064%
Other Services	81	0	-228	-3	-1	-27	-166	-317	-0.047%
Government	92	2	-408	35	-1	-153	-343	-684	-0.055%
Total		**6**	**715**	**26**	**-9**	**537**	**-2,457**	**-3,256**	**-0.031%**

TABLE G-4-4A

Job Impact by Industry for Clean Air Benefits and Measures Combined

Industry	NAICS	2014	2023	Average Annual (2013-2035)	
				Jobs	% Baseline
Agriculture, Forestry, Fishing and Hunting	11	-1	-1	1	0.006%
Mining	21	-35	2	-8	-0.018%
Utilities	22	5	89	67	0.210%
Construction	23	4,805	2,454	1,951	0.364%
Transportation Equipment Mfg.	336	0	-5	0	0.000%
Petroleum and Coal Products Mfg.	324	-6	-2	-4	-0.056%
Other Manufacturing	31-33 ex. 324 & 336	-163	161	106	0.016%
Wholesale Trade	42	-131	161	54	0.011%
Retail Trade	44-45	-811	301	-1	0.000%
Truck Transportation	484, 492	-6	10	1	0.001%
Transit Transportation	485	7	-54	-80	-0.245%
Other Transportation and Warehousing	48-49 ex. 484-485 &	-63	-99	-101	-0.066%
Information	51	-96	88	63	0.019%
Finance and Insurance	52	-379	7	-78	-0.013%
Real Estate and Rental and Leasing	53	103	895	648	0.116%
Professional and Technical Services	54	496	177	564	0.070%
Management and Support Services	55-56	-284	164	84	0.010%
Education, Health and Social Services	61-62	-369	858	560	0.047%
Arts, Entertainment and Recreation	71	-28	246	176	0.056%
Accommodation and Food Services	72	-203	1,176	819	0.120%
Other Services	81	-146	213	47	0.007%
Government	92	-56	878	508	0.041%
Total		**2,641**	**7,717**	**5,378**	**0.051%**

TABLE G-5-1A

Cost Share by Sub-region for Control Measures

Sub-Region	$PM_{2.5}$ Measures				Ozone Measures		All Measures	
	District		TCM					
	Millions $	%	Millions $	%	Millions $	%	Millions $	%
LA CO Beach & Catalina	$0.07	59%	$15.7	5%	$12	10%	$28	6%
LA CO Burbank	0.02	20%	15.5	5%	3	3%	19	4%
LA CO Central	0.06	51%	31.9	10%	7	6%	39	9%
LA CO North	0.02	18%	17.7	5%	4	3%	22	5%
LA CO San Fernando	-0.32	-263%	32.7	10%	7	6%	39	9%
LA CO SG Valley East	-0.24	-197%	17.6	5%	4	3%	21	5%
LA CO SG Valley West	-0.01	-10%	25.6	8%	5	4%	31	7%
LA CO South	-0.08	-61%	23.4	7%	7	6%	30	7%
LA CO South Central	0.00	0%	26.4	8%	5	4%	32	7%
LA CO Southeast	-0.13	-102%	31.7	10%	7	6%	39	9%
LA CO West	0.04	36%	23.3	7%	5	4%	29	6%
Orange Central	0.06	51%	16.1	5%	7	6%	23	5%
Orange North	0.01	12%	7.8	2%	4	3%	11	3%
Orange South	0.08	63%	14.7	5%	6	5%	21	5%
Orange West	0.25	204%	11.9	4%	5	4%	17	4%
Northwest Riverside	0.05	38%	3.0	1%	8	6%	11	2%
Other Riverside	0.13	102%	2.5	1%	4	3%	7	2%
Southwest Riverside	0.01	11%	2.4	1%	4	4%	7	2%
San Bernardino City	0.09	76%	2.6	1%	8	7%	11	2%
Other San Bernardino	0.00	0%	1.9	1%	3	3%	5	1%
Southwest San Bernardino	-0.01	-5%	2.0	1%	6	5%	8	2%
Total	**$0.12**	**100%**	**$326.4**	**100%**	**$122**	**100%**	**$448**	**100%**

TABLE G-5-2A
Average Annual Benefits (2014-2035) by Sub-region

Sub-region	Health		Material		Visibility		Total	
	MM$	%	MM$	%	MM$	%	MM$	%
LA CO Beach & Catalina	78	3%	0.4	3%	26	4%	105	4%
LA CO Burbank	19	1%	0.4	3%	26	4%	46	2%
LA CO Central	145	6%	0.9	6%	37	5%	182	6%
LA CO North	44	2%	0.4	3%	9	1%	53	2%
LA CO San Fernando	157	7%	0.8	6%	41	6%	199	7%
LA CO SG Valley East	96	4%	0.4	3%	20	3%	117	4%
LA CO SG Valley West	81	4%	0.6	4%	33	5%	114	4%
LA CO South	145	6%	0.6	4%	21	3%	167	6%
LA CO South Central	16	1%	0.6	4%	13	2%	30	1%
LA CO Southeast	70	3%	0.6	5%	22	3%	92	3%
LA CO West	203	9%	0.8	5%	94	13%	297	10%
Orange Central	115	5%	0.8	6%	23	3%	139	5%
Orange North	118	5%	0.4	3%	22	3%	141	5%
Orange South	128	6%	0.9	7%	60	9%	188	6%
Orange West	202	9%	0.7	5%	41	6%	244	8%
Northwest Riverside	117	5%	1.0	7%	55	8%	173	6%
Other Riverside	116	5%	1.1	8%	29	4%	146	5%
Southwest Riverside	60	3%	0.8	5%	29	4%	90	3%
San Bernardino City	35	2%	0.8	6%	47	7%	82	3%
Other San Bernardino	180	8%	0.6	4%	10	1%	190	6%
Southwest San Bernardino	122	5%	0.6	4%	40	6%	163	6%
Total	**2,247**	**100%**	**14.3**	**100%**	**696**	**100%**	**2,958**	**100%**

TABLE G-5-4A
Per Capita Clean Air Benefit and Cost
by Sub-region (in 2005 dollars)

Sub-region	Clean Air Benefit	Cost
LA CO Beach & Catalina	$162	$43
LA CO Burbank	71	29
LA CO Central	134	29
LA CO North	90	37
LA CO San Fernando	141	28
LA CO East	131	30
LA CO South	169	30
LA CO South Central	28	30
LA CO Southeast	71	30
LA CO West	310	30
OR CO Central	121	20
OR CO North	307	24
OR CO South	203	23
OR CO West	317	22
Northwest Riverside	137	9
Other Riverside	152	9
Chino-Redlands	139	11
Other San Bernardino	296	8
Total Four Counties	**$153**	**$23**

TABLE G-5-5A
Average Annual Job Impacts by Sub-region for
Benefits, Control Measures and Plan

Sub-region	Benefits (2014-2035)	Control Measures (2013-2035)	Plan (2013-2035)	
			Jobs	% Baseline
LA CO Beach & Catalina	217	-35	172	0.04%
LA CO Burbank	200	17	209	0.05%
LA CO Central	416	66	463	0.06%
LA CO North	132	-87	39	0.01%
LA CO San Fernando	399	-200	181	0.02%
LA CO East	587	-230	330	0.03%
LA CO South	311	-147	150	0.03%
LA CO South Central	205	-117	80	0.02%
LA CO Southeast	326	14	327	0.05%
LA CO West	446	120	546	0.08%
OR CO Central	508	-528	-42	-0.01%
OR CO North	297	-234	50	0.02%
OR CO South	744	-941	-232	-0.04%
OR CO West	678	-687	-40	-0.01%
RV CO NW Riverside	798	9	773	0.13%
RV CO Other	1,277	-130	1,089	0.16%
Chino-Redlands	1,075	-121	907	0.11%
Other San Bernardino	422	-26	377	0.14%
Total	**9,037**	**-3,256**	**5,378**	**0.05%**

TABLE G-5-6A
Employment Impacts by Occupational Wage Group for
Clean Air Benefits and Control Measures

Group	Median Weekly Earnings	No. of Occupations	% Impact from Baseline								
			Clean Air Benefits			Control Measures			Benefits & Measures		
			2014	2023	2035	2014	2023	2035	2014	2023	2035
1	$352-$517	19	0.024	0.110	0.117	-0.055	-0.041	-0.029	-0.031	0.069	0.087
2	$520-$659	19	0.016	0.079	0.096	-0.008	-0.022	-0.024	0.009	0.057	0.071
3	$661-$820	18	0.022	0.098	0.109	0.138	0.027	-0.029	0.160	0.125	0.079
4	$821-$996	19	0.022	0.092	0.100	0.009	-0.016	-0.023	0.030	0.076	0.077
5	$1,027-$1,729	19	0.016	0.077	0.090	-0.008	-0.026	-0.021	0.008	0.051	0.069

TABLE G-5-7A
Impacts on the Price of Consumption Goods for
Clean Air Benefits and Control Measures
(percent of baseline*)

Household Income	Clean Air Benefits			Control Measures			Benefits & Measures		
	2014	2023	2035	2014	2023	2035	2014	2023	2035
1st Quintile	-0.003	0.004	0.007	0.060	0.040	0.015	0.057	0.045	0.022
2nd Quintile	-0.003	0.004	0.006	0.059	0.039	0.015	0.056	0.042	0.021
3rd Quintile	-0.003	0.004	0.006	0.058	0.039	0.015	0.056	0.043	0.021
4th Quintile	-0.003	0.004	0.006	0.058	0.038	0.015	0.056	0.042	0.021
5th Quintile	-0.003	0.004	0.006	0.060	0.038	0.015	0.057	0.043	0.021

*Relative to the rest of the U.S.

