



REGIONAL TRANSPORTATION PLAN
2012-2035 RTP
SUSTAINABLE COMMUNITIES STRATEGY
Towards a Sustainable Future

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05 MEASURING UP



Introduction

The investments identified in the 2012–2035 RTP/SCS are expected to result in significant benefits to the region, not only with respect to transportation and mobility, but also air quality, economic activity and job creation, sustainability, and Environmental Justice. This chapter describes the benefits and outcomes projected to result from the implementation of the RTP/SCS with respect to the adopted performance measures. This chapter also describes how the RTP/SCS addresses the statutory requirements regarding Environmental Justice, SB 375, and transportation conformity.

Performance Outcomes

This section summarizes how well the 2012–2035 RTP/SCS performs. **TABLE 5.1** lists the performance outcomes and associated measures used to forecast performance using the SCAG Regional Travel Demand Model (RTDM). In addition, this section provides estimates of performance improvements for two different outcomes that do not rely on the RTDM: productivity and reliability. While this chapter includes summaries of the performance improvements expected from the implementation of the RTP/SCS, more detail is provided under separate cover in the Performance Measures Appendix.

Two new outcomes have been added in the 2012–2035 RTP/SCS: location efficiency and public health. The location efficiency outcome reflects the degree to which land use is improved to provide shorter and easier access to desired destinations, therefore encouraging the transit and active transportation modes. The health outcome monitors pollution emitted from transportation, which causes health problems such as asthma and even premature deaths.

In the discussion of performance and outcomes, three scenarios are referenced: Base Year, Baseline, and Plan. The 2008 Base Year represents existing conditions and is based on the transportation system on the ground and in service in 2008. The 2035 Baseline assumes current land use trends and represents a future in which only committed programs and projects are implemented and is based on projects programmed in the 2011 Federal Transportation Improvement Program (FTIP) that have received environmental clearance. The 2035 Plan represents future conditions in which the 2012–2035 RTP/SCS investments and strategies are fully realized. The specific projects associated with Baseline and Plan are identified in the 2012–2035 RTP/SCS Project List report.

TABLE 5.1 Adopted 2012–2035 RTP/SCS Outcomes and Performance Measures/Indicators

Outcome	Performance Measure/Indicator	Definition	Performance Target	Data Sources Used
Location Efficiency	Share of growth in High-Quality Transit Areas (HQTAs)	Share of the region's growth in households and employment in HQTAs	Improvement over No Project Baseline	Census (including annual American Community Survey), InfoUSA
	Land consumption	Additional land needed for development that has not previously been developed or otherwise impacted, including agricultural land, forest land, desert land, and other virgin sites	Improvement over No Project Baseline	Rapid Fire Model
	Average distance for work or non-work trips	The average distance traveled for work or non-work trips separately	Improvement over No Project Baseline	Travel Demand Model
	Percent of work trips less than 3 miles	The share of total work trips which are fewer than 3 miles	Improvement over No Project Baseline	Travel Demand Model
	Work trip length distribution	The statistical distribution of work trip length in the region	Improvement over No Project Baseline	Travel Demand Model
Mobility and Accessibility	Person delay per capita	Delay per capita can be used as a supplemental measure to account for population growth impacts on delay	Improvement over No Project Baseline	Travel Demand Model
	Person delay by facility type (mixed flow, HOV, arterials)	Delay—excess travel time resulting from the difference between a reference speed and actual speed	Improvement over No Project Baseline	Travel Demand Model
	Truck delay by facility type (highway, arterials)	Delay—excess travel time resulting from the difference between a reference speed and actual speed	Improvement over No Project Baseline	Travel Demand Model
	Travel time distribution for transit, SOV, HOV for work and non-work trips	Travel time distribution for transit, SOV, HOV for work and non-work trips	Improvement over No Project Baseline	Travel Demand Model
Safety and Health	Collision/accident rates by severity by mode	Accident rates per million vehicle miles by mode (all, bicycle/pedestrian, and fatality/killed)	Improvement over Base Year	CHP Accident Data Base, Travel Demand Model Mode Split Outputs
	Criteria pollutants emissions	CO, NO _x , PM _{2.5} , PM ₁₀ , and VOC	Meet Transportation Conformity requirements	Travel Demand Model/ ARB EMFAC Model

Outcome	Performance Measure/Indicator	Definition	Performance Target	Data Sources Used
Environmental Quality	Criteria pollutant and greenhouse gas emissions	CO, NO _x , PM _{2.5} , PM ₁₀ , and VOC Per capita greenhouse gas emissions (CO ₂)	Meet Transportation Conformity requirements and SB 375 per capita GHG-reduction targets	Travel Demand Model/ ARB EMFAC Model
Economic Well-Being	Additional jobs supported by improving competitiveness	Number of jobs added to the economy as a result of improved transportation conditions which make the region more competitive	Improvement over No Project Baseline	Regional Economic Model REMI
	Additional jobs supported by transportation investment	Total number of jobs supported in the economy as a result of transportation expenditures	Improvement over No Project Baseline	Regional Economic Model REMI
	Net contribution to gross regional product	Gross regional product due to transportation investments and increased competitiveness	Improvement over No Project Baseline	Regional Economic Model REMI
Investment Effectiveness	Benefit/cost ratio	Ratio of monetized user and societal benefits to the agency transportation costs	Greater than 1.0	California Benefit/Cost Model
System Sustainability	Cost per capita to preserve multimodal system to current and state of good repair conditions	Annual costs per capita required to preserve the multimodal system to current conditions	Improvement over Base Year	Estimated using SHOPP Plan and recent California Transportation Commission 10-Year Needs Assessment

Notes:

Performance measures tied to goals for reliability, preservation, productivity, health, energy efficiency, and security cannot currently be reliably forecasted and are not included in Table 5.1. However, SCAG has identified related measures to be used for monitoring purposes, and these are discussed in the Performance Measures technical report.

Performance measures are assessed at the regional level. SCAG encourages, but does not require, agencies to be consistent with the RTP/SCS performance measures to the extent practical in their subregional and project-level planning studies.

Location Efficiency

This is a new outcome for the 2012–2035 RTP/SCS. This outcome has several associated performance measures that reflect the impact of improved land use and transportation coordination in support of the Sustainable Communities Strategies (SCS) required under SB 375.

This outcome reflects the degree to which improved land use and transportation coordination measures impact the efficient movement of people and goods. The measures used to describe this outcome include:

- Share of growth in High-Quality Transit Areas
- Land consumption (total and per capita),
- Average distance for work or non-work trips,
- Percent of work trips less than three miles, and
- Work trip length distribution.

There are several additional measures that will be used for ongoing monitoring, and these will be discussed in the appendix.

SHARE OF GROWTH IN HIGH-QUALITY TRANSIT AREAS (HQTAs)

Between 2008 and 2035, growth in both household and employment in the HQTAs is projected to increase from the Baseline scenario to the Plan scenario. Specifically, the share of growth in households in HQTAs increases from 24 percent under the Baseline to 51 percent under the Plan. During the same period, the share of growth in employment in HQTAs increases from 31 percent under the Baseline to 53 percent under the Plan.

LAND CONSUMPTION

Greenfield land consumption refers to development that occurs on land that has not previously been developed or otherwise impacted, including agricultural land, forest land, desert land, and other virgin sites. As discussed above, the Plan directs more growth into the HQTAs than the Baseline. The vast majority of HQTAs are within the existing urbanized areas. Accordingly, the Plan consumes 408 square miles less “greenfield” land than the Baseline, 334 square miles compared to 742 square miles.

AVERAGE DISTANCE FOR WORK OR NON-WORK TRIPS

The average distance for work trips is projected in 2035 to decrease from 14.8 miles under the Baseline to 14.7 miles under the Plan. The average distance for non-work trips is projected to increase from 7.3 miles under the Baseline to 7.5 miles under the Plan.

PERCENT OF WORK TRIPS LESS THAN THREE MILES

The vast majority of work trips in Southern California have consistently relied on the single-occupant automobile. When the work trip length becomes shorter, particularly within a few miles, it increases the likelihood of using alternative modes such as transit or biking. By 2035, the share of work trips less than three miles is projected to increase from 14.8 percent under the Baseline to 15.4 percent under the Plan, which accounts for effects of landuse and investment in active transportation.

WORK TRIP LENGTH DISTRIBUTION

Under the Plan, more than half (51 percent) of the total work trips are less than 10 miles. Thirteen percent of the total work trips are longer than 25 miles. Additional information on work trip length distribution is provided in the Performance Measures Appendix.

Mobility and Accessibility

In the 1998 California Transportation Plan, this outcome is defined as, “Reaching desired destinations with relative ease within a reasonable time, with reasonable choices.”

In prior RTPs, mobility and accessibility were included as separate outcomes. For the 2012–2035 RTP/SCS, these have been combined into a single outcome with multiple performance measures. This section discusses the mobility and accessibility performance indicators and provides results based on outputs from the SCAG RTDM.

MOBILITY

The mobility performance measure relies on the commonly used measure of delay. Delay is the difference between the actual travel time and the travel time at some predefined reference or “optimal” speed for each mode alternative under analysis. It is measured in vehicle-hours of delay (VHD), which can then be used to derive person-hours of delay. This is a relatively straightforward measure to calculate using real-world and modeled data, is understandable by both transportation professionals and the general public, and can be forecasted for the 2035 future scenarios.

The mobility measures used to evaluate alternatives for this outcome are:

- Person Movement Delay by Facility Type (Mixed Flow, HOV, Arterials),
- Person Delay per Capita, and
- Truck delay by facility (Highway, Arterial).

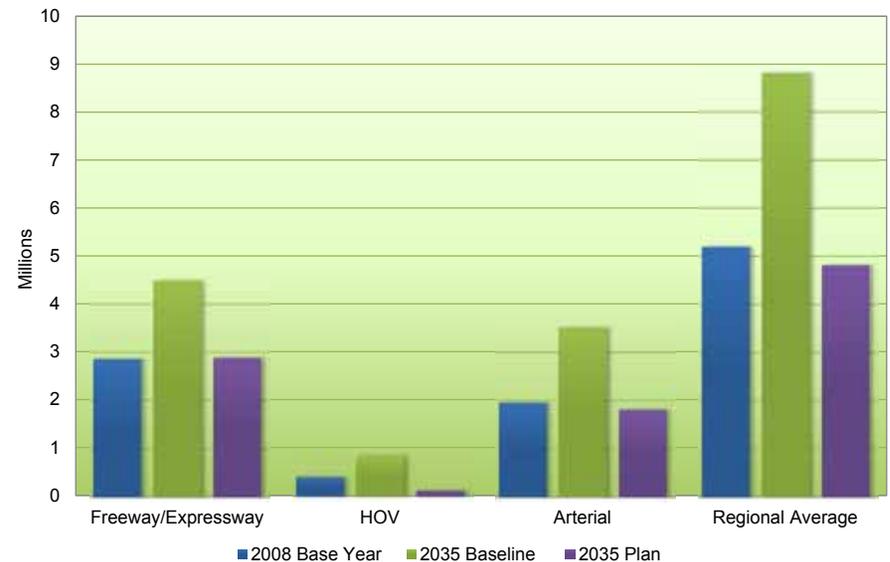
One additional measure for delay that is readily available for ongoing monitoring, but that cannot be readily forecasted, is non-recurrent delay. Recurrent congestion is the day-to-day congestion that occurs because too many vehicles are on the road at the same time. Non-recurrent congestion is the congestion that is caused by accidents, weather, special events, or other atypical incidents.

Non-recurrent congestion can be mitigated or reduced by improving incident management strategies. Other smart uses of technologies such as traffic signal coordination and the provision of real-time information about unexpected delays allow travelers to make better decisions about available transit or other alternatives.

Person Delay by Facility Type (Mixed-Flow Freeways, HOV, Arterials)

For the 2012–2035 RTP/SCS, this measure has been expanded to differentiate between single-occupancy vehicle (SOV) and high-occupancy vehicle (HOV) delay. As shown in **FIGURE 5.1**, person-hours of delay is expected to increase from Base Year to Baseline, but overall the Plan will improve on Baseline conditions by 45 percent, to conditions that are better than what is experienced today.

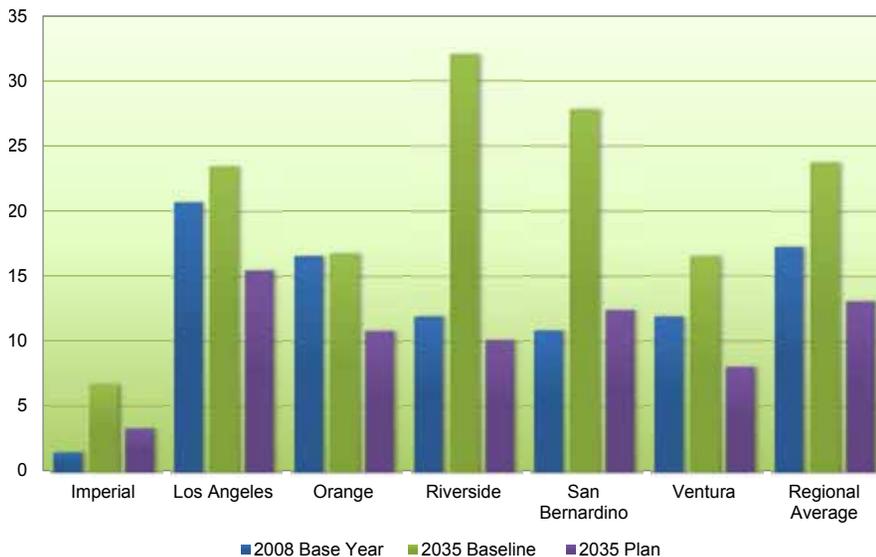
FIGURE 5.1 Daily Person-Hours of Delay by Facility Type



Person Delay per Capita

FIGURE 5.2 shows the person delay per capita for each of the six counties in the region and for the SCAG region as a whole. Normalizing delay by the number of people living in an area provides insight as to how well the region is mitigating traffic congestion in light of increasing population growth. Delay per capita is expected to grow considerably, particularly in the Inland Empire counties of Riverside and San Bernardino, under the Baseline conditions. However, implementation of the Plan is expected to reduce delay substantially, to below 2008 levels. The regional average delay per capita is expected to improve from over 20 minutes under the Baseline to over 10 minutes under the Plan. Not only does this represent a 45 percent improvement over Baseline, but a 24 percent improvement over Base Year as well.

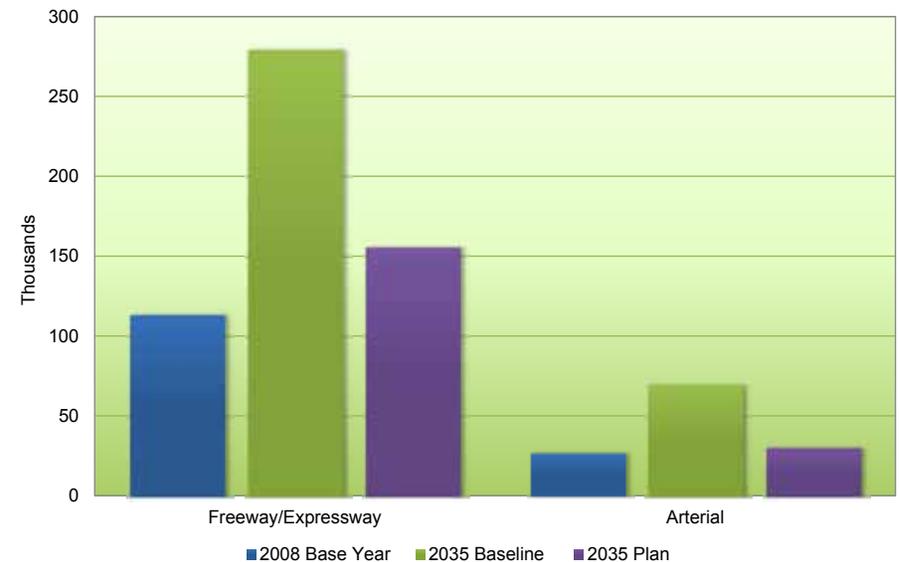
FIGURE 5.2 Daily Person Delay per Capita by County (Minutes)



Truck Delay by Facility Type (Highway, Arterials)

This measure estimates the average daily truck delay by facility type for freeways and arterials (**FIGURE 5.3**). The RTP/SCS includes significant investments in a regional freight corridor and other improvements to facilitate goods movement. The Plan is estimated to reduce truck delay by approximately 40 percent over Baseline on the freeway system and by approximately 55 percent on the arterial system. However, the truck delay under the Plan will still be above Base Year levels.

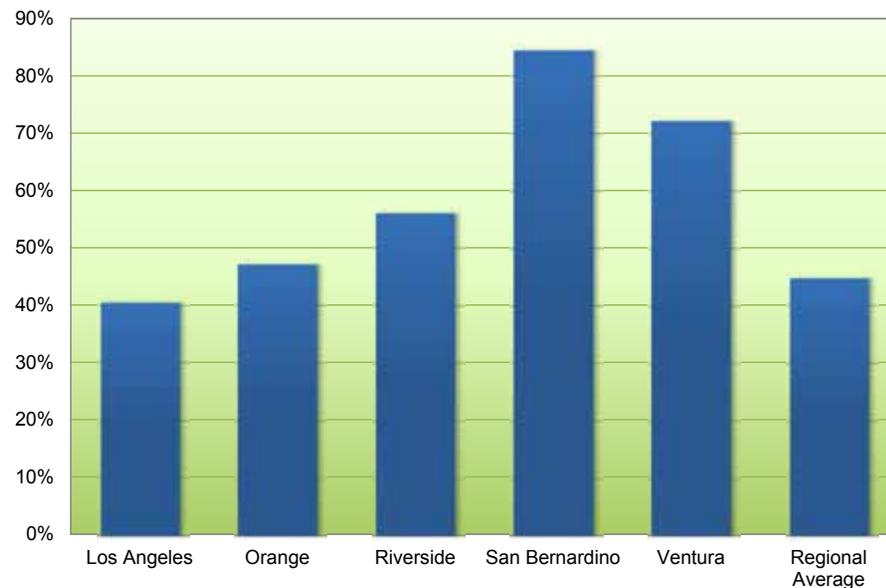
FIGURE 5.3 Daily Heavy-Duty Truck Hours of Delay



Highway Non-Recurrent Delay

This indicator identifies how much congestion can be considered to be atypical. Non-recurrent congestion is the congestion caused by accidents, weather, special events, or other incidents. This type of congestion can be addressed by strategic operational investments such as traveler information, incident management, and ramp metering. **FIGURE 5.4** shows the relative amount of freeway congestion that is estimated to be caused by non-recurrent events. Region-wide, approximately 45 percent of freeway congestion is estimated to be non-recurrent, but this estimate varies widely by county.

FIGURE 5.4 Non-Recurrent Congestion Share by County (2009)



More suburban or rural areas with less overall congestion have a higher percentage of all congestion represented by non-recurring events. San Bernardino County, for example, is estimated to have a majority of its congestion as non-recurrent in 2009. (The actual percentage is likely exaggerated due to the manner in which PeMS handles some data; more research is needed to verify this assessment.) In contrast, the more urbanized Los Angeles County had just over 40 percent of its total congestion represented by non-recurring incidents.

Speed Maps

EXHIBITS 5.1 through **5.3** depict the region's freeway speed conditions during the afternoon peak period (3 pm to 7 pm) based upon the SCAG RTDM results for Base Year 2008, Baseline 2035, and Plan 2035. Additional speed maps are provided in the Highways and Arterials Appendix.

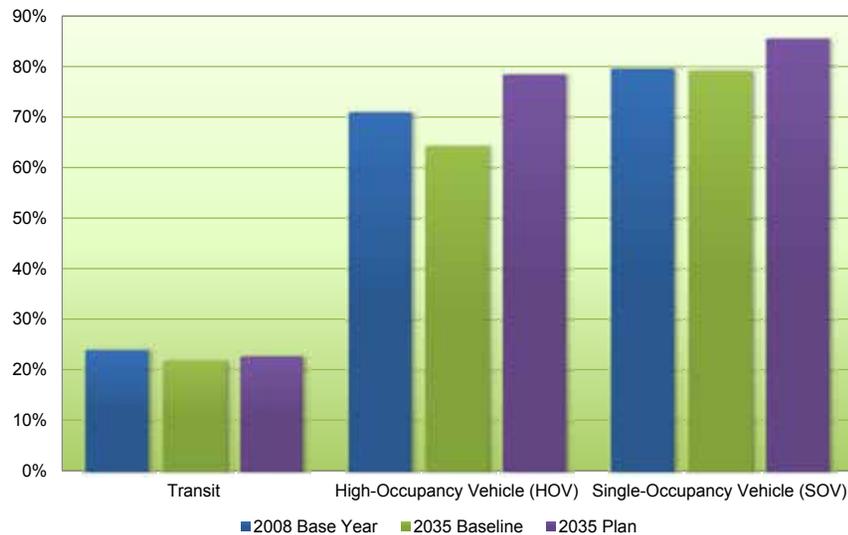
ACCESSIBILITY

Accessibility is used to capture how well the transportation system performs in providing people access to opportunities. Opportunities can include anything from jobs, education, medical care, recreation, shopping, or another activity that helps improve a person's life. For the 2012–2035 RTP/SCS, accessibility is simply defined as the distribution of trips by mode by travel time.

As with the 2008 RTP, accessibility is measured by taking afternoon or PM peak period travel demand model results for the base and forecast years and identifying the percentage of commute or home-based work trips that are completed within 45 minutes.

FIGURE 5.5 shows these results. In all cases, the 2035 Plan improves accessibility for home-based work trips over the baseline.

FIGURE 5.5 Percentage of PM Peak Period Home-Based Work Trips within 45 Minutes



The 2012–2035 RTP/SCS provides a more comprehensive measure of accessibility by including transit and HOV accessibility as well as non-work and work trips in the indicator. Results for the following were added to the 2012–2035 RTP/SCS based upon stakeholder input:

- Distributions of travel time (i.e., not just percentage completed within 45 minutes),
- High-occupancy vehicles (HOV) for each of the three modeled years,
- AM, midday, evening, and night accessibility for each of the three modeled years for all three modes (transit, SOV, and HOV), and
- Non-work trips for each of the three modeled years for all three modes (transit, SOV, and HOV) for all five time periods.

Productivity and Reliability

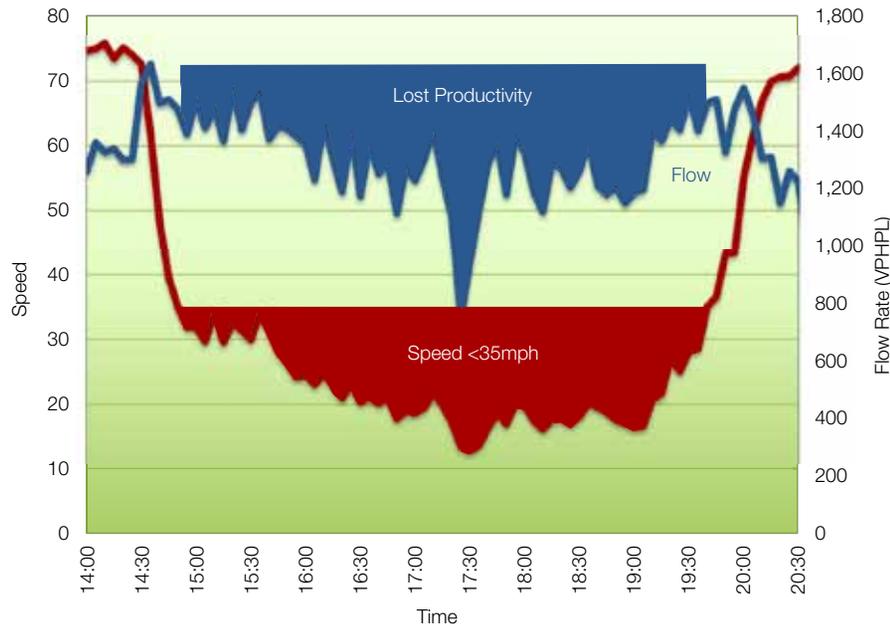
As with the non-recurrent congestion measure described in the previous section, the productivity and reliability outcomes cannot be readily forecasted and are not used for alternatives analysis in the 2012–2035 RTP/SCS. They do, however, provide some guidance on how much benefit can be obtained by regional investments in operational improvements. The productivity and reliability estimates presented here are based in part on Corridor System Management Plans (CSMPs) developed recently in the SCAG region. Productivity and reliability are critical since they reflect the improvements in efficiency and non-recurrent congestion, respectively. SCAG plans to monitor the progress achieved in improving productivity and reliability on a regular basis moving forward.