TABLE G-6-1A
Impacts on Region's Share of U.S. Jobs for
Clean Air Benefits and Control Measures (percent)

	Percent Share of U.S. Jobs for Benefits			**Percent Share of U.S. Jobs for All Measures**			**Percent Share of U.S. Jobs for Combined Benefits & Measures**		
	2014	**2023**	**2035**	**2014**	**2023**	**2035**	**2014**	**2023**	**2035**
Total Jobs									
With Benefits & Measures							5.129	4.952	4.935
With Benefits	5.126	4.953	4.936						
With All Measures				5.126	4.948	4.930			
Without 2012 AQMP	5.125	4.949	4.931	5.125	4.949	4.931	5.125	4.949	4.931
Difference	0.001	0.004	0.005	0.001	-0.001	-0.001	0.004	0.003	0.004
Manufacturing Jobs									
With Benefits & Measures							5.654	7.293	6.907
With Benefits	5.655	7.295	6.908						
With All Measures				5.654	7.29	6.904			
Without 2012 AQMP	5.655	7.292	6.905	5.655	7.292	6.905	5.655	7.292	6.905
Difference	0	0.003	0.003	-0.001	-0.002	-0.001	-0.001	0.001	0.002

Some numbers are rounded.

TABLE G-6-2A

Impacts on Cost of Production Relative to Those in the Rest of the U.S.
for Clean Air Benefits and Control Measures

Industry	Clean Air Benefits			Control Measures			Combined Benefits & Measures		
	2014	2023	2035	2014	2023	2035	2014	2023	2035
Forestry, Fishing and Hunting	-0.005%	-0.012%	-0.007%	0.000%	0.007%	0.001%	-0.005%	-0.005%	-0.006%
Mining	-0.003%	0.027%	0.024%	-0.016%	0.018%	-0.001%	-0.019%	0.045%	0.023%
Utilities	-0.003%	0.020%	0.018%	-0.021%	0.045%	0.034%	-0.024%	0.065%	0.052%
Construction	-0.004%	-0.022%	-0.014%	0.060%	0.051%	0.012%	0.056%	0.030%	-0.003%
Manufacturing	-0.003%	-0.006%	-0.002%	-0.002%	0.021%	0.010%	-0.005%	0.015%	0.007%
Wholesale Trade	-0.004%	-0.012%	-0.006%	-0.004%	0.018%	0.008%	-0.007%	0.006%	0.002%
Retail Trade	-0.004%	-0.004%	0.001%	-0.005%	0.032%	0.020%	-0.009%	0.028%	0.021%
Transportaion and Warehousing	-0.004%	-0.012%	-0.006%	-0.014%	0.096%	0.090%	-0.018%	0.084%	0.084%
Information	-0.004%	0.020%	0.020%	-0.003%	0.023%	-0.002%	-0.007%	0.043%	0.018%
Finance and Insurance	-0.004%	0.001%	0.004%	-0.007%	0.013%	0.001%	-0.011%	0.015%	0.006%
Real Estate, Rental and Leasing	-0.003%	0.044%	0.039%	-0.010%	0.019%	-0.003%	-0.013%	0.063%	0.036%
Professional and Technical Services	-0.004%	-0.010%	-0.004%	-0.004%	0.016%	0.003%	-0.008%	0.006%	-0.001%
Management of Companies and Enterprises	-0.004%	-0.015%	-0.008%	-0.004%	0.018%	0.004%	-0.009%	0.003%	-0.004%
Administrative and Waste Services	-0.004%	-0.013%	-0.007%	-0.003%	0.024%	0.007%	-0.007%	0.011%	0.000%
Educational Services	-0.004%	-0.011%	-0.004%	0.001%	0.017%	0.003%	-0.002%	0.006%	-0.001%
Health Care and Social Assistance	-0.004%	-0.018%	-0.009%	-0.002%	0.015%	0.003%	-0.006%	-0.003%	-0.006%
Arts, Entertainment and Recreation	-0.004%	0.010%	0.012%	-0.001%	0.024%	0.000%	-0.005%	0.034%	0.013%
Accommodation and Food Services	-0.003%	-0.001%	0.003%	-0.004%	0.014%	0.002%	-0.008%	0.012%	0.005%
Other Services (ex. Government)	-0.004%	0.000%	0.004%	-0.003%	0.017%	0.001%	-0.007%	0.017%	0.005%

TABLE G-6-3A

Impacts on Delivered Prices Relative to Those in the Rest of the U.S.
for Clean Air Benefits and Control Measures

Industry	Clean Air Benefits			Control Measures			Combined Benefits & Measures		
	2014	2023	2035	2014	2023	2035	2014	2023	2035
Forestry, Fishing and Hunting	-0.001%	-0.001%	-0.001%	0.000%	0.001%	0.001%	-0.001%	-0.001%	0.000%
Mining	-0.001%	0.009%	0.008%	-0.006%	0.006%	0.000%	-0.007%	0.009%	0.008%
Utilities	-0.003%	0.017%	0.016%	-0.017%	0.040%	0.031%	-0.020%	0.017%	0.047%
Construction	-0.004%	-0.020%	-0.014%	0.058%	0.052%	0.013%	0.054%	-0.020%	0.000%
Manufacturing	-0.002%	-0.003%	-0.001%	-0.001%	0.011%	0.005%	-0.003%	-0.003%	0.004%
Wholesale Trade	-0.003%	-0.011%	-0.006%	-0.003%	0.018%	0.008%	-0.006%	-0.011%	0.002%
Retail Trade	-0.003%	-0.003%	0.001%	-0.004%	0.026%	0.016%	-0.007%	-0.003%	0.017%
Transportaion and Warehousing	-0.002%	-0.005%	-0.003%	-0.009%	0.046%	0.048%	-0.010%	-0.005%	0.046%
Information	-0.003%	0.009%	0.010%	-0.003%	0.016%	0.000%	-0.006%	0.009%	0.011%
Finance and Insurance	-0.002%	0.001%	0.003%	-0.004%	0.009%	0.001%	-0.007%	0.001%	0.004%
Real Estate, Rental and Leasing	-0.003%	0.044%	0.039%	-0.004%	0.024%	0.002%	-0.008%	0.044%	0.041%
Professional and Technical Services	-0.004%	-0.009%	-0.004%	-0.004%	0.015%	0.003%	-0.007%	-0.009%	-0.001%
Management of Companies and Enterprises	-0.002%	-0.009%	-0.004%	-0.002%	0.011%	0.003%	-0.005%	-0.009%	-0.002%
Administrative and Waste Services	-0.004%	-0.012%	-0.006%	-0.003%	0.024%	0.007%	-0.007%	-0.012%	0.001%
Educational Services	-0.003%	-0.008%	-0.003%	0.001%	0.013%	0.002%	-0.002%	-0.008%	-0.001%
Health Care and Social Assistance	-0.003%	-0.012%	-0.006%	-0.001%	0.011%	0.003%	-0.004%	-0.012%	-0.004%
Arts, Entertainment and Recreation	-0.003%	0.007%	0.009%	-0.003%	0.019%	0.001%	-0.006%	0.007%	0.010%
Accommodation and Food Services	-0.003%	-0.001%	0.003%	-0.003%	0.012%	0.002%	-0.006%	-0.001%	0.005%
Other Services (ex. Government)	-0.003%	0.001%	0.004%	-0.002%	0.014%	0.001%	-0.005%	0.001%	0.005%

TABLE G-6-4A

Impacts on Imports and Exports for Clean Air Benefits and Control Measures

	Clean Air Benefits			Control Measures			Benefits & Measures		
	2014	2023	2035	2014	2023	2035	2014	2023	2035
Demand*	+	+	+	-	-	-	+	+	+
Imports	+	+	+	+	+	+	+	+	+
Self Supply*	+	+	+	-	-	-	-	+	+
Exports	+	-	-	-	-	-	-	-	-
Output (Production)	+	+	+	-	-	-	-	+	+
Delivered Price	-	+	+	-	+	+	-	+	+
Cost of Production	-	+	+	-	+	+	-	+	+

A plus or minus sign means that there is an increase or decrease in the value of that economic variable resulting from benefits, measures, or both of the 2012 AQMP relative to the baseline economic activities.

*Includes changes in demand due to changes in control requirements.

TABLE G-7-1A
Average Annual Impacts of AQMP and CEQA Alternatives

CEQA Alternatives*	Costs		PM2.5 Benefits		Jobs for Combined Costs & Benefits
	Millions of 2005 Dollars	Jobs	Millions of 2005 Dollars	Jobs	
2012 AQMP	$448	-3,257	$2,958	9,037	5,378
Alt 2—Localized PM Control	450	-3,334	1,814	4,007	459
Alt 3—Greater Reliance on NOx Reductions	495	-4,715	3,429	11,209	5,994
Alt 4—$PM_{2.5}$ Strategy Only	$327	-1,620	<$2,958	<9,037	<5,378

TABLE G-7-3A
Average Annual Quantified Benefits by Category by Alternative
(millions of 2005 dollars)

CEQA Alternatives	Total	Health	Visibility	Material
2012 Plan	$2,958	$2,247	$696	$14
Alt2—Localized PM Control	1,814	1,370	438	7
Alt 3—Greater Reliance on NOx Reductions	3,429	2,430	988	11
Alt 4—$PM_{2.5}$ Strategy Only	<$2,958	<$2,247	<$696	<$14

NO TCM AND RELATED BENEFIT SCENARIO

Under this scenario, the cost of the 2012 AQMP represents only those measures proposed by the AQMD. The cost of TCMs is excluded from the analysis. Consequently, the congestion relief benefit associated with the TCMs is also removed from the benefit of clean air. Under this scenario, the annual cost of the Plan is projected to be $122.7 million with a projected annual benefit of approximately $3 billion. Relative to the No TCM Benefit Scenario, all the affected tables are updated and presented below. These table numbers are preceded with a "G" and end with a "B."