PRODUCTIVITY

The productivity outcome reflects the degree to which the transportation system performs during peak demand conditions. It is a system efficiency measure. The productivity indicator is defined as the percentage of utilization during peak demand conditions.

For highways, productivity is particularly important because when we need capacity the most, we often get the lowest “production” from our system. On some corridors throughput can decline as much as 50 percent during peak periods, and most congested urban corridors typically lose 25 percent of their capacity during rush hour. This loss of productivity is shown in **FIGURE 5.6**, which depicts how much vehicle throughput declines (i.e., productivity is lost) during rush hour.

FIGURE 5.6 Illustrative Highway Productivity Losses



Source: Caltrans Freeway Performance Measurement System (PeMS) for Los Angeles I-5 southbound; postmile 11.54, Washington Blvd; 10/19/2011; vehicle detector station 716924.

FIGURE 5.7 summarizes the current estimate for productivity losses on the region's freeway system and the expected improvements due to Plan investments. Maximizing the system's productivity is a critical goal of this RTP/SCS, and the overall system management approach aims to recapture lost productivity. The incremental investment of \$6.2 billion to implement advanced operational strategies on our freeways and arterials is projected to recapture 20 percent of the lost productivity. These projections are based on recent studies indicating that investments in ramp metering, arterial signal coordination, traveler information, and incident management can achieve such improvements and more.

FIGURE 5.7 Highway System Productivity (Lost Lane-Miles)

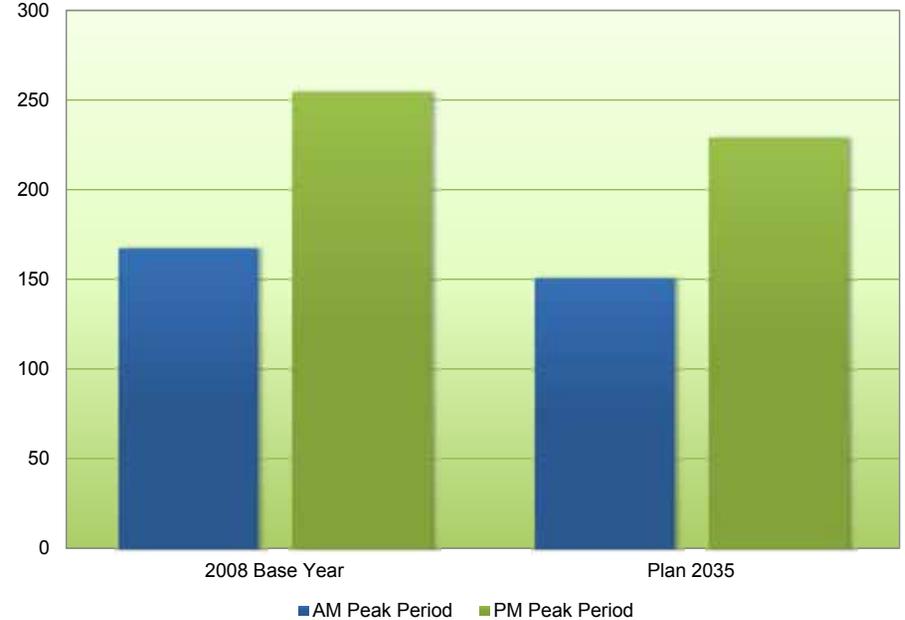
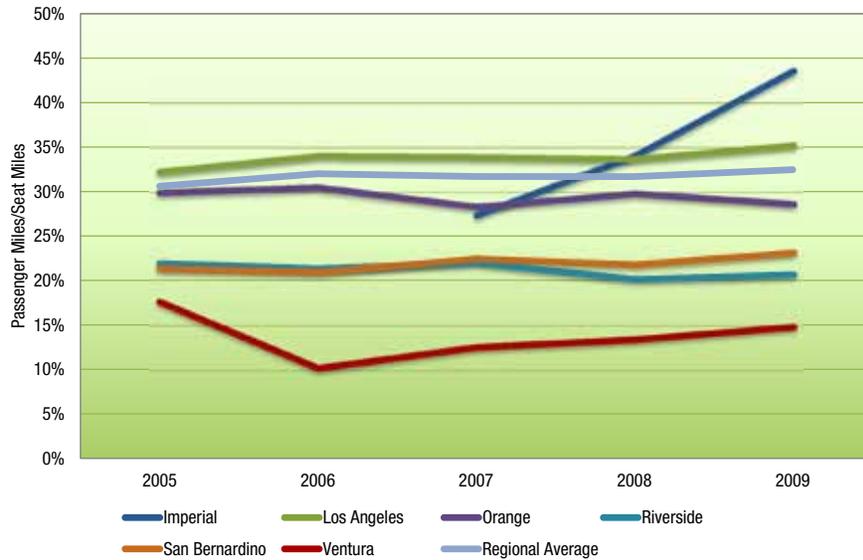


FIGURE 5.8 shows the percentage of transit passenger miles traveled compared to the total number of seat miles provided, a measure of transit productivity.

FIGURE 5.8 Ratio of Transit Passenger Miles/Seat Miles



RELIABILITY

Reliability captures the relative predictability of the public’s travel time. Unlike mobility, which measures how fast the transportation system is moving people and goods, and accessibility, which addresses how much time people must spend traveling in total, reliability focuses on how much mobility and accessibility vary from day to day. This variability is illustrated in **FIGURE 5.9**, where Highway “A” and Highway “B” both have the same average travel time, meaning that they experience the same level of mobility. However, when each day’s travel time is taken into account, one sees that Highway “A” has lower variability than Highway “B.”

FIGURE 5.9 Difference between Reliability and Mobility



Same Mobility (same travel time and delay), but Highway “A” is much more reliable

Reliability is the level of variability in transportation service between the expected travel time and the actual travel time between origin-destination (OD) pairs. Reliability can be calculated by using statistical tools. The standard deviation is one such tool that provides an estimate of how much the travel time on any given day will “deviate” from the average travel time. It provides the probable range of time that a motorist will arrive within his or her scheduled time. Dividing the standard deviation by the average time spent traveling produces the percentage of variability for an OD pair.

Reliability can only be monitored and not forecasted. This is because travel demand models cannot evaluate variations in travel times, but can only estimate average travel times and delay (i.e., mobility). However, **TABLE 5.2** presents the estimated improvements in reliability for three different hours during the day. These improvements are expected as a result of the TSM investments, especially as they relate to incident management. These estimates are based in part on the recently completed Corridor System Management Plans (CSMPs) in the SCAG region.

TABLE 5.2 Estimated Improvements in Reliability

Hour	Average Travel Time (minutes)	Variability of Travel Time	Travel Time Based on Level of Confidence of Arriving on Time (minutes)		
			67%	95%	99%
8:00 AM	23	29%	30	37	43
Noon	20	16%	24	27	30
5:00 PM	27	38%	38	48	59

Safety and Health

The safety outcome for evaluating projects has been carried over from the 2008 RTP, but the 2012–2035 RTP/SCS effort also includes a new health outcome. Safety addresses how well the transportation system minimizes accidents and is measured in fatalities, injuries, and property damage accidents per million vehicle miles by mode.

Safety and health impacts of regional transportation improvements cannot be easily forecasted, but total accidents can show a reduction in future years if people shift from modes with higher accident risk to modes with lower accident risk. Total number of accidents is generally used as the performance measure and can be partially projected by using mode-specific accident rates (e.g., for highways, arterials, transit). This approach is used for the 2012–2035 RTP/SCS, but it is important to note that this approach does not take into account safety improvements for each mode. It just reflects the changes based on modal or facility shifts. It is not possible to forecast this measure by ethnicity or income group. Finally, for monitoring, this measure can be reported historically by time period month and by mode (including for non-motorized transportation), but it cannot be

projected at this level of detail. The safety outcome results are discussed in further detail in the Performance Measures Appendix.

Health is a new outcome for the 2012–2035 RTP/SCS. There are health measures that will be used for ongoing monitoring for the region, but to evaluate alternatives, the health measure will be the tons of pollutants emitted, since these are highly correlated to health problems such as asthma. This measure supports both the Health outcome as well as the Environmental Quality outcome.

Environmental Quality

This outcome is measured in terms of criteria pollutant emissions. Emissions are estimated using the SCAG RTDM results, which are input to the ARB's Emission Factors (EMFAC) model. Pollutant emissions are reported in detail as part of the Transportation Conformity Appendix.

Economic Well-Being

Never before have the crucial linkages and interrelationships between the economy, the regional transportation system, and land use been as important as now. For the first time, the 2012–2035 RTP/SCS includes a significant consideration of the economic impacts and opportunities provided by the transportation infrastructure plan set forth in the RTP/SCS, considering not only the economic and job creation impacts of the direct investment in transportation infrastructure, but also the efficiency gains in terms of worker and business economic productivity and goods movement. The RTP/SCS outlines a transportation infrastructure investment strategy that will beneficially impact Southern California, the state, and the nation in terms of economic development, competitive advantage, and overall competitiveness in the global economy in terms of attracting and retaining employers in the Southern California region.

Implementation of SCAG's RTP/SCS will create or sustain jobs today to build transportation infrastructure projects for tomorrow. SCAG's RTP/SCS totaling more than \$500 billion in transportation investments will put thousands of Southern Californians back to work in much-needed jobs, not only in construction, but in a broad cross-section of industry clusters. Over the twenty-three year period and six-county SCAG region, the plan will generate significant employment. An annual average of 174,500 new jobs will be generated by

construction and operations expenditures that are specified in the RTP program (TABLE 5.3), and the indirect and induced jobs that flow from those expenditures. An additional 354,000 annual jobs will be created by the SCAG region’s increased competitiveness and improved economic performance that will result from congestion reduction and improvements in regional amenities due to implementation of the 2012-2035 RTP/SCS. The rest of the state of California and nation will benefit from spillover impacts of additional accrued jobs.

TABLE 5.3 Employment Impact from Construction and Maintenance Expenditures (Per Year)

	2011– 2015	2016– 2020	2021– 2025	2026– 2030	2031– 2035	Total
Los Angeles	112.2	89.1	90.1	93.4	76.4	92.2
Orange	36.1	34.0	35.5	37.8	32.3	35.1
Riverside	23.5	22.0	25.0	28.0	23.7	24.4
San Bernardino	18.0	15.5	18.5	21.4	18.0	18.3
Ventura	3.8	3.4	3.0	3.6	3.2	3.4
Imperial	0.7	0.7	1.1	1.6	0.9	1.0
	194.4	164.7	173.2	185.7	154.4	174.5

The goods movement, logistics & distribution, tourism, manufacturing, and many other transportation-reliant sectors are heavily dependent on efficient transportation infrastructure and are key Southern California job generators for all six SCAG-region counties. Without making the investments in Southern California’s transportation system outlined in this plan, economic recovery and job creation will be markedly slower throughout the region. Longer term, failure to make sufficient regional transportation investments will cost Southern California economically and the region’s business competitiveness will be at risk.

Investment Effectiveness

The cost-effectiveness outcome indicates the degree to which the Plan’s expenditures generate benefits that transportation users can experience directly. This outcome is important to the public because it describes how the Plan’s transportation investments make productive use of scarce funds.

The benefit/cost ratio is the indicator for the cost-effectiveness outcome, and it compares the incremental benefits to the incremental costs of the modal investments. The benefits are divided into several categories, including:

- Delay savings,
- Air quality improvements, and
- Reductions in vehicle operating costs.

For these categories, travel demand and air quality models are used to estimate the benefits of the Plan compared to the Baseline. Most of these benefits are a function of changes in vehicle miles traveled (VMT) and vehicle hours traveled (VHT). For example, a highway project that increases VMT would negatively impact air quality and vehicle operating costs, while a transit project that decreases VMT would have the opposite effect. Not all impacts are linear, so reductions in congestion can increase or decrease vehicle operating costs and emissions. Delay savings are reflected directly in the VHT statistics.

To estimate the benefit/cost ratio, the benefits in each category are converted into dollars and added together. These are divided by the total incremental costs of the Plan’s transportation improvements to produce a ratio. **FIGURE 5.10** summarizes the results of this analysis.