TABLE G-3-1B

Average Annual Control Cost by Industry in Millions of 2005 Dollars (2013-2035)

Industry	NAICS	District $PM_{2.5}$	Ozone	All	
				Millions of $	Percent of Output
Agriculture, Forestry, Fishing,and Hunting	113-115	$0.000	$0.160	$0.160	0.016%
Oil and Gas Extraction, Mining and Support	211-213	0.000	0.454	0.454	0.002%
Utilities	22	-0.191	7.007	6.816	0.027%
Construction	23	0.000	8.268	8.268	0.013%
Wood Product Mfg.	321	0.013	0.004	0.017	0.000%
Nonmetallic Mineral Product Mfg.	327	-0.148	1.790	1.642	0.039%
Primary Metal Mfg.	331	0.004	0.008	0.012	0.000%
Fabricated Metal Product Mfg.	332	0.024	2.473	2.497	0.011%
Machinery Mfg.	333	-0.007	0.012	0.005	0.000%
Computer and Electronic Product Mfg.	334	0.004	0.241	0.245	0.000%
Electrical Equipment and Appliance Mfg.	335	0.011	0.006	0.017	0.000%
Motor vehicle and Transportation Equipment Mfg.	3361-3369	-0.004	1.211	1.207	0.004%
Furniture and Related Product Mfg.	337	0.000	0.010	0.010	0.000%
Miscellaneous Mfg.	339	0.000	0.043	0.044	0.000%
Food Mfg.	311	0.004	0.033	0.037	0.000%
Beverage and Tobacco Product Mfg.	312	0.000	0.012	0.012	0.000%
Textile and Textile Products Mills	313-314	0.008	0.004	0.012	0.000%
Apparel Mfg.	315	0.000	0.011	0.011	0.000%
Leather and Allied Product Mfg.	316	0.000	0.001	0.001	0.000%
Paper Mfg.	322	0.044	0.007	0.051	0.001%
Printing and Related Support Activities	323	0.004	0.008	0.013	0.000%
Petroleum and Coal Products Mfg.	324	0.200	11.991	12.191	0.034%
Chemical Mfg.	325	0.019	0.136	0.155	0.001%
Plastics and Rubber Products Mfg.	326	0.001	2.304	2.305	0.016%
Wholesale Trade	42	-0.003	0.439	0.435	0.000%
Retail Trade	44-45	0.000	1.101	1.101	0.001%
Air Transportation	481	0.010	0.009	0.019	0.000%
Rail Transportation	482	0.000	7.357	7.357	0.298%
Water Transportation	483	0.000	0.004	0.004	0.000%
Truck Transportation, Couriers and Messengers	484,492	0.000	7.764	7.764	0.030%
Transit and Ground Passenger Transportation	485	0.000	6.821	6.821	0.319%
Pipeline Transportation	486	0.006	0.136	0.142	0.022%
Scenic and Sightseeing Transportation	487-488	0.000	6.829	6.829	0.107%
Warehousing and Storage	493	0.000	1.349	1.349	0.039%
Publishing Industries except Internet	511	0.000	0.020	0.019	0.000%
Motion Picture and Sound Recording Industries	512	0.000	0.073	0.073	0.000%
Internet Services and Data Processing	516,518,519	0.000	0.015	0.016	0.000%
Broadcasting except Internet; Telecomm.	515,517	0.000	0.061	0.061	0.000%
Monetary Authorities	521,522,525	0.000	0.082	0.082	0.000%

TABLE G-3-1B
(Continued)

Industry	NAICS	District $PM_{2.5}$	Ozone	All	
				Millions of $	Percent of Output
Securities, Commodity Contracts and Investments	523	0.000	0.046	0.046	0.000%
Insurance Carriers and Related Activities	524	0.000	0.042	0.042	0.000%
Real Estate	531	0.001	0.257	0.258	0.000%
Rental and Leasing Services	532-533	0.000	0.679	0.679	0.002%
Professional and Technical Services	54	0.000	0.134	0.134	0.000%
Management of Companies and Enterprises	55	0.000	0.050	0.050	0.000%
Administrative and Support Services	561	0.002	1.519	1.522	0.003%
Waste Management and Remediation Services	562	0.000	2.395	2.395	0.041%
Educational Services	61	0.000	0.014	0.014	0.000%
Ambulatory Health Care Services	621	0.000	0.061	0.061	0.000%
Hospitals	622	0.000	0.035	0.035	0.000%
Nursing and Residential Care Facilities	623	0.000	0.009	0.009	0.000%
Social Assistance	624	0.000	0.006	0.006	0.000%
Performing Arts and Spectator Sports	711	0.000	0.022	0.022	0.000%
Museums, Historical Sites, Zoos and Parks	712	0.000	0.003	0.003	0.001%
Amusement, Gambling, and Recreation	713	0.000	0.007	0.007	0.000%
Accommodation	721	0.001	0.011	0.012	0.000%
Food Services and Drinking Places	722	0.000	0.045	0.045	0.000%
Repair and Maintenance	811	0.000	0.017	0.017	0.000%
Personal and Laundry Services	812	0.016	0.012	0.028	0.000%
Membership Associations and Organizations	813	0.000	0.011	0.011	0.000%
Private Households	814	0.000	0.003	0.003	0.000%
Government	92	0.102	7.770	7.872	0.004%
Consumer		0.000	40.194	40.194	
Total		$0.123	$121.597	$121.720	

TABLE G-3-10B
Total Costs and Benefits of the Plan
(millions of 2005 dollars)

	2014	2023	Average Annual
Total Costs	$27	$207	$122
Total Benefits	$5,429	$2,358	$2,958

TABLE G-4-1B

Job Impacts of Quantified Clean Air Benefits and Measures

Category	2014	2023	2035	Average Annual
Clean Air Benefits & Measures (2013-2035)	1,931	7,187	9,688	6,994
Clean Air Benefits (2014-2035)	1,913	9,656	11,838	9,037
Visibility Improvements	1,008	5,313	6,445	4,947
Reduced Materials Expenditures	133	191	181	179
Health Benefits	774	4,146	5,214	3,910
Control Measures (2013-2035)	18	-2,465	-2,143	-1,646
District $PM_{2.5}$	7	-10	-3	-4
Ozone Strategy	26	-2,457	-2,142	-1,639

Results from modeling all the categories are slightly different from the sum of results from modeling each category one at a time because of nonlinearity of the REMI model.

TABLE G-4-3B

2012 AQMP Employment Impact by Industry for District Measures Only

Industry	**NAICS**	**2014**	**2023**	**Average Annual (2013-2035)**	
				Jobs	% Baseline
Agriculture, Forestry, Fishing and Hunting	11	0	-1	-1	-0.006%
Mining	21	1	-15	-14	-0.033%
Utilities	22	10	41	32	0.101%
Construction	23	3	-206	-98	-0.018%
Transportation Equipment Mfg.	336	24	1	8	0.010%
Petroleum & Coal Products Mfg.	324	0	-5	-3	-0.049%
Other Manufacturing	31-33 ex. 324 & 336	10	-42	-6	-0.001%
Wholesale Trade	42	13	-57	-36	-0.008%
Retail Trade	44-45	-118	-621	-411	-0.041%
Truck Transportation	484, 492	4	-44	-34	-0.020%
Transit Transportation	485	20	-84	-100	-0.308%
Other Transportation and Warehousing	48-49 ex. 484-485 & 492	12	-114	-107	-0.069%
Information	51	1	-21	-10	-0.003%
Finance and Insurance	52	1	-69	-32	-0.005%
Real Estate, Rental and Leasing	53	-1	-134	-81	-0.014%
Professional and Technical Services	54	7	-117	-77	-0.010%
Management and Support Services	55-56	9	-220	-154	-0.018%
Education, Health and Social Services	61-62	-4	-107	-61	-0.005%
Arts, Entertainment, and Recreation	71	0	-28	-17	-0.005%
Accommodation and Food Services	72	1	-113	-87	-0.013%
Other Services	81	-4	-166	-96	-0.014%
Government	92	30	-344	-259	-0.021%
Total		**18**	**-2,465**	**-1,646**	**-0.016%**

TABLE G-4-4B

Job Impact by Industry for Clean Air Benefits and Measures Combined

Industry	NAICS	2014	2023	Avgerage Annual (2013-2035)	
				Jobs	% Baseline
Agriculture, Forestry, Fishing and Hunting	11	0	2	4	0.020%
Mining	21	5	14	13	0.031%
Utilities	22	20	92	77	0.243%
Construction	23	170	471	497	0.093%
Transportation Equipment Mfg.	336	23	9	15	0.019%
Petroleum and Coal Products Mfg.	324	1	1	1	0.017%
Other Manufacturing	31-33 ex. 324 & 336	40	264	253	0.039%
Wholesale Trade	42	53	224	222	0.047%
Retail Trade	44-45	45	499	600	0.060%
Truck Transportation	484, 492	11	19	25	0.015%
Transit Transportation	485	29	-44	-66	-0.202%
Other Transportation and Warehousing	48-49 ex. 484-485 & 492	18	-54	-55	-0.036%
Information	51	18	115	123	0.037%
Finance and Insurance	52	29	102	147	0.024%
Real Estate and Rental and Leasing	53	245	796	734	0.131%
Professional and Technical Services	54	100	393	389	0.048%
Management and Support Services	55-56	114	363	376	0.044%
Education, Health and Social Services	61-62	156	1,030	1,030	0.086%
Arts, Entertainment and Recreation	71	57	250	233	0.074%
Accommodation and Food Services	72	362	1,370	1,174	0.171%
Other Services	81	82	240	269	0.039%
Government	92	353	1,031	933	0.074%
Total		**1,931**	**7,187**	**6,994**	**0.066%**

TABLE G-5-1B

Cost Share by Sub-region for District Control Measures

Sub-Region	District $PM_{2.5}$ Measures		Ozone Measures		All District Measures	
	Millions $	**%**	**Millions $**	**%**	**Millions $**	**%**
LA CO Beach & Catalina	$0.07	59%	$12	10%	$12	10%
LA CO Burbank	$0.02	20%	$3	3%	$3	3%
LA CO Central	$0.06	51%	$7	6%	$7	6%
LA CO North	$0.02	18%	$4	3%	$4	3%
LA CO San Fernando	-$0.32	-263%	$7	6%	$7	5%
LA CO SG Valley East	-$0.24	-197%	$4	3%	$4	3%
LA CO SG Valley West	-$0.01	-10%	$5	4%	$5	4%
LA CO South	-$0.08	-61%	$7	6%	$7	6%
LA CO South Central	$0.00	0%	$5	4%	$5	4%
LA CO Southeast	-$0.13	-102%	$7	6%	$7	6%
LA CO West	$0.04	36%	$5	4%	$5	4%
Orange Central	$0.06	51%	$7	6%	$7	6%
Orange North	$0.01	12%	$4	3%	$4	3%
Orange South	$0.08	63%	$6	5%	$6	5%
Orange West	$0.25	204%	$5	4%	$5	4%
Northwest Riverside	$0.05	38%	$8	6%	$8	6%
Other Riverside	$0.13	102%	$4	3%	$4	4%
Southwest Riverside	$0.01	11%	$4	4%	$4	4%
San Bernardino City	$0.09	76%	$8	7%	$8	7%
Other San Bernardino	$0.00	0%	$3	3%	$3	2%
Southwest San Bernardino	-$0.01	-5%	$6	5%	$6	5%
Total	**$0.12**	**100%**	**$122**	**100%**	**$122**	**100%**

TABLE G-5-4B
Per Capita Clean Air Benefit and Cost
by Sub-region (in 2005 dollars)

Sub-region	Clean Air Benefit	Cost
LA CO Beach & Catalina	$162	$19
LA CO Burbank	71	5
LA CO Central	134	5
LA CO North	90	7
LA CO San Fernando	141	5
LA CO East	131	5
LA CO South	169	7
LA CO South Central	28	5
LA CO Southeast	71	6
LA CO West	310	5
OR CO Central	121	6
OR CO North	307	8
OR CO South	203	6
OR CO West	317	6
Northwest Riverside	137	6
Other Riverside	152	6
Chino-Redlands	139	8
Other San Bernardino	296	5
Total Four Counties	**$153**	**$6**

TABLE G-5-5B
Average Annual Job Impacts by Sub-region for
Benefits, Control Measures and Plan

Sub-region	Benefits (2014-2035)	Control Measures (2013-2035)	Plan (2013-2035)	
			Jobs	% Baseline
LA CO Beach & Catalina	217	-54	153	0.04%
LA CO Burbank	200	-47	145	0.03%
LA CO Central	416	-105	293	0.04%
LA CO North	132	-38	88	0.03%
LA CO San Fernando	399	-96	285	0.03%
LA CO East	587	-127	434	0.04%
LA CO South	311	-77	220	0.04%
LA CO South Central	205	-69	127	0.03%
LA CO Southeast	326	-80	232	0.04%
LA CO West	446	-93	333	0.05%
OR CO Central	508	-104	382	0.06%
OR CO North	297	-41	244	0.08%
OR CO South	744	-102	609	0.10%
OR CO West	678	-78	570	0.11%
RV CO NW Riverside	798	-132	631	0.11%
RV CO Other	1,277	-172	1,047	0.15%
Chino-Redlands	1,075	-194	834	0.10%
Other San Bernardino	422	-36	367	0.14%
Total	**9,037**	**-1,646**	**6,994**	**0.07%**

TABLE G-5-6B
Employment Impacts by Occupational Wage Group for
Clean Air Benefits and Control Measures

Group	Median Weekly Earnings	No. of Occupations	% Impact from Baseline								
			Clean Air Benefits			Control Measures			Benefits & Measures		
			2014	2023	2035	2014	2023	2035	2014	2023	2035
1	$352-$517	19	0.024	0.110	0.117	-0.002	-0.028	-0.021	0.022	0.082	0.096
2	$520-$659	19	0.016	0.079	0.096	0.000	-0.022	-0.017	0.017	0.057	0.078
3	$661-$820	18	0.022	0.098	0.109	0.002	-0.029	-0.025	0.024	0.069	0.084
4	$821-$996	19	0.022	0.092	0.100	0.001	-0.018	-0.015	0.023	0.074	0.085
5	$1,027-$1,729	19	0.016	0.077	0.090	0.001	-0.017	-0.014	0.017	0.060	0.077

TABLE G-5-7B
Impacts on the Price of Consumption Goods for
Clean Air Benefits and Control Measures
(percent of baseline*)

Household Income	Clean Air Benefits			Control Measures			Benefits & Measures		
	2014	2023	2035	2014	2023	2035	2014	2023	2035
1st Quintile	-0.003	0.004	0.007	0.003	0.019	0.006	0.001	0.024	0.013
2nd Quintile	-0.003	0.004	0.006	0.003	0.018	0.007	0.001	0.022	0.013
3rd Quintile	-0.003	0.004	0.006	0.003	0.018	0.007	0.001	0.022	0.013
4th Quintile	-0.003	0.004	0.006	0.003	0.018	0.007	0.001	0.021	0.012
5th Quintile	-0.003	0.004	0.006	0.004	0.018	0.006	0.001	0.022	0.013

*Relative to the rest of the U.S.

TABLE G-6-1B

Impacts on Region's Share of U.S. Jobs for
Clean Air Benefits and Control Measures (percent)

	Percent Share of U.S. Jobs for Benefits			**Percent Share of U.S. Jobs for All Measures**			**Percent Share of U.S. Jobs for Combined Benefits & Measures**		
	2014	**2023**	**2035**	**2014**	**2023**	**2035**	**2014**	**2023**	**2035**
Total Jobs									
With Benefits & Measures							5.126	4.952	4.936
With Benefits	5.126	4.953	4.936						
With All Measures				5.125	4.947	4.930			
Without 2012 AQMP	5.125	4.949	4.931	5.125	4.949	4.931	5.125	4.949	4.931
Difference	0.001	0.004	0.005	0	-0.002	-0.001	0.001	0.003	0.005
Manufacturing Jobs									
With Benefits & Measures							5.656	7.294	6.908
With Benefits	5.655	7.295	6.908						
With All Measures				5.655	7.291	6.904			
Without 2012 AQMP	5.655	7.292	6.905	5.655	7.292	6.905	5.655	7.292	6.905
Difference	0	0.003	0.003	0	-0.001	-0.001	0.001	0.002	0.003

Some numbers are rounded.

TABLE G-6-2B

Impacts on Cost of Production Relative to Those in the Rest of the U.S.
for Clean Air Benefits and Control Measures

Industry	Clean Air Benefits			Control Measures			Combined Benefits & Measures		
	2014	2023	2035	2014	2023	2035	2014	2023	2035
Forestry, Fishing and Hunting	-0.005%	-0.012%	-0.007%	0.000%	0.004%	0.001%	-0.005%	-0.009%	-0.006%
Mining	-0.003%	0.027%	0.024%	-0.001%	0.012%	0.003%	-0.004%	0.039%	0.026%
Utilities	-0.003%	0.020%	0.018%	-0.016%	0.041%	0.036%	-0.019%	0.060%	0.054%
Construction	-0.004%	-0.022%	-0.014%	-0.001%	0.032%	0.007%	-0.005%	0.011%	-0.007%
Manufacturing	-0.003%	-0.006%	-0.002%	0.000%	0.012%	0.008%	-0.003%	0.006%	0.006%
Wholesale Trade	-0.004%	-0.012%	-0.006%	0.000%	0.008%	0.006%	-0.004%	-0.004%	-0.001%
Retail Trade	-0.004%	-0.004%	0.001%	0.000%	0.023%	0.019%	-0.004%	0.019%	0.020%
Transportaion and Warehousing	-0.004%	-0.012%	-0.006%	-0.017%	0.086%	0.089%	-0.020%	0.074%	0.083%
Information	-0.004%	0.020%	0.020%	0.000%	0.007%	0.000%	-0.004%	0.027%	0.020%
Finance and Insurance	-0.004%	0.001%	0.004%	0.000%	0.005%	0.000%	-0.004%	0.006%	0.005%
Real Estate, Rental and Leasing	-0.003%	0.044%	0.039%	-0.001%	0.012%	-0.001%	-0.004%	0.056%	0.038%
Professional and Technical Services	-0.004%	-0.010%	-0.004%	0.000%	0.005%	0.002%	-0.004%	-0.005%	-0.003%
Management of Companies and Enterprises	-0.004%	-0.015%	-0.008%	0.000%	0.004%	0.001%	-0.004%	-0.011%	-0.007%
Administrative and Waste Services	-0.004%	-0.013%	-0.007%	0.000%	0.013%	0.005%	-0.004%	0.000%	-0.002%
Educational Services	-0.004%	-0.011%	-0.004%	0.000%	0.004%	0.001%	-0.004%	-0.007%	-0.003%
Health Care and Social Assistance	-0.004%	-0.018%	-0.009%	0.000%	0.003%	0.001%	-0.004%	-0.015%	-0.008%
Arts, Entertainment and Recreation	-0.004%	0.010%	0.012%	-0.001%	0.007%	0.001%	-0.004%	0.017%	0.013%
Accommodation and Food Services	-0.003%	-0.001%	0.003%	0.000%	0.005%	0.001%	-0.004%	0.004%	0.004%
Other Services (ex. Government)	-0.004%	0.000%	0.004%	0.000%	0.006%	0.001%	-0.004%	0.006%	0.005%

TABLE G-6-3B

Impacts on Delivered Prices Relative to Those in the Rest of the U.S.
for Clean Air Benefits and Control Measures