The investments in the 2012–2035 RTP/SCS provide a return of \$2.90 for every dollar invested. For this analysis, all benefits and costs are expressed in 2011 dollars. Benefits are estimated over the 25-year RTP/SCS planning period from 2011 to 2035. The user benefits are estimated using California’s Cal-B/C benefit/cost framework and incorporate SCAG’s RTDM outputs. The costs include the incremental public expenditures over the entire RTP/SCS planning period.

FIGURE 5.10 Results of Regional Benefit/Cost Analysis

System Sustainability

A transportation system is sustainable if it maintains its overall performance over time with the same costs for its users. Sustainability, therefore, reflects how our decisions today affect future generations. The indicator for sustainability is the total inflation-adjusted cost per capita to maintain overall system performance at current conditions.

The performance measures presented in this chapter show that the planned transportation system in 2035 will perform better compared to today. This RTP/SCS commits itself to maintaining a sustainable system by allocating \$217 billion to maintaining the system in a state of good repair over the period of the plan. This is an average annual per capita investment of more than \$400 per person for each year of the plan period.

RTP/SCS Performance for Co-Benefits

In addition to the transportation performance results discussed above, the RTP/SCS's more focused land pattern, increased investments in transit, and support for communities that foster walk and bike modes as serious transportation options leads to additional benefits in fiscal, economic, environmental, and other quality-of-life performance measures. These results compare the RTP/SCS with a future trend-based scenario that more closely follows the development trends of the past decades. Unlike the RTP/SCS, this trend-based future scenario relies more heavily on growth in undeveloped lands at the edges of cities and beyond and focuses more new housing toward single-family products in suburban patterns. Different from the modeling process used for the mobility-based performance measures, these performance results were derived using the single framework model described in the SCS Background Documentation Appendix.

Better Placemaking

The challenges of traffic congestion and long commutes make the value of including options for better places to live and work even more important. The RTP/SCS focuses over 50 percent of new housing and job growth for 2035 in areas served by high-quality transit, as well as other opportunity areas in existing main streets, downtowns, and along corridors where infrastructure already exists. This more compact land use pattern, combined with the identified transportation network improvements and strategies, results in improved pedestrian and bicycle access to community amenities, lowers average trip length, and reduces vehicle miles traveled. These outcomes not only reduce GHG emissions, but also support the development of more livable communities that provide more housing choices, conserve natural resources, offer transportation options, and promote a better quality of life.

Lower Cost to Taxpayers and Families

LOCAL INFRASTRUCTURE CAPITAL AND OPERATIONS AND MAINTENANCE COSTS

Increased land consumption can lead to higher costs for local and subregional infrastructure, as new development in “greenfield” lands (areas, including agricultural lands,

not previously developed) requires significant capital investments to extend or build new local roads, water and sewer systems, and parks. Conversely, growth focused in urban areas often takes advantage of existing infrastructure and more efficient service to higher concentrations of jobs and housing. This cost difference increases when operations and maintenance (O&M) costs are taken into account. O&M costs include the ongoing city expenditures required to operate and maintain the infrastructure serving new residential growth. More dispersed development, which requires greater lengths of roads and sewer pipes, incurs higher O&M costs to local jurisdictions than more compact development, which capitalizes on shared infrastructure capacity.

The RTP/SCS shows that growth in urban and mixed-use developments in already developed areas can reduce costs significantly, as demonstrated by adding up capital infrastructure and ongoing O&M costs to 2035. If the development trend of the past decades continues, new growth would require \$33.2 billion in capital infrastructure and O&M costs. By contrast, local jurisdictions following the land use pattern included in the RTP/SCS leads to \$27.2 billion in costs, representing a savings of \$6 billion.

LOCAL REVENUES

To determine the RTP/SCS's impact on local revenues, SCAG utilized estimates of potential revenues from property and property transfer taxes, sales taxes, and vehicle license fees generated by new households. By 2035, the RTP/SCS's more compact development generates \$13,800 per acre in local revenues, which is approximately \$4,000 per acre more than a land use pattern of more dispersed development.

HOUSEHOLD COSTS

If the land use patterns of the past decades persist, average household costs associated with driving and residential energy and water use will be up to \$19,000 in 2035. By comparison, the RTP/SCS would cost each household \$16,000. Over time, the differences in annual expenditures would amount to a significant sum for each household, which increases further if the effect of local infrastructure cost burdens, which are typically passed on to homeowners and renters in the form of taxes, fees, home prices, and assessments, is considered.

Benefits to Public Health and the Environment

LAND CONSUMPTION

New land consumption includes all land that will be newly urbanized, including residential and employment areas, roadways, open space, and public lands. Through infill, redevelopment, and more efficient use of new greenfield land to accommodate new growth, a land use pattern with a greater share of urban infill and compact development consumes less land overall. By contrast, a pattern that places a greater share of new growth in dispersed standard development patterns consumes more land. The development trend of the past decades would consume approximately 740 square miles of land, nearly twice as much as the RTP/SCS, which consumes approximately 330 square miles, to accommodate growth through 2035.

BUILDING ENERGY USE

Building energy use is determined by the mix of housing types and the proportion of development in temperate climate zones within the SCAG region. A land use pattern that contains more mixed-use/walkable and urban infill development accommodates a higher proportion of growth in more energy-efficient housing types like townhomes, apartments, and smaller single-family homes, as well as more compact commercial building types. By contrast, a large proportion of standard development leads to a higher proportion of larger single-family homes, which are typically less energy efficient. Location also comes into play—buildings in the warmer areas of the region and beyond use more energy each year, in part because they require more energy to cool during the summer months.

Differences in land use patterns lead to substantial differences in the amount of electricity and natural gas used. These differences will vary depending on policies regulating how efficient buildings become. Assuming the same efficiency standards, the RTP/SCS uses 8 percent less energy per year when compared to a land use pattern that more closely aligns with the past development trend. Additionally, the overall energy savings that come from developing more compactly translate to meaningful savings in residential energy bills. On average, the RTP/SCS saves approximately \$950 million per year in total by 2035, or about \$130 per household.

RESIDENTIAL WATER USE

Variations in land use patterns and their related building profiles also lead to substantial differences in residential water use and cost. Residential water use is a function of both indoor and outdoor water needs, with outdoor use (landscape irrigation) accounting for the majority of the difference among housing types. Because homes with larger yards require more water for landscape irrigation, lot size is generally interrelated with a household's overall water consumption. Thus, a land use pattern with a greater proportion of the standard development, which includes more large-lot single-family homes, requires more water than a land use pattern with a greater proportion of compact and urban infill development, which includes more attached and multifamily homes. And, as is the case for energy use, the location of new development has a significant bearing on water use—homes in warmer areas use more water to maintain lawns and other landscaping.

Water use will vary based on efficiency and conservation policies, which will be increasingly important as California faces future constraints to water supply. Assuming the same modest improvements, the RTP/SCS uses approximately 970 billion gallons of water (6 percent less than a land use pattern based on past development trends). Saving water also saves on costs, and the RTP/SCS saves approximately \$245 million per year in total by 2035.

HEALTH INCIDENCES AND COSTS

Auto-related air pollution contributes to a spectrum of health incidences, including cases of chronic bronchitis; respiratory and cardiovascular hospitalizations; respiratory-related ER visits; acute bronchitis; work loss days; premature mortality; asthma exacerbation; and acute, lower, and upper respiratory symptoms. Using research-based rates and valuations produced by the American Lung Association, the RTP/SCS results in a 24 percent reduction in total health incidences and saves over \$1.5 billion per year in total costs.

Greater Responsiveness to Demographics and the Changing Housing Market

There is little question that the demographic profile of Southern California is changing, resulting in different housing and transportation needs. The traditional suburban development pattern that characterizes most of the region is still appropriate for many residents and homeowners, but the increasing demand for small-lot and multifamily housing, walkable and bikeable environments, and shorter commutes calls for more varied housing options located in more compact developments.

The RTP/SCS responds to this emerging need through an overall land use pattern that focuses new housing growth in urban centers served by various transportation options, including high-quality transit and active transportation. Approximately 70 percent of this new housing will be multifamily products.

Environmental Justice

Title VI and Environmental Justice Overview

The concept of Environmental Justice is about equal and fair access to a healthy environment, with the goal of protecting underrepresented and poorer communities from incurring disproportionate negative environmental impacts. Consideration of Environmental Justice in the transportation planning process stems from Title VI of the Civil Rights Act of 1964 (Title VI). Title VI establishes the need for transportation agencies to disclose to the public the benefits and burdens of proposed projects on minority populations. The understanding of civil rights has expanded to include low-income communities, as further described below. Title VI states that “No person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance.” Additionally, Title VI not only bars intentional discrimination, but also unjustified disparate impact discrimination. Disparate impacts result from policies and practices that are neutral on their face (i.e., there is no evidence of intentional discrimination), but have the effect of discrimination on protected groups.

A 1994 Presidential Order (Executive Order 12898) directed every federal agency to make Environmental Justice part of its mission by identifying and addressing the effects of all programs, policies, and activities on underrepresented groups and low-income populations. Reinforcing Title VI, this Presidential Order ensures that every federally funded project nationwide considers the human environment when undertaking the planning and decision-making process. The Presidential memorandum accompanying E.O. 12898 identified Title VI as one of several federal laws that should be applied “to prevent minority communities and low-income communities from being subject to disproportionately high and adverse environmental effects.” Given the overlap in Title VI and Environmental Justice policies, this report will use the term “Environmental Justice” as an inclusive term to mean minority and low-income populations.¹

In addition to federal requirements, SCAG must comply with California Government Code Section 11135, which states that “no person in the State of California shall, on the basis of race, national origin, ethnic group identification, religion, age, sex, sexual orientation, color, or disability, be unlawfully denied full and equal access to the benefits of, or be unlawfully subjected to discrimination under, any program or activity that is conducted, operated, or administered by the state or by any state agency, is funded directly by the state, or receives any financial assistance from the state.”

The State of California also provides guidance for those involved in transportation decision-making to address Environmental Justice. In 2003, Caltrans published the *Desk Guide on Environmental Justice in Transportation Planning and Investments* to provide information and examples of ways to promote Environmental Justice. The *Desk Guide* identified requirements for public agencies, guidance on impact analyses, recommendations for public involvement, and mitigation.

Major Environmental Justice Issues in the Region

The SCAG region is experiencing major challenges to quality of life and affordability. For example, the region’s residents have a high cost burden, with 45 percent of owner-occupied households and 54 percent of renter-occupied households spending 30 percent or more of their incomes on housing. In the SCAG region, less than 55 percent of households own their homes, a 2 percentage point decline from 2007 and 11 percent below the national average for homeownership (66 percent). There were 8.1 million renters in the region in 2009.²

In general, housing is considered affordable if it costs 30 percent or less of a household’s income. However, a more refined indicator called the Housing + Transportation Affordability Index was developed by the Center for Neighborhood Technology to better gauge the true cost of housing based on its location. Based on this index, 67 percent of households in the SCAG region spend 45 percent or more of their incomes on housing and transportation, among the highest percentages in the nation.³

The poverty rate in the SCAG region stands at 15 percent, with 2.6 million residents living in poverty. This is 3 percentage points higher than the national average. In 2009, per capita income was \$42,784, which is about \$17,000 less than that in the San Francisco Bay Area. Adding to the high poverty rate, real average wages (adjusted for inflation) have been stagnant for a decade. Further, for the past three years the SCAG region has experienced unemployment rates over 12 percent, about 3 percentage points higher than the national average. The lower income levels are associated in part with the educational attainment levels in the region. Only 25 percent of adults have a bachelor’s degree or higher in the SCAG region, compared to almost 40 percent in the San Francisco Bay Area. In Riverside and San Bernardino Counties, 17 percent of adults have a bachelor’s degree or higher. In Imperial County, only 12 percent of adults have a bachelor’s degree or higher.⁴

Additional environmental concerns include exposure to toxic pollutants and obesity levels. Exposure to air pollutants is an Environmental Justice issue due to the disproportionate

¹ See Title VI Legal Manual, U.S. Department of Justice Civil Rights Division (2001), page 59.

² U.S. Census. American Community Survey. 2009.

³ Center for Neighborhood Technology. Housing and Transportation Affordability Index. Last accessed October 15, 2011, from <http://htaindex.cnt.org/>.