Industry	Clean Air Benefits			Control Measures			Combined Benefits & Measures		
	2014	2023	2035	2014	2023	2035	2014	2023	2035
Forestry, Fishing and Hunting	-0.001%	-0.001%	-0.001%	0.000%	0.001%	0.000%	-0.001%	-0.001%	-0.001%
Mining	-0.001%	0.009%	0.008%	0.000%	0.004%	0.001%	-0.001%	0.014%	0.009%
Utilities	-0.003%	0.017%	0.016%	-0.013%	0.035%	0.031%	-0.016%	0.052%	0.047%
Construction	-0.004%	-0.020%	-0.014%	-0.001%	0.031%	0.007%	-0.004%	0.011%	-0.006%
Manufacturing	-0.002%	-0.003%	-0.001%	0.000%	0.007%	0.005%	-0.002%	0.004%	0.003%
Wholesale Trade	-0.003%	-0.011%	-0.006%	0.000%	0.008%	0.006%	-0.004%	-0.003%	0.000%
Retail Trade	-0.003%	-0.003%	0.001%	0.000%	0.019%	0.015%	-0.003%	0.015%	0.016%
Transportaion and Warehousing	-0.002%	-0.005%	-0.003%	-0.010%	0.041%	0.048%	-0.012%	0.036%	0.045%
Information	-0.003%	0.009%	0.010%	0.000%	0.005%	0.000%	-0.003%	0.014%	0.010%
Finance and Insurance	-0.002%	0.001%	0.003%	0.000%	0.003%	0.000%	-0.002%	0.005%	0.003%
Real Estate, Rental and Leasing	-0.003%	0.044%	0.039%	-0.001%	0.012%	-0.001%	-0.004%	0.056%	0.038%
Professional and Technical Services	-0.004%	-0.009%	-0.004%	0.000%	0.004%	0.001%	-0.004%	-0.005%	-0.002%
Management of Companies and Enterprises	-0.002%	-0.009%	-0.004%	0.000%	0.002%	0.001%	-0.002%	-0.007%	-0.004%
Administrative and Waste Services	-0.004%	-0.012%	-0.006%	0.000%	0.013%	0.005%	-0.004%	0.001%	-0.001%
Educational Services	-0.003%	-0.008%	-0.003%	0.000%	0.003%	0.001%	-0.003%	-0.006%	-0.002%
Health Care and Social Assistance	-0.003%	-0.012%	-0.006%	0.000%	0.002%	0.001%	-0.003%	-0.010%	-0.006%
Arts, Entertainment and Recreation	-0.003%	0.007%	0.009%	-0.001%	0.006%	0.001%	-0.004%	0.013%	0.010%
Accommodation and Food Services	-0.003%	-0.001%	0.003%	0.000%	0.004%	0.001%	-0.003%	0.003%	0.003%
Other Services (ex. Government)	-0.003%	0.001%	0.004%	0.000%	0.005%	0.000%	-0.003%	0.006%	0.004%

TABLE G-6-4B

Impacts on Imports and Exports for Clean Air Benefits and Control Measures

	Clean Air Benefits			Control Measures			Benefits & Measures		
	2014	2023	2035	2014	2023	2035	2014	2023	2035
Demand*	+	+	+	+	-	-	+	+	+
Imports	+	+	+	+	+	+	+	+	+
Self Supply*	+	+	+	+	-	-	+	+	+
Exports	+	-	-	+	-	-	+	-	-
Output (Production)	+	+	+	+	-	-	+	+	+
Delivered Price	-	+	+	-	+	+	-	+	+
Cost of Production	-	+	+	-	+	+	-	+	+

A plus or minus sign means that there is an increase or decrease in the value of that economic variable resulting from benefits, measures, or both of the 2012 AQMP relative to the baseline economic activities.

*Includes changes in demand due to changes in control requirements.

TABLE G-7-1B
Average Annual Impacts of AQMP and CEQA Alternatives

CEQA Alternatives*	Costs		$PM_{2.5}$ Benefits		Jobs for Combined Costs & Benefits
	Millions of 2005 Dollars	Jobs	Millions of 2005 Dollars	Jobs	
2012 AQMP	$122.7	-1,646	$2,958	9,037	5,378
Alt 2—Localized PM Control	123.6	-1,726	1,814	4,007	2,105
Alt 3—Greater Reliance on NOx Reductions	168.3	-3,092	3,429	11,209	7,622
Alt 4—$PM_{2.5}$ Strategy Only	$0.1	-4	<$2,958	<9,037	<5,378

APPENDIX H

TCM BENEFIT AT 2014 LEVEL

INTRODUCTION

The average annual congestion relief benefit of $7.7 billion from 2014 to 2035 in the Draft Socioeconomic Report for the Draft 2012 AQMP is for all TCM-type projects in the 2012 Regional Transportation Plan (RTP). However, committed TCMs in the 2012 AQMP are comprised of only the first two years of TCM-type projects in the 2012 RTP. In order to analyze the benefit from the SIP-committed TCMs between 2014 and 2035 and due to the data constraint, it was assumed that the congestion relief benefit would stay constant at the 2014 level. This estimate is conservative because

- Only those projects that will be operational in the first two years are included in the 2014 benefit, and
- Some of the committed TCM projects will not be fully completed and operational in the first two years.

The 2014 congestion relief benefit from the SIP-committed TCMs is estimated to be $519 million in 2014 and would continue from 2015 to 2035. The following tables corresponding to those in the Socioeconomic Report have been updated to reflect the annual $519 million congestion relief benefit. All the table numbers are preceded with an "H."

TABLE H-3-3
Quantifiable Benefits of 2012 AQMP
(millions of 2005 dollars)

Benefit	Average Annual (2014 to 2035)
Reduction in Morbidity	$23
Reduction in Mortality	2,225
Visibility Improvement	696
Reduced Materials Expenditures	14
Congestion Relief	519
Total	$3,477

TABLE H-3-10
Total Costs and Benefits of the Plan
(millions of 2005 dollars)

	2014	2023	Average Annual
Total Costs	$510	$357	$448
Total Benefits	$5,948	$2,672	$3,477

TABLE H-4-1
Job Impacts of Quantified Clean Air Benefits and Measures

Category	2014	2023	2035	Average Annual
Clean Air Benefits & Measures (2013-2035)	2,987	10,986	13,906	8,498
Clean Air Benefits (2014-2035)	2,261	12,931	16,876	12,299
Congestion Relief	348	3,254	5,017	3,245
Visibility Improvements	1,008	5,313	6,445	4,947
Reduced Materials Expenditures	133	191	181	179
Health Benefits	774	4,146	5,214	3,910
Control Measures (2013-2035)	731	-1,929	-2,955	-3,257
TCMs	715	537	-813	-1,611
District $PM_{2.5}$	7	-10	-3	-4
Ozone Strategy	26	-2,457	-2,142	-1,639

Results from modeling all the categories are slightly different from the sum of results from modeling each category one at a time because of nonlinearity of the REMI model.

TABLE H-4-2

2012 AQMP Employment Impacts by Industry for Clean Air Benefits

Industry	NAICS	Jobs		Average Annual (2014-2035)	
		2014	2023	Jobs	% Baseline
Agriculture, Forestry, Fishing and Hunting	11	1	5	10	0.046%
Mining	21	8	43	42	0.095%
Utilities	22	15	69	66	0.208%
Construction	23	235	927	864	0.160%
Transportation Equipment Mfg.	336	4	19	18	0.023%
Petroleum and Coal Products Mfg.	324	2	8	7	0.105%
Other Manufacturing	31-33 ex. 324 & 336	91	489	440	0.067%
Wholesale Trade	42	92	421	409	0.086%
Retail Trade	44-45	25	1,353	1,294	0.129%
Truck Transportation	484, 492	-81	122	109	0.065%
Transit Transportation	485	15	57	52	0.160%
Other Transportation and Warehousing	48-49 ex. 484-485 & 492	19	105	97	0.062%
Information	51	35	191	197	0.059%
Finance and Insurance	52	13	233	254	0.041%
Real Estate and Rental and Leasing	53	354	1,267	1,186	0.211%
Professional and Technical Services	54	153	721	701	0.086%
Management and Support Services	55-56	155	828	800	0.092%
Education, Health and Social Services	61-62	441	1,728	1,762	0.147%
Arts, Entertainment and Recreation	71	103	393	377	0.119%
Accommodation and Food Services	72	603	2,062	1,883	0.274%
Other Services	81	-461	33	10	0.002%
Government	92	440	1,858	1,721	0.137%
Total		**2,261**	**12,931**	**12,299**	**0.116%**

TABLE H-4-4

Job Impact by Industry for Clean Air Benefits and Measures Combined

Industry	NAICS	Jobs		Average Annual (2013-2035)	
		2014	2023	Jobs	% Baseline
Agriculture, Forestry, Fishing and Hunting	11	-1	1	5	0.025%
Mining	21	-32	15	5	0.012%
Utilities	22	11	108	85	0.269%
Construction	23	4,873	2702	2,184	0.407%
Transportation Equipment Mfg.	336	4	6	10	0.013%
Petroleum and Coal Products Mfg.	324	-5	1	-1	-0.021%
Other Manufacturing	31-33 ex. 324 & 336	-102	343	269	0.041%
Wholesale Trade	42	-79	300	189	0.040%
Retail Trade	44-45	-949	532	219	0.022%
Truck Transportation	484, 492	-95	69	43	0.026%
Transit Transportation	485	14	-37	-64	-0.197%
Other Transportation and Warehousing	48-49 ex. 484-485 & 492	-51	-54	-60	-0.039%
Information	51	-78	143	118	0.036%
Finance and Insurance	52	-393	69	-14	-0.002%
Real Estate and Rental and Leasing	53	210	1233	969	0.173%
Professional and Technical Services	54	556	388	769	0.095%
Management and Support Services	55-56	-234	408	320	0.037%
Education, Health and Social Services	61-62	-87	1447	1,162	0.098%
Arts, Entertainment and Recreation	71	19	361	287	0.091%
Accommodation and Food Services	72	39	1754	1,367	0.199%
Other Services	81	-694	-161	-328	-0.048%
Government	92	61	1360	963	0.077%
Total		**2,987**	**10,986**	**8,498**	**0.081%**