⁴ U.S. Census. American Community Survey. 2009.

share of minority and low-income populations living in close proximity to heavily traveled corridors, particularly near port and logistics activity. This exposure to unhealthy air results in 5,000 premature deaths and 140,000 children with asthma and respiratory symptoms. More than half of Americans exposed to PM_{2.5} pollution exceeding the national standard reside in the SCAG region.⁵ Additionally, populations living in areas without access to parks, safe walking environments, and fresh food have a greater prevalence of obesity and associated ailments such as diabetes.⁶ Although the SCAG region's level of obesity (24 percent) is lower than the national average of 33.8 percent, there are still disparities among racial groups, based on data from the CDC. For example, the prevalence of obesity among non-Hispanic White women is 33 percent, whereas the obesity rates among non-Hispanic Black women and Mexican American women is 49.6 percent and 45.1 percent, respectively.⁷ This raises policy questions about the opportunities for physical activity, access to healthy foods, and safety.

SCAG's Title VI and Environmental Justice Policy & Program

As a government agency that receives federal funding, SCAG is required to conduct an Environmental Justice analysis for its RTP. SCAG's Environmental Justice program includes two main elements: technical analysis and public outreach. Specifically, it is SCAG's role to ensure that when transportation decisions are made, low-income and minority communities have ample opportunity to participate in the decision-making process and that they receive an equitable distribution of benefits and not a disproportionate share of burdens.

SCAG adheres to all directives on Environmental Justice. The Environmental Justice movement stems from Title VI of the Civil Rights Act of 1964. Title VI of the Civil Rights Act of 1964 provides one very significant means by which the public can seek greater accountability from transportation agencies. Title VI states that "No person in the United States shall, on the ground of race, color, or national origin, be excluded from

participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance."

Under federal policy, all federal agencies must make Environmental Justice part of their mission and adhere to three fundamental Title VI/Environmental Justice principles:

- To avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations.
- To ensure the full and fair participation by all potentially affected communities in the transportation decision-making process.
- To prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations.

In the 1990s, the federal executive branch issued orders on Environmental Justice that amplified Title VI, in part by providing protections on the basis of income as well as race. These included President Clinton's Executive Order 12898 (1994) and subsequent U.S. Department of Transportation (DOT) and Federal Highway Administration orders (1997 and 1998, respectively), along with a 1999 DOT guidance memorandum.

On August 4, 2011, seventeen federal agencies signed the "Memorandum of Understanding on Environmental Justice and Executive Order 12898." The signatories, including the U.S. Department of Transportation (DOT), agreed to develop Environmental Justice strategies to protect the health of people living in communities overburdened by pollution and provide the public with annual progress reports on their efforts. The MOU advances agency responsibilities outlined in 1994 Executive Order 12898 and directs each of the federal agencies to make Environmental Justice part of its mission and to work with other agencies on Environmental Justice issues as members of the Interagency Working Group on Environmental Justice.

In response to this MOU, the DOT revised its Environmental Justice Strategy. The revisions reinforce the DOT's programs and policies related to Environmental Justice and strengthen its efforts to outreach to minority and low-income populations. Further, on September 29, 2011, the Federal Transit Authority issued two proposed circulars on Title VI and Environmental Justice to clarify the requirements and offer guidance. FTA Circular 4702.1A, Title VI Requirements and Guidelines for Federal Transit Administration Recipients (Docket No. FTA-2011-0054), provides information required in the Title VI

⁵ California Air Resources Board, South Coast Air Quality Management District, and Southern California Association of Governments. *Powering the Future*. August 2011.

⁶ Sonia Caprio, MD, et.al. *Diabetes Care* November 2008 vol. 31 no. 11 2211–2221

⁷ Centers for Disease Control and Prevention: National Diabetes Surveillance System. Last accessed October 18, 2011, from <http://apps.nccd.cdc.gov/DDTSTRS/default.aspx> and Centers for Disease Control and Prevention. *Prevalence of Overweight, Obesity, and Extreme Obesity Among Adults: United States, Trends 1960–1962 through 2007–2008*. June 2010.

Program, proposes changing the reporting requirement from every four years to every three years, and adds a requirement for mapping and charts to analyze the impacts of the distribution of state and federal public transportation funds. SCAG has reviewed the proposed Circulars as additional guidance for the development of the RTP/SCS. The FTA Circular 4703.1, Environmental Justice Policy Guidance for Federal Transit Administration Recipients (Docket number FTA-2011-0055), provides recommendations to MPOs (and other recipients of FTA funds) on how to fully engage Environmental Justice populations in the public transportation decision-making process; how to determine whether Environmental Justice populations would be subjected to disproportionately high and adverse human health or environmental effects as a result of a transportation plan, project, or activity; and how to avoid, minimize, or mitigate these effects. The proposed Environmental Justice Circular does not contain any new requirements, policies, or directives. Nonetheless, SCAG complies with the framework provided to integrate the principles of Environmental Justice into our decision-making processes.

Finally, under Senate Bill 375 (SB 375), SCAG is required to include a Sustainable Communities Strategy within the RTP/SCS. The RTP/SCS represents the collective vision of the six counties in the SCAG region and provides a framework for the future development of our regional transportation system. Through SB 375, the California Air Resources Board (ARB) established per capita targets for GHG reduction for cars and light trucks for the SCS. The targets for the SCAG region are 8 percent in 2020 and 13 percent in 2035, from 2005 levels. As part of the early target-setting process, the ARB appointed a Regional Target Advisory Committee (RTAC) to recommend factors to be considered and methodologies to be used for setting the targets. The RTAC report was finalized in September 2009 and included a recommendation on housing and social equity. The report recognized the impact policies to reduce Vehicle Miles Traveled (VMT) could have on social equity, specifically calling for appropriately located affordable housing match local wage levels. The RTAC further recommended that displacement and gentrification, as a result of changing land uses and increased housing costs, should be addressed and specifically avoided to the extent possible in the SCS. As a result of this recommendation and input from our Environmental Justice stakeholders, SCAG has updated its methodology to include new areas of analysis, including gentrification and displacement.

SCAG's Title VI and Environmental Justice Outreach

A key component of the RTP/SCS development process is seeking public participation. Public input from our Environmental Justice stakeholders helped SCAG prioritize and address needs in the region. As part of the Environmental Justice outreach effort, SCAG compiled a list of key stakeholders to be contacted regarding RTP/SCS programs and policies. This list is comprised of over 300 individuals and organizations involved with the 2008 RTP as well as additional stakeholders, such as the South Coast Air Quality Management District's (SCAQMD) Environmental Justice Working Group, which included new groups such as local community advocates, air quality interest groups, and unions. SCAG maintains this list regularly and allows interested persons to sign up online for the mailing list.

SCAG held two Environmental Justice workshops and convened focus groups on the Environmental Justice analysis to ensure that all members of the public have an opportunity to participate meaningfully in the planning process. All the workshops were properly noticed and advertised. A majority of the region's Environmental Justice organizations were represented at both workshops. In addition to the special Environmental Justice workshops, SCAG held a workshop for Resource Agencies during development of the RTP/SCS, where Environmental Justice was a primary focus. Furthermore, Environmental Justice stakeholders have been involved throughout the planning process. On June 24, 2010, SCAG held a workshop to review the planning process and familiarize the participants with the Environmental Justice analysis process. The workshop drew representatives of all major Environmental Justice groups from throughout the region, with video conferencing made available from SCAG's regional offices. Attendance totaled 37 participants.

The following is a summary of the main topics discussed at the workshop:

- SCAG was requested to conduct a presentation on SCAG's modeling process,
- The Environmental Justice analysis should include baseline data of major issues facing the region,
- Public health was identified as a topic that should be further analyzed,
- SCAG was requested to include the housing plus transportation affordability index in its analysis, and

- Gentrification needs to be addressed, particularly with SB 375’s emphasis on transit-oriented development.

As a result of these workshops, SCAG determined that new analysis areas were necessary to capture the concerns raised by our stakeholders. These new areas are discussed in greater depth below, but include impacts from rail transportation, gentrification and displacement, pollution exposure along heavily traveled corridors, and impacts from revenue-generating mechanisms such as congestion pricing.

On June 30, 2011, SCAG held a follow-up workshop to discuss the proposed new analysis areas with our stakeholders and seek further input. In response to comments from the first workshop, SCAG also included a summary of the modeling process. This workshop drew 45 participants from all six regional offices.

The participants provided thoughtful comments and feedback on SCAG’s proposed analysis and planning process, including:

- PM_{2.5} should be analyzed in the Environmental Justice report,
- The Environmental Justice community should be included early in the decision-making processes and advisory committees,
- The report should identify communities of concern and compare those areas with the location of investments,
- SCAG should produce maps that show long-range trip projections compared to system capacity,
- Housing should be included in the performance measures, including housing/jobs fit (costs vs. wages), and
- The impacts of freight movement should be analyzed and mitigated.

In response to comments made at the workshop, SCAG followed up by organizing focused meetings to further discuss the methodology and ensure it addressed the concerns raised by Environmental Justice stakeholders. Also, participants were urged to attend subsequent public workshops. Many of those who attended the Environmental Justice workshops did attend the RTP/SCS workshops. Furthermore, to address the comments made during SCAG’s workshops, the Environmental Justice analysis will be updated from prior cycles as follows:

- Focus more on non-motorized transportation,
- Identify and quantify the primary Environmental Justice challenges in transportation in the region, including the development of a baseline for key issues such as poverty, exposure to pollutants, and concentration of pollutants,
- Bring public health to the forefront—focus on pollutants and cancer concentration in communities of concern,
- Begin to analyze potential gentrification impacts from urban infill and transit-oriented development, and
- Provide an Environmental Justice mitigation toolbox with recommended mitigation measures for subsequent projects.

Technical Analysis

SCAG has been recognized for its technical approach to understanding the benefits and burdens in our regional plan. Each planning cycle presents new and emerging concerns for the region to address. For example, in the 2008 RTP, SCAG analyzed accessibility to public parks, including the distribution of parks by income and park accessibility by travel mode and income. In keeping with the trend of developing robust environmental analyses, the current RTP/SCS analyzes impacts from rail transport, exposure to pollutants along heavily traveled corridors, gentrification and displacement, and impacts from revenue-generating mechanisms such as a VMT fee. As with previous RTPs, the goal of the 2012–2035 RTP/SCS is to ensure that when transportation decisions are made, low-income and minority communities have ample opportunity to participate in the decision-making process and receive an equitable distribution of benefits and not a disproportionate share of burdens.

IDENTIFYING DEMOGRAPHIC GROUPS

Executive Order 12898 and the DOT and FHWA Orders on Environmental Justice define “minority” as persons belonging to any of the following groups, as well as “other” categories that are based on self-identification of individuals in the U.S. Census:⁸ Black, Hispanic, Asian, and American Indian and Alaskan Native. SCAG bases its analysis on

⁸ Department of Transportation, Federal Highway Administration. Environmental Justice Emerging Trends and Best Practices Guidebook, Document Number: FHWA-HEP-11-024. August 2011.

the latest census data for ethnic/racial groups in the SCAG region by census tract and by transportation analysis zone (TAZ).

Identifying low-income and minority populations is necessary both for conducting effective public participation and for assessing the distribution of benefits and burdens of transportation plans and projects. For the purposes of this analysis, SCAG focused on all low-income groups and minority populations. The minority population in the SCAG region comprises 65 percent of the total population. The predominant minority groups are Hispanics and Asian/Pacific Islanders, which combine to account for over 50 percent of the total minority population within the SCAG region.

Poverty level is a federally established income guideline used to define persons who are economically disadvantaged as defined by the U.S. Department of Health & Human Services guidelines.⁹ The poverty level applicable to the SCAG region is chosen on the basis of regional average household size for the census year. For example, for a regional mean of 2.98 persons—rounded to 3—per household, the threshold would consist of the sum of the value for the first person plus two additional people. The household counts in each income range are then used to determine the number and percentage of households in each census tract below the poverty level. In 2010, a family of three earning less than \$17,374 was classified as living in poverty.¹⁰

In addition to complying with federal guidance, SCAG also conducts income equity analyses based on five income quintiles. A quintile, by definition, is a category into which 20 percent of the ranked population falls. For each new analysis, SCAG defines regional income quintiles based on the most recent census data on household income. Once the income quintiles are established, the incidence of benefits and costs can be estimated and compared across these income categories. **TABLE 5.4** lists the demographic categories used in SCAG’s Environmental Justice analysis.