TABLE H-5-2

Average Annual Benefits (2014-2035) by Sub-region

Sub-region	Health		Congestion		Material		Visibility		Total	
	MM$	%	MM$	%	MM$	%	MM$	%	MM$	%
LA CO Beach & Catalina	78	3%	28	5%	0.4	3%	26	4%	133	4%
LA CO Burbank	19	1%	53	10%	0.4	3%	26	4%	99	3%
LA CO Central	145	6%	-20	-4%	0.9	6%	37	5%	163	5%
LA CO North	44	2%	9	2%	0.4	3%	9	1%	62	2%
LA CO San Fernando	157	7%	45	9%	0.8	6%	41	6%	244	7%
LA CO SG Valley East	96	4%	25	5%	0.4	3%	20	3%	142	4%
LA CO SG Valley West	81	4%	18	3%	0.6	4%	33	5%	132	4%
LA CO South	145	6%	53	10%	0.6	4%	21	3%	220	6%
LA CO South Central	16	1%	7	1%	0.6	4%	13	2%	36	1%
LA CO Southeast	70	3%	19	4%	0.6	5%	22	3%	111	3%
LA CO West	203	9%	2	0%	0.8	5%	94	13%	300	9%
Orange Central	115	5%	30	6%	0.8	6%	23	3%	168	5%
Orange North	118	5%	10	2%	0.4	3%	22	3%	151	4%
Orange South	128	6%	30	6%	0.9	7%	60	9%	218	6%
Orange West	202	9%	46	9%	0.7	5%	41	6%	290	8%
Northwest Riverside	117	5%	62	12%	1.0	7%	55	8%	235	7%
Other Riverside	116	5%	19	4%	1.1	8%	29	4%	165	5%
Southwest Riverside	60	3%	29	6%	0.8	5%	29	4%	119	3%
San Bernardino City	35	2%	23	4%	0.8	6%	47	7%	105	3%
Other San Bernardino	180	8%	3	1%	0.6	4%	10	1%	193	6%
Southwest San Bernardino	122	5%	27	5%	0.6	4%	40	6%	190	5%
Total	**2,247**	**100%**	**519**	**100%**	**14.3**	**100%**	**696**	**100%**	**3,477**	**100%**

TABLE H-5-4
Per Capita Clean Air Benefit and Cost
by Sub-region (in 2005 dollars)

Sub-region	Clean Air Benefit	Cost
LA CO Beach & Catalina	$204	$43
LA CO Burbank	153	29
LA CO Central	120	29
LA CO North	105	37
LA CO San Fernando	173	28
LA CO East	155	30
LA CO South	223	30
LA CO South Central	34	30
LA CO Southeast	85	30
LA CO West	313	30
OR CO Central	146	20
OR CO North	329	24
OR CO South	235	23
OR CO West	377	22
Northwest Riverside	186	9
Other Riverside	183	9
Chino-Redlands	167	11
Other San Bernardino	301	8
Total Four Counties	**$180**	**$23**

TABLE H-5-5
Average Annual Job Impacts by Sub-region for
Benefits, Control Measures and Plan

Sub-region	Benefits (2014-2035)	Control Measures (2013-2035)	Plan (2013-2035)	
			Jobs	% Baseline
LA CO Beach & Catalina	325	-35	276	0.06%
LA CO Burbank	342	17	345	0.08%
LA CO Central	482	66	526	0.07%
LA CO North	188	-87	93	0.03%
LA CO San Fernando	602	-200	377	0.05%
LA CO East	844	-230	577	0.06%
LA CO South	526	-147	356	0.06%
LA CO South Central	280	-117	152	0.03%
LA CO Southeast	463	14	457	0.07%
LA CO West	547	120	644	0.09%
OR CO Central	777	-528	216	0.03%
OR CO North	390	-234	138	0.05%
OR CO South	1,015	-941	28	0.00%
OR CO West	999	-687	267	0.05%
RV CO NW Riverside	1,102	9	1,060	0.18%
RV CO Other	1,652	-130	1,447	0.21%
Chino-Redlands	1,316	-121	1,134	0.14%
Other San Bernardino	451	-26	404	0.15%
Total	**12,299**	**-3,256**	**8,498**	**0.08%**

TABLE H-5-6
Employment Impacts by Occupational Wage Group for
Clean Air Benefits and Control Measures

Group	Median Weekly Earnings	No. of Occupations	% Impact from Baseline								
			Clean Air Benefits			Control Measures			Benefits & Measures		
			2014	2023	2035	2014	2023	2035	2014	2023	2035
1	$352-$517	19	0.031	0.147	0.167	-0.055	-0.041	-0.029	-0.024	0.106	0.138
2	$520-$659	19	0.021	0.108	0.137	-0.008	-0.022	-0.024	0.013	0.086	0.113
3	$661-$820	18	0.013	0.123	0.149	0.138	0.027	-0.029	0.151	0.150	0.119
4	$821-$996	19	0.028	0.123	0.143	0.009	-0.016	-0.023	0.036	0.107	0.120
5	$1,027-$1,729	19	0.025	0.108	0.132	-0.008	-0.026	-0.021	0.017	0.082	0.111

TABLE H-5-7
Impacts on the Price of Consumption Goods for
Clean Air Benefits and Control Measures
(percent of baseline*)

Household Income	Clean Air Benefits			Control Measures			Benefits & Measures		
	2014	2023	2035	2014	2023	2035	2014	2023	2035
1st Quintile	-0.007	0.002	0.006	0.060	0.040	0.015	0.052	0.043	0.022
2nd Quintile	-0.007	0.002	0.005	0.059	0.039	0.015	0.052	0.040	0.020
3rd Quintile	-0.007	0.002	0.005	0.058	0.039	0.015	0.052	0.040	0.020
4th Quintile	-0.007	0.002	0.005	0.058	0.038	0.015	0.052	0.039	0.020
5th Quintile	-0.007	0.002	0.006	0.060	0.038	0.015	0.052	0.041	0.021

*Relative to the rest of the U.S.

TABLE H-6-1
Impacts on Region's Share of U.S. Jobs for
Clean Air Benefits and Control Measures (percent)

	Percent Share of U.S. Jobs for Benefits			Percent Share of U.S. Jobs for All Measures			Percent Share of U.S. Jobs for Combined Benefits & Measures		
	2014	2023	2035	2014	2023	2035	2014	2023	2035
Total Jobs									
With Benefits & Measures							5.127	4.954	4.937
With Benefits	5.126	4.955	4.939						
With All Measures				5.126	4.948	4.930			
Without 2012 AQMP	5.125	4.949	4.931	5.125	4.949	4.931	5.125	4.949	4.931
Difference	0.001	0.006	0.008	0.001	-0.001	-0.001	0.002	0.005	0.006
Manufacturing Jobs									
With Benefits & Measures							5.654	7.295	6.910
With Benefits	5.656	7.297	6.910						
With All Measures				5.654	7.29	6.904			
Without 2012 AQMP	5.655	7.292	6.905	5.655	7.292	6.905	5.655	7.292	6.905
Difference	0.001	0.005	0.005	-0.001	-0.002	-0.001	-0.001	0.003	0.005

Some numbers are rounded.

TABLE H-6-2

Impacts on Cost of Production Relative to Those in the Rest of the U.S.
for Clean Air Benefits and Control Measures

Industry	Clean Air Benefits			Control Measures			Combined Benefits & Measures		
	2014	2023	2035	2014	2023	2035	2014	2023	2035
Forestry, Fishing and Hunting	-0.012%	-0.020%	-0.014%	0.000%	0.007%	0.001%	-0.012%	-0.014%	-0.013%
Mining	-0.001%	0.038%	0.038%	-0.016%	0.018%	-0.001%	-0.017%	0.056%	0.037%
Utilities	-0.004%	0.026%	0.026%	-0.021%	0.045%	0.034%	-0.025%	0.071%	0.060%
Construction	-0.013%	-0.034%	-0.026%	0.060%	0.051%	0.012%	0.047%	0.018%	-0.014%
Manufacturing	-0.010%	-0.013%	-0.008%	-0.002%	0.021%	0.010%	-0.013%	0.008%	0.001%
Wholesale Trade	-0.011%	-0.021%	-0.014%	-0.004%	0.018%	0.008%	-0.015%	-0.002%	-0.006%
Retail Trade	-0.010%	-0.010%	-0.003%	-0.005%	0.032%	0.020%	-0.015%	0.022%	0.017%
Transportaion and Warehousing	-0.230%	-0.195%	-0.158%	-0.014%	0.096%	0.090%	-0.244%	-0.099%	-0.068%
Information	-0.006%	0.023%	0.025%	-0.003%	0.023%	-0.002%	-0.009%	0.046%	0.023%
Finance and Insurance	-0.005%	0.001%	0.006%	-0.007%	0.013%	0.001%	-0.013%	0.015%	0.007%
Real Estate, Rental and Leasing	-0.003%	0.055%	0.053%	-0.010%	0.019%	-0.003%	-0.012%	0.073%	0.050%
Professional and Technical Services	-0.008%	-0.015%	-0.008%	-0.004%	0.016%	0.003%	-0.012%	0.002%	-0.005%
Management of Companies and Enterprises	-0.009%	-0.022%	-0.014%	-0.004%	0.018%	0.004%	-0.013%	-0.004%	-0.010%
Administrative and Waste Services	-0.009%	-0.019%	-0.012%	-0.003%	0.024%	0.007%	-0.012%	0.005%	-0.006%
Educational Services	-0.008%	-0.016%	-0.008%	0.001%	0.017%	0.003%	-0.006%	0.001%	-0.005%
Health Care and Social Assistance	-0.009%	-0.025%	-0.016%	-0.002%	0.015%	0.003%	-0.011%	-0.010%	-0.012%
Arts, Entertainment and Recreation	-0.006%	0.011%	0.015%	-0.001%	0.024%	0.000%	-0.007%	0.034%	0.015%
Accommodation and Food Services	-0.008%	-0.004%	0.002%	-0.004%	0.014%	0.002%	-0.012%	0.009%	0.004%
Other Services (ex. Government)	-0.008%	-0.003%	0.003%	-0.003%	0.017%	0.001%	-0.011%	0.014%	0.004%