TABLE 5.4 Demographic and Economic Categories

Ethnic/Racial/Other Categories (persons)	Income Categories (Households)
White (Non-Hispanic)	Below Poverty Level
African-American	Income Quintile 1 (lowest)
American Indian	Income Quintile 2
Asian/Pacific Islander	Income Quintile 3
Hispanic (Latino)	Income Quintile 4
Other Racial Categories	Income Quintile 5
Disabled/Mobility Limited	
Age 65 and Above	
Non-English speaking	
Individuals without High School Diploma	
Households without a car	
Foreign-Born Population	
Young Children 5 and Under (Provided in Additional Analysis/Data)	
Sensitive Receptors: Hospitals, Daycare Facilities, Schools, Senior Centers, Parks/Open Space	

Plan versus Baseline

As with the other performance outcomes presented in this chapter, the comparison of the Plan versus Baseline is the primary focus of the Environmental Justice analysis for the 2012–2035 RTP/SCS. The Plan represents the selected strategy to guide the region’s transportation planning over the next few decades, while the Baseline represents “business as usual” and assumes current land use trends and the completion of projects programmed in the 2011 Federal Transportation Improvement Program (FTIP) that have received environmental clearance. The data for the analysis is based on the SCAG RTDM results.

⁹ Department of Transportation, Federal Highway Administration. Environmental Justice Emerging Trends and Best Practices Guidebook, Document Number: FHWA-HEP-11-024. August 2011.

¹⁰ Weighted average threshold. U.S. Census Bureau. Poverty Thresholds. Last accessed October 14, 2011 from <http://www.census.gov/hhes/www/poverty/data/threshld/index.html>.

PERFORMANCE MEASURES

In the development of this report, SCAG identified eleven performance measures to analyze existing social and environmental equity in the region and to address the impacts of the 2012–2035 RTP/SCS on various Environmental Justice population groups. Detailed analysis is presented for the following eleven performance measures:

1. 2012–2035 RTP/SCS Revenue Sources In Terms of Tax Burdens
2. Share of Transportation System Usage
3. 2012–2035 RTP/SCS Investments
4. Impacts of Proposed VMT Fees
5. Distribution of Travel Time and Travel Distance Savings
6. Jobs-Housing Imbalance or Jobs-Housing Mismatch
7. Accessibility to Employment and Services
8. Accessibility to Parks
9. Gentrification and Displacement
10. Environmental Impact Analyses (Air, Health, Noise)
 - a. Air Quality and Health Impacts
 - Historic Performance At the Regional Level
 - Environmental Impacts along Freeways and Highly Traveled Corridors
 - Environmental impacts of Plan and Baseline Scenarios
 - b. Noise impacts
 - Aviation
 - Roadway
11. Rail-Related Impacts

The following section summarizes the findings for each of the eleven performance measures analyzed as part of the Environmental Justice Report. The full results can be found in the Environmental Justice Appendix.

Performance Measure 1: 2012–2035 RTP/SCS Revenue Sources in Terms of Tax Burdens

Different funding sources (i.e., income taxes, property taxes, sales, fuel, etc.) can impose disproportionate burdens on lower-income and minority groups. Sales and gasoline taxes, which are the primary sources of funding for the region’s transportation system, were evaluated for the purposes of this analysis. The amount of taxes paid was analyzed to demonstrate how tax burdens fall on various demographic groups. As in previous RTP Environmental Justice Reports, the 2012–2035 RTP/SCS Environmental Justice analysis examined in detail the incidence or distribution of, the burden of taxation.

The 2012–2035 RTP/SCS Environmental Justice analysis performed a comparative examination of the amount of taxes (sales, gasoline, and income) paid by the five respective income groups and by ethnicity. The analysis indicates that taxes paid as a percentage of each group’s disposable income puts the heaviest burden on lower-income groups. This is the so-called “regressive” nature of the excise gasoline tax and retail sales tax levy on primarily consumer durable and non-durables that are necessities of daily living. The lower quintile groups (Quintile 1 and Quintile 2) are anticipated to pay 38.7 percent and 9.9 percent of their gross adjusted income on regional sales and gasoline taxes, respectively. By comparison, the higher quintile groups (Quintile 4 and 5) are anticipated to pay 6.6 percent and 3.0 percent of their income on all regional sales and gasoline taxes, respectively. Although the lower income quintile groups pay a larger percentage of their income on taxes than other quintiles, their contribution of the total share of sales and gasoline taxes is the smallest of the group at 8.4 percent for Quintile 1 and 12.8 percent for Quintile 2. Quintile 4 and Quintile 5, in contrast, pay 23.4 percent and 37.7 percent of the total sales and gasoline taxes in the region. Thus, those with limited financial means will not pay a disproportionate amount of overall taxes under the Plan compared with their usage of the transportation system and their shares of RTP/SCS investment.

The analysis indicates that tax burdens are expected to fall more heavily on non-minority groups, with non-Hispanic Whites paying 48.8 percent of the income taxes and 40.8 percent of the retail and gasoline tax.

Performance Measure 2: Share of Transportation System Usage

In order to determine the existing level of system usage, SCAG analyzed the 2010 National Household Travel Survey (NHTS). The NHTS is a household-based travel survey conducted periodically by the Federal Highway Administration (FHWA). The NHTS is the authoritative source of national data on the travel behavior of the American public.

SCAG then analyzed the transportation system usage by mode by race/ethnicity and income quintile. The data show that most bus and urban rail riders are lower-income quintile households—the lowest two income quintile households combined account for 84 percent of bus riders and 93 percent of urban rail riders. By ethnicity, Hispanics use disproportionately more bus, urban rail, and pedestrian facilities than their share of total households or population, while non-Hispanic Whites use disproportionately more auto and bike modes, similar to their mode usage for work trips.

Performance Measure 3: 2012–2035 RTP/SCS Investments

One of the most prominent Environmental Justice issues is the transportation investment strategy, which can impact the transportation choices of low-income and minority communities. A disproportionate allocation of resources for various transit investments can indicate a pattern of discrimination.

As a regional MPO, SCAG aims to identify and address Title VI of the Civil Rights Act and the Environmental Justice implications of its planning processes and investment decisions. This analysis intends to determine where the 2012–2035 RTP/SCS is putting its investments and will evaluate whether resources are being allocated equitably. The 2012–2035 RTP/SCS utilized a benefit assessment method that considered to what extent various socioeconomic groups were receiving value from existing and funded transportation investments. SCAG compared the total share of transportation funding borne by low-income households against other income groups. In this analysis, SCAG reported expenditure distribution in several ways. First, SCAG estimated the share of total RTP/SCS expenditures allocated to each category of household income. This was done by totaling expenditures on each type of mode (bus, HOV lanes, commuter/high-speed rail, highways/arterials, and light/heavy rail). These expenditures were then allocated to income categories based on each income group's use-share of these modes.

The results in the 2012–2035 RTP/SCS revealed that approximately 25 percent of Plan investments will be allocated to the lowest quintile group (compared with the group system usage of just under 17 percent), while 19 percent will be invested for the highest income category (Quintile 5), with total transportation system usage of almost 25 percent. In other words, transportation investments would go to modes likeliest to be used by lower-income households.

The current analysis for the 2012–2035 RTP/SCS further reveals that Plan investments will be distributed equitably on the basis of system usage by ethnic/racial groups. The full analysis is available in the Environmental Justice Appendix.

Performance Measure 4: Impacts of Proposed VMT Fees

This is a new analysis area based on the finance strategy in the 2012–2035 RTP/SCS, which recommends a vehicle mile traveled (VMT)–based user fee. This VMT user fee would be implemented to replace the gasoline tax and is estimated to cost about \$0.05 (in 2011 dollars) per mile and indexed to maintain purchasing power starting in 2025. The implementation of this strategy requires actions of both the State Legislature and Congress.

This section discusses the land use impact from the “VMT fee” scenario. This is a cursory analysis using SCAG's PECAS land use model. To parameterize the VMT fee scenario for a model run, the following assumptions were applied:

- Current gasoline tax, \$0.364 per gallon, would gradually increase until 2025 to \$0.50 per gallon.
- After then, a \$0.05 per mile of VMT fee would replace the gasoline tax at year 2026.
- Relative to the Production, Exchange, and Consumption Allocation System (PECAS) model's base year, 2007, the travel cost would be 10 percent higher at year 2025 than in 2007. Between 2008 and 2024, this cost increase is linear. At year 2026, the travel cost would be 20 percent higher than in 2007 and thereafter stabilized.

In general, the results suggest that with higher travel costs region-wide as reflected in the VMT-based user fees, people and households will tend to move to nearby local centers where accessibility to job opportunities is plentiful, so as to offset the impacts from an increase in travel costs. On the other hand, employers will relocate to key

locations to better align themselves with the newly emerging concentration of workers and households.

Performance Measure 5: Distribution of Travel Time and Travel Distance Savings

SCAG assessed both the distribution of travel time and distance savings that are expected to result from the implementation of the 2012–2035 RTP/SCS by analyzing demographic data and the associated mode usage statistics for each Transportation Analysis Zone (TAZ) in the region. With this input, an estimate for the time savings for each income and ethnic group can be identified for trips involving transit (i.e., local bus and all transit) and automobiles.

The analysis resulted in the following observations:

- Share of travel times savings by income groups are generally consistent with the mode usage for each income group. Higher-income quintile groups captured more savings in person-hours traveled proportionally to their relative higher usage of auto mode. On the other hand, lower-income groups received more benefits from transit-related time savings for their higher usage in the transit mode.
- Similarly, person-mile travel changes are also in line with usage by income groups in terms of auto mode.
- The outcomes for share of travel time savings and person-mile benefits by ethnic groups are also very balanced and in line with each ethnic group’s use of the transportation system.
- In terms of relative improvements by income/ethnicity group, lower-income quintile groups received greater improvements in person-mile travel reductions and local bus travel time savings than higher-income groups and about the same level of improvement in person-hour savings as higher-income households. Alternatively, higher-income households enjoyed a moderately better improvement in all transit mode time savings.
- The improvements in mobility and person-mile travel benefits are fairly similar and close for all ethnic groups.

Performance Measure 6: Jobs-Housing Imbalance or Job Housing Mismatch

In the practice of urban and transportation planning, the subject of job-housing imbalance and job-housing mismatch is considered a key contributor to traffic congestion and, some argue, an impediment to Environmental Justice. Among the arguments:

- Workers are priced out of the job rich areas, which makes long-distance travel and congestion inevitable for many
- Coastal counties have not built enough housing, forcing workers to move to inland counties where housing is affordable. This results in long distance commuting and traffic congestion

While this analysis is not expecting to allay all concerns of the jobs-housing imbalance and/or jobs-housing mismatch, the statistics are provided to investigate socioeconomic profiles of long-distance commuters—defined here as “intercounty commuters—such that stakeholders and policymakers can better understand the demographic composition of long-distance commuters.

From an economic point of view, transportation and driving are expensive; workers without a car or people with less income who cannot afford a vehicle have to either live close to their jobs where they can have access to transit or can walk or bike. Moreover, since long-distance commuting is expensive, people do not partake in it unless subsidies exist to own a dependable vehicle, access is available to relatively fast and cheap transit, or they have a good-paying job.

The statistics indicate that, almost without exception, all intercounty commuters command much higher wages than those commuters who work and live in the same county. Those commuters also command wages higher than workers who work and reside in their destination work counties. From an Environmental Justice perspective, this research does not provide definitive results. Rather, it raises additional questions that

could be investigated to better understand how jobs, workers, housing, and associated income distribution could impact travel patterns of low income and minority populations.

Performance Measure 7: Accessibility to Employment and Services

Accessibility is a foundation for social and economic interactions. As an indicator, accessibility is measured by the spatial distribution of potential destinations; the ease of reaching each destination; and the magnitude, quality and character of the activities at the destination sites. Travel costs are central: The lower the costs of travel, in terms of time and money, the more places that can be reached within a certain budget and thus, the greater the accessibility. Destination choice is equally crucial: The more destinations and the more varied the destinations, the higher the level of accessibility.