TABLE H-6-3

Impacts on Delivered Prices Relative to Those in the Rest of the U.S.
for Clean Air Benefits and Control Measures

Industry	Clean Air Benefits			Control Measures			Combined Benefits & Measures		
	2014	2023	2035	2014	2023	2035	2014	2023	2035
Forestry, Fishing and Hunting	-0.002%	-0.003%	-0.002%	0.000%	0.001%	0.001%	-0.002%	-0.001%	-0.001%
Mining	0.000%	0.014%	0.013%	-0.006%	0.006%	0.000%	-0.006%	0.020%	0.013%
Utilities	-0.003%	0.022%	0.023%	-0.017%	0.040%	0.031%	-0.020%	0.063%	0.053%
Construction	-0.012%	-0.032%	-0.024%	0.058%	0.052%	0.013%	0.046%	0.020%	-0.011%
Manufacturing	-0.006%	-0.007%	-0.004%	-0.001%	0.011%	0.005%	-0.007%	0.004%	0.001%
Wholesale Trade	-0.011%	-0.020%	-0.013%	-0.003%	0.018%	0.008%	-0.014%	-0.002%	-0.005%
Retail Trade	-0.008%	-0.008%	-0.002%	-0.004%	0.026%	0.016%	-0.012%	0.018%	0.014%
Transportaion and Warehousing	-0.118%	-0.100%	-0.082%	-0.009%	0.046%	0.048%	-0.127%	-0.054%	-0.034%
Information	-0.004%	0.010%	0.013%	-0.003%	0.016%	0.000%	-0.008%	0.026%	0.013%
Finance and Insurance	-0.003%	0.001%	0.004%	-0.004%	0.009%	0.001%	-0.008%	0.010%	0.005%
Real Estate, Rental and Leasing	-0.002%	0.055%	0.054%	-0.004%	0.024%	0.002%	-0.007%	0.079%	0.055%
Professional and Technical Services	-0.008%	-0.014%	-0.008%	-0.004%	0.015%	0.003%	-0.011%	0.001%	-0.005%
Management of Companies and Enterprises	-0.005%	-0.013%	-0.008%	-0.002%	0.011%	0.003%	-0.008%	-0.002%	-0.005%
Administrative and Waste Services	-0.008%	-0.017%	-0.011%	-0.003%	0.024%	0.007%	-0.011%	0.006%	-0.004%
Educational Services	-0.006%	-0.012%	-0.006%	0.001%	0.013%	0.002%	-0.005%	0.001%	-0.004%
Health Care and Social Assistance	-0.006%	-0.017%	-0.010%	-0.001%	0.011%	0.003%	-0.007%	-0.006%	-0.008%
Arts, Entertainment and Recreation	-0.006%	0.007%	0.011%	-0.003%	0.019%	0.001%	-0.009%	0.026%	0.012%
Accommodation and Food Services	-0.006%	-0.003%	0.002%	-0.003%	0.012%	0.002%	-0.009%	0.008%	0.004%
Other Services (ex. Government)	-0.007%	-0.001%	0.004%	-0.002%	0.014%	0.001%	-0.009%	0.013%	0.005%

TABLE H-6-4

Impacts on Imports and Exports for Clean Air Benefits and Control Measures

	Clean Air Benefits			Control Measures			Benefits & Measures		
	2014	2023	2035	2014	2023	2035	2014	2023	2035
Demand*	+	+	+	-	-	-	+	+	+
Imports	+	+	+	+	+	+	+	+	+
Self Supply*	+	+	+	-	-	-	-	+	+
Exports	+	+	+	-	-	-	-	-	-
Output (Production)	+	+	+	-	-	-	-	+	+
Delivered Price	-	-	+	-	+	+	-	+	+
Cost of Production	-	-	+	-	+	+	-	+	+

A plus or minus sign means that there is an increase or decrease in the value of that economic variable resulting from benefits, measures, or both of the 2012 AQMP relative to the baseline economic activities.
*Includes changes in demand due to changes in control requirements.

TABLE H-7-1
Average Annual Impacts of AQMP and CEQA Alternatives

CEQA Alternatives*	Costs		PM2.5 Benefits		Jobs for Combined Costs & Benefits
	Millions of 2005 Dollars	Jobs	Millions of 2005 Dollars	Jobs	
Draft Final 2012 AQMP	$448	-3,257	$3,477	12,299	8,498
Alt 2—Localized PM Control	450	-3,334	2,333	7,260	3,407
Alt 3—Greater Reliance on NOx Reductions	495	-4,715	3,948	14,475	9,121
Alt 4—$PM_{2.5}$ Strategy Only	$327	-1,620	<$3,477	<12,299	<8,498

TABLE H-7-3
Average Annual Quantified Benefits by Category by Alternative
(millions of 2005 dollars)

CEQA Alternatives	Total	Health	Visibility	Congestion Relief	Material
2012 Plan	$3,477	$2,247	$696	$519	$14
Alt2—Localized PM Control	2,333	1,370	438	519	7
Alt 3—Greater Reliance on NOx	3,948	2,430	988	519	11
Alt 4—$PM_{2.5}$ Strategy Only	<$3,477	<$2,247	<$696	$519	<$14

APPENDIX I

CPI AND COST INDICES

Table I-1
Price Indices

Year	CPI for Los Ángeles CMSA (1982 - 1984 = 100)*	CPI for Los Ángeles CMSA (2005 = 100)	Marshall and Swift Index (1926 = 100)	Marshall and Swift Index (2005 = 100)
2005	201.800	100.000	1,244.5	100.000
2006	210.400	104.262	1,302.3	104.644
2007	217.338	107.700	1,373.3	110.350
2008	225.008	111.500	1,449.3	116.456
2009	223.219	110.614	1,468.6	118.007
2010	225.894	111.940	1,457.4	117.107
2011	231.928	114.930	1536.5**	123.463

*CMSA = Consolidated Metropolitan Statistical Areas.
**4th quarter.

Sources:
http://www.dof.ca.gov/HTML/FS_DATA/LatestEconData/FS_UseCPI.php
Chemical Engineering, Various Issues

Footnotes:
1. The Marshall and Swift (M & S) Indices were used to convert current dollars to 2005 dollars for all the control measures except TCMs.
2. Nominal dollars in TCMs were converted to 2005 dollars based on an annual compounded inflation rate of 3.2 percent.
3. CPIs were used for conversions to 2005 dollar in the assessment of all clean air benefits.

APPENDIX J

GLOSSARY

American Community Survey (ACS): The ACS is an ongoing statistical survey that samples a small percentage of the population every year to provide up-to-date information about the social and economic needs of communities.

Acute Health Effect: An adverse health effect that occurs over a relatively short period of time (e.g., minutes or hours).

Acute Respiratory Symptoms: Any respiratory disease-related symptoms including chest discomfort, coughing, wheezing, sore throat, head cold, chest cold, sinus trouble, hay fever, headache and doctor-diagnosed flu.

Air Quality Simulation Model: A computer program that simulates the transport, dispersion, and transformation of compounds emitted into the air and can project the relationship between emissions and air quality.

Ambient Air: The air occurring at a particular time and place outside of structures. Often used interchangeably with "outdoor" air.

APCD (Air Pollution Control District): A county agency with authority to regulate stationary, indirect, and area sources of air pollution (e.g., power plants, highway construction, and housing developments) within a given county, and governed by a district air pollution control board composed largely of the elected county supervisors. (See AQMD).

AQMD (Air Quality Management District): A group of counties or portions of counties, or an individual county specified in law with authority to regulate stationary, indirect, and area sources of air pollution within the region and governed by a regional air pollution control board comprised mostly of elected officials from within the region. (See APCD).

AQMP (Air Quality Management Plan): A Plan prepared by an APCD/AQMD, for a county or region designated as a non-attainment area, for the purpose of bringing the area into compliance with the requirements of the national and/or California Ambient Air Quality Standards. AQMPs are incorporated into the State Implementation Plan (SIP).

Asthma Symptom Days: Days in which asthma symptoms are present in asthmatic individuals.

BenMAP Model (Environmental Benefits Mapping and Analysis Program): A computer model designed to estimate general population exposures to air pollutants. The model uses air quality data from the CAMx Model as inputs for exposure calculations. The model is structured in a manner that allows for consideration of spatial and temporal variations in concentrations, variations in human time activity, and mobility of the population.

CAA (Federal Clean Air Act): A federal law passed in 1970 and amended in 1977 and 1990 which forms the basis for the national air pollution control effort. Basic elements of the act include national ambient air quality standards for major air pollutants, air toxics standards, acid rain control measures, and enforcement provisions.

CARB (California Air Resources Board): The State's lead air quality agency consisting of a 11-member Governor-appointed board. It is responsible for attainment and maintenance of

the State and federal air quality standards, and is primarily responsible for motor vehicle pollution control. It oversees county and regional air pollution management programs.

CMAQ (Community Multiscale Air Quality Model): A three dimensional photochemical grid model used to simulate ozone and $PM_{2.5}$ formation.

Cardiac Hospital Admissions: Hospital admissions due to heart-related ailments or disease.

CCAA (California Clean Air Act): A California law passed in 1988 which provides the basis for air quality planning and regulation independent of federal regulations. A major element of the Act is the requirement that local APCDs/AQMDs in violation of the CAAQS must prepare attainment plans which identify air quality problems, causes, trends, and the actions to be taken to attain and maintain California's air quality standards by the earliest practicable date.

CEQA (California Environmental Quality Act): A California law which sets forth a process for public agencies to make informed decisions on discretionary project approvals. The process aids decision makers to determine whether any environmental impacts are associated with a proposed project. It requires environmental impacts associated with a proposed project to be identified, disclosed, and mitigated to the maximum extent feasible.

Clean Air Benefits: These include reduced morbidity, avoided mortality, visibility improvements, increased crop yield, traffic congestion relief, reduced spending on refurbishing sensitive building materials, and less damage to plant life and livestock resulting from attaining federal and state air quality standards.

CO (Carbon Monoxide): A colorless, odorless gas resulting from the incomplete combustion of fossil fuels. Over 80% of the CO emitted in urban areas is contributed by motor vehicles. CO interferes with the blood's ability to carry oxygen to the body's tissues and results in numerous adverse health effects. CO is a criteria air pollutant.

Concentration-Response Function: A mathematical relationship derived to calculate the number of cases of a specific health effect expected in a population exposed to a given ambient concentration of an air pollutant.

Chronic Bronchitis: Chronic lung disease characterized by frequent coughing, increased sputum production, and interference with oxygen exchange between air and blood in the lungs of severely affected individuals.

Chronic Health Effect: An adverse health effect which occurs over a relatively long period of time (e.g., months or years).

Consumer Expenditure Survey (CES): The CES collects information on the buying habits of American consumers. The survey consists of two components: (1) a Diary survey completed by participating consumers for two consecutive 1-week periods; and (2) an Interview survey in which the expenditures of consumers are obtained in five interviews conducted every 3 months. Each component of the survey queries an independent sample of consumers which is representative of the U.S. population. Over 52 weeks of

the year, 5,000 consumers are sampled for the Diary survey. The Interview sample is selected on a rotating panel basis, targeted at 5,000 consumers each quarter.

Current Population Survey (CPS): The CPS provides monthly statistics that serve as measures of both current labor force utilization and overall performance of the U.S. economy. The information collected from a sample of 60,000 households relates to the employment status of the entire population. For the employed, there are data on hours worked, full-time and part-time status of workers, and usual weekly earnings. For the unemployed, data routinely are collected on duration of unemployment, the respondent's job status at the time that his or her jobless spell began, and job-seeking methods used. Among those not in the labor force, data are obtained for so-called discouraged workers, who have ceased active job hunting.

Discounted Cash Flow Method: A method to evaluate the present worth of a stream of expenditures in future years. Future expenditures are discounted based on the interest rate and the length of the period in which the expenditures are made.

Disposable Income: It is the sum of the incomes of all the individuals in the economy after all taxes have been deducted.

Dose-Response Function: A mathematical relationship which expresses the likelihood of a connection between exposure to a specific amount of an air pollutant (inhaled dose) and one or more responses elicited by exposure to the specific pollutant. For human health evaluations, responses are health effects, e.g., eye irritations and restricted activity days. For agriculture, the responses are changes in crop yields.

Emergency Room Visits: Visits to emergency rooms by individuals in need of urgent or immediate treatment.

Grid Cell: An area bound by evenly spaced horizontal and vertical bars or lines.

Episodic Model: A photochemical grid model that typically simulates air quality for a 3-5 day period, e.g., the CAMx Model used for the ozone attainment demonstration .

Hedonic Prices: Hedonic prices are a method to compute the price of a good that is not traded in the market based on the price of a traded good that has the attribute of the non-traded good. Based on the amount of the attribute, the imputed price of the non-traded good is a fraction of the price of the traded good. For example, air quality is an attribute of real estate.

Mobile Sources: Sources of air pollution such as automobiles, motorcycles, trucks, off-road vehicles, boats and airplanes. (Contrast with stationary sources.)

NAICS Code: The North American Industry Classification System (NAICS) has replaced the U.S. Standard Industrial Classification (SIC) system. NAICS was developed jointly by the U.S., Canada, and Mexico to provide new comparability in statistics about business activity across North America. Economic units that use like processes to produce goods or services are grouped together. NAICS reflects the structure of today's economy in the U.S., Canada, and Mexico, including the emergence and growth of the service sector and

new and advanced technologies. NAICS also provides for increased comparability with the International Standard Industrial Classification System (ISIC, Revision 3), developed and maintained by the United Nations.

Nitrogen Oxides (Oxides of Nitrogen, NO_X): A general term pertaining to compounds of nitric acid (NO), nitrogen dioxide (NO_2), and other oxides of nitrogen. Nitrogen oxides are typically created during combustion processes, and are major contributors to smog formation and acid deposition. NO_2 is a criteria air pollutant, and may result in numerous adverse health effects.

Off-Road Mobile Sources: Mobile sources of air pollution (vehicles) which are not authorized to operate on streets and highways. Examples include trains, boats, aircraft, farm equipment, and earthmoving equipment.

On-Road Mobile Sources: Mobile sources of air pollution (vehicles) which are authorized to operate on streets and highways. Examples include passenger cars, trucks, and buses.

Ozone: A strong-smelling, pale blue, reactive toxic chemical gas consisting of three oxygen atoms. It is a product of the photochemical process involving the sun's energy. Ozone exists in the upper atmosphere ozone layer as well as at the earth's surface. Ozone at the earth's surface can cause numerous adverse health effects and is a criteria air pollutant. It is a major component of smog.

Ozone Precursors: Chemicals such as hydrocarbons and oxides of nitrogen, occurring either naturally or as a result of human activities, which contribute to the formation of ozone, a major component of smog.

$PM_{2.5}$ (Particulate Matter): Major class of air pollutants consisting of tiny solid or liquid particles of soot, dust, smoke, fumes, and mists. The size of the particles (2.5 microns or smaller, about 0.0004 inches or less) allows them to enter the air sacs (gas exchange region) deep in the lungs where they may get deposited and result in adverse health effects. $PM_{2.5}$ also causes reduced visibility and is a criteria air pollutant.

$PM_{2.5}$ Model: Modeling approaches to assess contributions to primary and secondary $PM_{2.5}$. Primary $PM_{2.5}$ source apportionment is accomplished by receptor models and secondary particles such as sulfate and nitrate are apportioned to their precursors utilizing the Particle-In-Cell (PIC) dispersion model.

Premature Mortality: Death before the term of life expectancy.

Quantifiable Clean Air Benefits: Clean air is not a commodity exchanged in a market. The contingency valuation method or the hedonic pricing is often used to assess the monetary benefit associated with clean air. There are instances where association between an effect and clean air (cause) cannot be quantitatively established or is unknown, thus precluding the application of the contingency valuation method or hedonic pricing. Quantifiable clean air benefits are those benefit categories where monetary values can be placed based on past literature.

Reactive Organic Gas (ROG): A reactive chemical gas, composed of hydrocarbons, which may contribute to the formation of smog. Also sometimes referred to as Non-Methane Organic Compounds (NMOCs) or volatile organic compounds (VOCs).

Regional Economic Models, Inc. (REMI) Model: The REMI model is an economic and demographic forecasting and simulation model designed to examine the economic and demographic effects resulting from policy initiatives or external events in a local economy. For the socioeconomic analysis of the 2007 AQMP, the REMI 8.0.9 70-sector model for the 19 sub-regions within the counties of Los Angeles, Orange, Riverside, and San Bernardino is used.

Respiratory Hospital Admissions: Hospital admissions due to respiratory illness.

Restricted Activity Days: Days when activities are either fully or partially restricted due to illness, which include days spent in bed and days missed from work.

Relative Response Factor (RRF): A measure of simulated concentrations in a future year compared to those in a historical year from an air quality model.

Smog: A combination of smoke, ozone, hydrocarbons, nitrogen oxides, and other chemically reactive compounds which, under certain conditions of weather and sunlight, may result in a murky brown haze that causes adverse health effects. The primary source of smog in California is motor vehicles.

Standard Industrial Classification (SIC) Code: The SIC code is used to classify all establishment-based federal economic statistics by industry. The SIC code facilitates the comparability of establishment data in the U.S. economy. The classification covers the entire range of economic activities and defines industries in accordance with the composition and structure of the economy.

State Implementation Plan (SIP): A document prepared by each state describing existing air quality conditions and measures which will be taken to attain and maintain national ambient air quality standards (see AQMP).

Stationary Sources: Non-mobile sources such as power plants, refineries, and manufacturing facilities which emit air pollutants. (Contrast with mobile sources.)

Sulfur Dioxide (SO_2): A strong smelling, colorless gas that is formed by the combustion of fossil fuels. Power plants which may use coal or oil high in sulfur content can be major sources of SO_2. SO_2 and other sulfur oxides contribute to the problem of acid deposition. SO_2 is a criteria pollutant.

Total Suspended Particulate Matter (TSP): Airborne particles that are less than 100 micrometers.

U.S. EPA (Environmental Protection Agency): The federal government agency charged with setting policy and guidelines, and carrying out legal mandates, for the protection of national interests in environmental resources.

VHT: Vehicle Hours Traveled.

VMT: Vehicle Miles Traveled.

Visibility: The distance that atmospheric conditions allow a person to see at a given time and location. Visibility reductions from air pollution are often due to the presence of sulfur and nitrogen oxides, as well as particulate matter.

Volatile Organic Compounds (VOCs): Hydrocarbon compounds which exist in the ambient air. VOCs contribute to the formation of smog and/or may themselves be toxic. VOCs often have an odor. Some examples of VOCs are gasoline, alcohol, and the solvents used in paints.

Willingness to Pay (WTP): WTP is an approach to measuring monetary values of benefits received from non-market goods such as environmental quality. The methods used to arrive at a WTP value include surveys and hedonic price functions.

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