Job and shopping accessibility calculations are presented in the Environmental Justice Appendix. Summary highlights from the analysis include the following:

- The elderly population showed only above average accessibility to job opportunity by auto; all other measures come out slightly below average for both job and shopping accessibility. As mentioned earlier, staff plan to research and further study residential location and land uses in the surrounding areas for this population group, in particular because the region is facing an aging population in the next 20–25 years.
- In general, lower-income quintile households and populations below poverty all showed higher job and shopping accessibility in Base Year 2008 under every transportation mode.
- As in the case of distance-based accessibility, non-Hispanic Native Americans and non-Hispanic other, similar to non-Hispanic White, are below average in both job and shopping accessibility.
- Nonetheless, through the implementation of recommended strategies in the 2012–2035 RTP/SCS, the elderly, non-Hispanic Native Americans, and non-Hispanic others will experience greater improvements than the average population in both employment and shopping opportunities.

Performance Measure 8: Accessibility to Parks

Similar to the method in measuring job accessibility, park accessibility is defined as the percentage of park acreage reachable within 45-minute travel time via 1) automobile;

2) local bus; and 3) all transit options. SCAG's existing typical weekday model was utilized for the analysis, as there is currently no weekend transportation model for the region.

The results of this park accessibility analysis by auto, local bus, and all transit modes for 45 minutes of travel are presented in the Environmental Justice Appendix. General conclusions from the table and figures include:

- Park accessibility statistics indicate that park accessibility by transit is much lower than that by automobile for all groups. This is true for all parks—national, state, or local parks. By transit, there is almost no access to national parks, and very limited access to state parks in all scenarios—Base Year 2008, Baseline, or under the Plan. This observation is consistent with the conclusions of the 2008 RTP Environmental Justice Report that there is a near complete lack of public transportation services into, in particular, the national forests.
- Income quintiles 4 and 5 will have moderately higher access to either state and/or local parks in the region via automobile. Population groups showing marginally lower accessibility to national parks by auto include non-Hispanic Black, income Quintile 1 and 5, and population below poverty. As to state park accessibility by auto, all population groups show slightly lower than average accessibility except for non-Hispanic White and the two higher-income quintile households. More Environmental Justice population groups, including Hispanics, non-Hispanic Asians, income Quintile 2, and the disabled population, show higher than average accessibility to local parks than the average population in the region.
- In addition to the elderly, non-Hispanic Native Americans, and non-Hispanic other, further analysis should also focus on non-Hispanic Blacks where their park accessibility by auto is below the average for all parks. However, the 2012–2035 RTP/SCS provides improvements for these population groups at a greater rate than the rest of the region's population groups.

Performance Measure 9: Gentrification and Displacement

The integration of transportation and land use has been recognized for its ability to reduce vehicle miles traveled, air pollution, and greenhouse gases, while increasing opportunities for physical activity. However, there are concerns associated with transit-oriented development (TOD). Specifically, there has been criticism of smart growth in relation to affordability. Some opponents have suggested that concentrating growth in

cities and towns to avoid sprawl can lead to higher household costs, an effect completely opposite of what was intended. In some cases where transit service has spurred significant new TOD, the result can be that people with average incomes are unable to afford to buy homes in or near the new developments. This highlights the need for strategies that, at a minimum, set aside some portion of new development and surrounding households as affordable housing adjacent to transit and in surrounding households.¹¹

In response to these concerns, SCAG developed a methodology to model and monitor the demographic trends in and around transit-oriented communities. With this methodology, SCAG has the ability to track demographic changes over time in those areas designated as key growth areas. The results will help SCAG and our partners better understand what demographic shifts occurred from the development of TOD along urban and commuter rail lines. It will also serve as Baseline data for comparison in future RTP cycles. More information on this methodology can be found in the Environmental Justice Appendix. Resources to address gentrification and displacement are provided for informational purposes only. Local agencies may consider them at their discretion.

Performance Measure 10: Environmental Impact Analyses (Air, Health, Noise)

HISTORICAL AIR QUALITY AND HEALTH IMPACTS

Emissions Impact on Environmental Justice Populations at the Regional Level

Exposure to air pollutants is an Environmental Justice issue due to the disproportionate share of minority and low-income populations living in close proximity to heavily traveled corridors, particularly near port and logistics activity. This exposure to unhealthy air results in 5,000 premature deaths and 140,000 children with asthma and respiratory symptoms. More than half of Americans exposed to PM_{2.5} pollution exceeding the national standard reside in the SCAG region.¹²

¹¹ Department of Transportation, Federal Highway Administration. Environmental Justice Emerging Trends and Best Practices Guidebook, Document Number: FHWA-HEP-11-024. August 2011.

¹² California Air Resources Board, South Coast Air Quality Management District, and Southern California Association of Governments. Powering the Future. August 2011.

New to the Title VI and Environmental Justice analysis for the 2012–2035 RTP/SCS, SCAG has mapped data for existing exposure to ozone, concentration of particulate matter emissions, cancer risks, and respiratory hazard risks. In order to assess the historical impacts of emissions on various demographic groups throughout the region, emissions information was summarized to the Environmental Justice communities. Further, additional analysis has been included in the final Environmental Justice Appendix that documents the health and emissions data for children age 5 or under. The analysis compares the performance of the Plan scenario with the Baseline scenario for children age 5 or under within 500 feet of freeways and highly traveled corridors and in areas affected by roadway noise, aviation noise, and near rail lines. It also includes historical air quality and health factors for areas that have a concentration of young children that is higher than the region at large. These findings are available in the Environmental Justice Appendix.

ENVIRONMENTAL IMPACTS ALONG FREEWAYS AND HIGHLY TRAVELED CORRIDORS

The concentration of air pollutants along heavily traveled corridors, particularly PM₁₀ and PM_{2.5}, is a major concern in Southern California. SCAG identified major corridors defined as urban roads with 100,000 average daily trips and rural roads with 50,000 daily trips. Next, SCAG overlaid the income and racial and ethnic composition of those households within 500 feet of the corridor. This analysis allows SCAG to better understand the impacted populations and allow for greater outreach to those communities of concern. After the release of the Draft RTP/SCS, SCAG also prepared additional analysis to highlight the emissions exposure in buffer areas within 500 feet of freeways and high volume roads, and also added analysis of the areas within 1000 feet.

The analysis illustrated the distribution of Environmental Justice communities residing within 500 feet of a heavily traveled corridor. Low-income groups comprise 7 percent of the population living within 500 feet of a heavily traveled corridor, while 7.1 percent of minorities reside in these areas. This is higher than the regional level, which shows that 5.7 percent of the region's population lives within 500 feet of a heavily traveled corridor. These findings are available in the Environmental Justice Appendix.

ENVIRONMENTAL IMPACTS OF PLAN AND BASELINE SCENARIOS

SCAG's air pollutant emissions analysis was based on emission estimates for pollutants that have localized health effects: carbon monoxide (CO) and particulate matter (PM).

An analysis was also conducted for PM exhaust emissions from heavy-duty vehicles: an indicator for diesel toxic air contaminants. The results were calculated based on the estimated emissions at the TAZ level.

It is important to note that total emissions of all pollutants in the region will decrease compared to existing conditions with or without the Plan, due to the combination of measures being taken to meet air quality standards. Since the Plan must demonstrate conformity with regional air quality management plans that call for reductions in emissions of air pollutants, the Plan itself will likewise result in reductions of pollutant emissions. This is generally because the Plan investments will alleviate roadway congestion and provide a greater range of transportation alternatives. The analysis in the Appendix, however, is based on a comparison of Plan to Baseline conditions, rather than a comparison of Plan to current conditions.

Data and analysis included in the Environmental Justice Appendix does not account for Plan improvements in vehicle technology particularly for truck only corridors. These corridors in the Plan are exclusively for zero and/or near-zero emission vehicles. Furthermore, the Program Environmental Impact Report (PEIR) accompanying the 2012-2035 RTP/SCS includes mitigation measures that would reduce impacts associated with health risk within 500 feet of freeways and high-traffic volume roadways to less than significant. Analysis included in the Environmental Justice Appendix also does not account for emissions improvements through the implementation of these mitigation measures. As such, emissions and exposure analysis shown in the Appendix is abundantly conservative and demonstrates worst-case scenario outcomes. If these emissions improvements had been accounted for, we believe the analysis would show little or no areas with worsened emissions (“hot spots”) associated with the Plan. Moreover, the currently available data on emissions and on the distribution of households and population is imprecise such that the overlay with emissions and Environmental Justice populations will tend to overstate any potential impacts. Nevertheless, given on-going concerns and evolving information on health impacts, SCAG encourages project sponsors to be cognizant of any potential health risks in project design and delivery. Consistent with the mitigation identified and to be implemented as part of the proposed final PEIR, SCAG will assist in disseminating information and identifying effective strategies to reduce risk at the project level.

NOISE IMPACTS

Roadway Noise

The SCAG region has an extensive roadway system with nearly 21,000 centerline miles and 65,000 lane miles. It includes one of the country’s most extensive high-occupancy vehicle lane systems and a growing network of toll lanes, as well as high-occupancy toll (HOT) lanes. The region also has a vast network of arterials and other minor roadways. Roadway facilities noise may cause significant environmental concerns.

Noise associated with highway traffic depends on a number of factors that include traffic volumes, vehicle speed, vehicle fleet mix (cars, trucks), as well as the location of the highway with respect to sensitive receptors (i.e., schools, daycare facilities, parks, etc.). According to Federal Highway Administration (FHWA) guidance, noise impacts occur when noise levels increase substantially when compared to existing noise levels. For the purposes of this analysis (consistent with FHWA guidance), noise increases of 3 dB along highways where noise levels are currently, or would be in the future, above 66 dB are considered to be significant, regardless of adjacent land use.

Highways that would be expected to have an increase of 3 dB or more include those where any of the following would occur: (1) the total traffic volumes increase by 100 percent compared to existing conditions; (2) the medium/heavy truck traffic volumes increase by 130 percent compared to existing conditions; or (3) the medium/heavy truck traffic volumes increase by 100 percent and there is an increase in other traffic volumes by 50 percent. These highway segments were identified using the results of SCAG’s regional transportation model.

On some highways, there is no potential for noise levels to reach 66 dB. To eliminate these from the analysis, the following criteria were applied: (1) arterials where the FHWA’s Traffic Noise Model (TNM) indicated that the motor vehicle volume (and the percentage of medium/heavy trucks) would result in traffic noise levels less than 66 dB; (2) arterials where the calculated motor vehicle speed was less than 17 mph; or (3) freeways where the average volume-to-capacity ratio was equal to or greater than 1.0, which would result in vehicle speeds of less than 30 mph. If a highway met any one of these criteria, it was eliminated from further consideration.

For each highway segment where a significant increase in noise would occur, a 150-foot impact zone was determined on either side (see the Environmental Justice Appendix for roadway segments selected from the 2012–2035 RTP/SCS). Using GIS, the percentage of each affected TAZ’s land area that fell within this zone was identified, and this percentage was applied to the demographic data forecast for this TAZ. This methodology was utilized in both the 2008 and 2004 RTP.

The results show that minority populations were primarily affected by highway noise impacts. As indicated by the distribution of households in highway noise areas by ethnic/racial category, minority populations, specifically Hispanics, would be disproportionately impacted by highway noise. Approximately 60 percent of Hispanics would be residing in highway noise areas by 2035. This is a 1 percent increase from the results of the 2008 RTP Environmental Justice analysis.

SCAG further investigated the impacts on areas and the number of people affected by improvement of roadway noise from the proposed 2012–2035 RTP/SCS as it compared with the 2035 Baseline conditions. As illustrated in the roadway segment maps where noise impacts are identified for both Baseline and for the proposed Plan, areas or number of segments under the proposed Plan are much smaller/fewer than those under the Baseline condition. Thus, it is projected that there will be 183,000 fewer people (13.9 percent reduction) and 63,000 fewer households (15.3 percent reduction) affected by roadway noise than those under the Baseline condition (1,321,600 people/426,700 households).

While the proposed 2012–2035 RTP/SCS improves the roadway noise conditions by reducing the areas, roadway segments, and the number of people affected by roadway noise, the benefits are not proportionally shared by each Environmental Justice category as observed in the roadway noise impacted areas or in the region as whole. SCAG’s analysis found that the roadway noise reductions will disproportionately benefit non-Hispanic Whites and the two highest-income quintile groups. Several other Environmental Justice communities also receive greater benefits from roadway noise improvements, including non-Hispanic Asian, non-Hispanic other, elderly, and the disabled.

Aviation Noise

The SCAG region supports the nation’s largest regional airport system in terms of number of airports and aircraft operations, operating in a very complex airspace environment. The

system has six established air carrier airports including Los Angeles International (LAX), Bob Hope (formerly Burbank), John Wayne, Long Beach, Ontario, and Palm Springs. There are also four emerging air carrier airports in the Inland Empire and North Los Angeles County. These include San Bernardino International Airport (formerly Norton AFB), March Inland Port (joint use with March Air Reserve Base), Southern California Logistics Airport (formerly George AFB), and Palmdale Airport (joint use with Air Force Plant 42). The regional system also includes 45 general aviation airports and two commuter airports, for a total of 57 public use airports. Although the projected demand for airport capacity has decreased compared to the 2008 RTP, there is still moderate growth for the future. The challenge is striking a balance between the aviation capacity needs of Southern California with the local quality of life for the affected populations.

Projected noise impacts from aircraft operations at the region’s airports in 2035 were modeled for inclusion in the Programmatic Environmental Impact Report for the RTP/SCS. For each airport, modeling produced a contour, or isoline, for the 65 dB Community Noise Equivalent Level (CNEL), a measure of noise that takes into account both the number and the timing of flights, as well as the mix of aircraft types. The Federal Aviation Administration (FAA) considers residences to be an “incompatible land use” with noise at or above 65 dB. To identify potentially impacted populations, the anticipated population within the 65 dB CNEL contour was calculated using the following steps:

1. Calculate the percentage of TAZs that would lie within a 65 dB CNEL contour.
2. Assign the SCAG projected population to the TAZ.
3. Apply the demographic breakdown of the TAZ as a whole to the population within the 65 dB CNEL contour.

It should be noted that after 9-11 and the Great Recession experienced since 2008, the global aviation industry remains in a depressed state. SCAG region air passenger demand and cargo forecasts have been revised downward repeatedly in 2004 RTP and 2008 RTP from the aviation scenario and forecasts adopted in the 2001 RTP. Currently for the 2012–2035 RTP/SCS, projections of aviation demand and air cargo remained significantly less than those projected and adopted in the 2001 RTP. Thus the downward revisions in projected demand at airports resulted in the reduction of airport noise areas and the corresponding communities that will be studied.

For the purposes of this study, aviation noise areas are defined as areas that are adversely affected by aircraft and airport noise. As part of the Environmental Justice analysis, special attention will be paid to income, disability, age, and race/ethnicity of affected populations.

The analysis indicates that the 2012–2035 RTP/SCS results in a disproportionate aviation noise impact to low-income and minority populations. Under the 2012–2035 RTP, the lowest-income group (Quintile 1) will represent 27 percent of the households impacted by noise above the 65 dB CNEL, while the highest-income group (Quintile 5) will represent only 13 percent of the households impacted by noise above the 65 dB CNEL.

Similarly, a disproportionate number of households below the poverty threshold will be affected by airport noise levels above the 65 dB CNEL. While 14 percent of the SCAG region households are projected to be living below the poverty level, 19 percent of those that live within the noise contour areas will be below the poverty line.

In terms of race/ethnicity, the aviation plan of the 2012–2035 RTP/SCS is projected to have a disproportionate aviation noise impact on minority groups, who make up 89 percent of population within the noise contours, compared with a regional average of 76 percent of minority population in 2035. Specifically, Hispanic and African-American populations are disproportionately affected. These two groups will make up 55 percent and 6 percent of the regional population in 2035, respectively, but represent 62 percent and 21 percent of those that will live within the impacted noise contour area. Consistent with mitigation identified in the proposed Final PEIR, SCAG will assist in disseminating information and identifying effective strategies to reduce impacts at the project level. Potential mitigation measures for noise impacts are included for reference in the Environmental Justice Mitigation Toolbox.

Performance Measure 11: Rail-Related Impacts

As described in the Goods Movement Technical Appendix (p 32), freight rail emissions are 5 percent and 4 percent of regional goods movement related NO_x and PM emissions, respectively. When compared to all regional PM and NO_x sources, the contribution of freight rail emissions is even lower. However, environmental pollution from locomotives, rail yards and other rail facilities must be considered as concentrations of rail activities can cause localized rail pollution. In response to input from our federal partners, SCAG developed a summary analysis to address potential environmental justice impacts in

areas adjacent to railroads and rail facilities, although further discussion and analysis is recommended. This section includes an analysis of Environmental Justice communities adjacent to railroads and rail facilities, rail impacts to sensitive receptors, and a summary examination of potential environmental justice concerns that are alleviated by grade separation projects. The train traffic index and related analysis provided in the Environmental Justice Appendix includes data from both passenger and freight rail traffic.

ADDITIONAL SCAG STRATEGIES: ENVIRONMENTAL JUSTICE MITIGATION TOOLBOX

New to the 2012–2035 RTP/SCS, SCAG has developed a toolbox of potential mitigation measures to address potential impacts to Environmental Justice communities. The toolbox presents optional mitigation recommendations that may be effective in addressing project-specific Environmental Justice impacts after a comprehensive review of impacts and consultation with all stakeholders. These measures were identified through a review of the literature, the PEIR, and recent planning activities.¹³ Measures incorporating or referring to compliance with existing regulations are for informational purposes only and do not supersede existing regulations.

Potential Mitigation for Noise Impacts

Project sponsors may voluntarily, to the extent feasible and applicable, and where their jurisdictional authority permits:

- As part of the appropriate environmental review of each project, conduct a project-specific noise evaluation and identify and implement applicable mitigation.
- Employ land use planning measures, such as zoning, restrictions on development, site design, and use of buffers, to ensure that future development is compatible with adjacent transportation facilities.

¹³ The EJ Mitigation Toolbox draws from, among other sources, mitigation measures included in the Draft 2012–2035 RTP/SCS Program Environmental Impact Report (PEIR), particularly for air quality and noise impacts. As captured here, Environmental Justice mitigation is geared toward reducing impacts for Environmental Justice communities as defined in this appendix, whereas PEIR measures are more broadly geared to sensitive receptors as defined in the PEIR. Mitigation activities cited here (e.g., performing corridor-specific analysis) are consistent between this toolbox and the Final PEIR Appendix G.

- Maximize the distance between noise-sensitive land uses and new roadway lanes, roadways, rail lines, transit centers, park-and-ride lots, and other new noise-generating facilities.
- Construct sound-reducing barriers, where feasible and applicable, between noise sources and noise-sensitive land uses. Sound barriers can be in the form of earth berms or soundwalls. Constructing roadways as appropriate and feasible so that they are depressed below-grade of the existing sensitive land uses also creates an effective barrier between the roadway and sensitive receptors.
- Maximize distance of new route alignments from Environmental Justice communities.

Potential Mitigation for Air Quality Impacts along Heavily Traveled Corridors

Local air districts, local jurisdictions, and project sponsors may voluntarily implement measures adopted by ARB designed to attain federal air quality standards for PM_{2.5} and eight-hour ozone. ARB's strategy includes the following elements:

- Set technology forcing new engine standards;
- Require clean fuels and reduce petroleum dependency;
- Work with US EPA to reduce emissions from federal and state sources;
- Pursue near-term advanced technology demonstration and deployment such as:
 - Zero- or near zero emissions heavy-duty trucks (2013 and beyond)¹⁴
 - Tier 4 marine engine repowers and replacements (2014 and beyond)
 - Tier 4 and zero-emissions railyard equipment (2015 and beyond)¹⁵
- Pursue long-term advanced technology measures;
- In addition, consider proposed new transportation-related SIP measures include:
 - Improvements and Enhancements to California's Smog Check Program
 - Expanded Passenger Vehicle Retirement
 - Modifications to Reformulated Gasoline Program
 - Cleaner In-Use Heavy-Duty Trucks
 - Ship Auxiliary Engine Cold Ironing and Other Clean Technology

¹⁴ Please see Chapter 2, Transportation Investments for more information regarding a heavy-duty truck demonstration project in partnership with SCAQMD.

¹⁵ For more information, see <http://www.dieselnet.com/standards/us/marine.php> and <http://www.dieselnet.com/standards/us/loco.php>.

- Cleaner Ship Main Engines and Fuel
- Port Truck Modernization
- Clean Up Existing Commercial Harbor Craft

- Conduct corridor-level analysis for proposed projects in areas where air quality impacts may be concentrated among Environmental Justice communities
- Project sponsors should consider identifying the Environmental Justice impacts of each project. In consultation with the affected community, mitigation measures can be identified to best address the project's impacts.
- Participate in statewide and regional discussions seeking to balance multiple policy objectives affecting air quality and the siting of transit-oriented development.

Potential Mitigation for Rail-Related Impacts

- Construct sound-reducing barriers, where feasible and applicable, between noise sources and noise-sensitive land use

Potential Mitigation for Road Pricing Mechanisms

- Transit, vanpools, or other options as alternatives in locations not served by transit
- Upper limits on road pricing
- Exemptions or discounts for persons who are disadvantaged people such as those whose earnings are below a certain income level and people with disabilities
- Limits on the number of priced crossings in a period for cordon charges
- Allowances for unlimited use of priced facilities in certain periods, typically off-peak hours and holidays¹⁶
- Develop detailed program design including billing and collection technology, rate structure, enforcement, spillover guards, revenues and gas tax replacement strategy, and mitigation for perceived geographic inequity before communicating with public¹⁷

¹⁶ Department of Transportation, Federal Highway Administration. Environmental Justice Emerging Trends and Best Practices Guidebook, Document Number: FHWA-HEP-11-024. August 2011.

¹⁷ National Cooperative Highway Research Program Report 686. Road Pricing: Public Perceptions and Program Development (2011).

- Develop an explicit benefit plan for increased revenues dovetailing with goals and mitigation concerns (e.g., enhanced transit, spillover protections, better enforcement)¹⁸
- Include Environmental Justice mitigation actions as part of the NEPA review¹⁹

Potential Mitigation for Environmental Justice Impacts

- Fund proactive measures to improve air quality in neighboring homes, schools, and other sensitive receptors
- Provide public education programs about environmental health impacts to better enable residents to make informed decisions about their health and community
- Engage in proactive measures to train and hire local residents for construction or operation of the project to improve their economic status and access to health care

Potential Resources Related to Gentrification and Displacement

Trends observed in areas with transit oriented developments (TODs) are inconclusive. However, the following resources are provided for informational purposes only. Local agencies may consider them at their discretion.

- California Department of Housing and Community Development, Inclusionary Housing Publications²⁰
- PolicyLink, Equitable Development Toolkit²¹
- National Association of Realtors, Field Guide to Inclusionary Zoning²²
- The Partnership for Working Families, Community Benefits Agreements²³
- Los Angeles Alliance for a New Economy, LAX Community Benefit Agreement²⁴

¹⁸ Ibid.

¹⁹ Ibid.

²⁰ Please see <http://www.hcd.ca.gov/hpd/inclusionary.pdf>

²¹ Please see http://www.policylink.org/site/c.lkIXLbMNJrE/b.5136575/k.39A1/Equitable_Development_Toolkit.htm

²² Please see <http://www.realtor.org/library/library/fg806>

²³ Please see <http://www.communitybenefits.org/section.php?id=155>

²⁴ Please see <http://www.communitybenefits.org/section.php?id=155>

SB 375 Greenhouse Gas Emission Targets

California's Sustainable Communities and Climate Protection Act, or SB 375, requires SCAG to develop a Sustainable Communities Strategy to reduce per capita GHG emissions through integrated transportation, land use, housing and environmental planning. Pursuant to SB375, ARB set per capita GHG emission reduction targets from passenger vehicles for each of the state's 18 MPOs. For the SCAG region, the targets are set at eight percent below 2005 per capita emissions levels by 2020 and 13 percent below 2005 per capita emissions levels by 2035. The 2012–2035 RTP/SCS achieves per capita GHG emission reductions relative to 2005 of nine percent in 2020 and 16 percent in 2035.

Transportation Conformity

Transportation conformity is required under CAA section 176(c) to ensure that federally supported highway and transit project activities “conform to” the purpose of the SIP. Conformity currently applies to areas that are designated non-attainment, and those re-designated to attainment after 1990, maintenance areas, with plans developed for the specific transportation related criteria pollutants. Conformity for the purpose of the SIP means that transportation activities will not cause new air quality violations, worsen existing violations, or delay timely attainment of the relevant NAAQS. The conformity tests and analyses are: regional emissions analysis, timely implementation of Transportation Control Measures, financial constraint analysis, and public involvement (see Transportation Conformity appendix for details). The Regional Council makes the conformity determination finding as part of the approval of the 2012–2035 RTP/SCS.