

The slide features a light blue background with a dark blue triangular shape in the bottom-left corner. A white circle is centered on the page, containing the text 'CHAPTER 5' in a gold, sans-serif font. The circle is surrounded by a light blue ring. Two parallel diagonal lines, one gold and one white, cross the circle from the top-left to the bottom-right.

# CHAPTER 5

## CHAPTER 5

# MEASURING OUR PROGRESS

# CONNECT SOCAL & PERFORMANCE-BASED PLANNING

SCAG has been incorporating performance measures into its Regional Transportation Plan (RTP) evaluation process since development of the 1998 Plan. For the 2004 RTP, SCAG developed a set of measurable outcomes that were based upon the principle of sustainability, which includes environmental preservation, linking transportation and land use and focusing on how the region meets its critical system preservation needs. Connect SoCal builds upon the sustainability goals established in previous RTP cycles, reflecting the ever-evolving needs and priorities of our region. The performance measures developed in support of Connect SoCal are focused on a set of outcomes that aim to continue to strengthen land-use and transportation connections, enhance the health of our region's residents, reduce greenhouse gas (GHG) emissions, and ameliorate the consequential effects of climate change.

Implementation of the strategies, programs and projects identified in Connect SoCal will help to secure a safe, efficient, sustainable and prosperous future for our region. To demonstrate the effectiveness of Connect SoCal toward achieving our regional goals and desired outcomes, SCAG conducted a 'Plan' vs 'No Plan' (or 'Baseline') analysis, which compares how the region would perform with and without implementation of the Plan. The conclusions of that analysis are the focus of this chapter. More details on the Connect SoCal performance analysis and its results may be found in the Performance Measures Technical Report.

Implementation of the Plan would result in a regional transportation system that provides improved travel conditions and better air quality, while also ensuring an equitable distribution of benefits among the various communities that comprise the SCAG region. With Connect SoCal, trips to work, schools and other key destinations would be faster and more efficient. Connect SoCal improves the integration of multiple transportation modes, leading to an increase in carpooling, demand for transit and use of active transportation (bicycle and pedestrian) modes for work trips and for other trips made throughout the day.

Analysis conducted by SCAG found that, in comparison to the 2045 Baseline, Connect SoCal will:

- Increase the combined percentage of work trips made by carpooling, active transportation, and public transit by 3 percent, with a commensurate reduction in the number of commuters traveling by single-occupancy vehicle
- Reduce vehicle miles traveled per capita by 5 percent and vehicle hours traveled per capita by 9 percent (for automobiles and light/medium-duty trucks) as a result of more efficient land use strategies and improved regional transit service
- Increase transit use for work trips by 2 percent, as a result of improved transit service and more transit-oriented, mixed-use development
- Reduce travel delay per capita by 26 percent
- Reduce heavy-duty truck delay by 24 percent
- Create more than 264,500 new jobs annually, due to an increased level of economic competitiveness throughout the region, and improved regional economic performance. This more competitive economic environment would be the result of an improved regional transportation system and reduced levels of congestion
- Reduce greenfield development by 29 percent. Conservation of open space, agricultural lands, and other rural land uses may be achieved by focusing new residential and commercial development in higher density areas that are already equipped with the requisite urban infrastructure.

Note, the above transportation performance results do not include off-model adjustments and are therefore considered to be conservative estimates of Connect SoCal performance.

Connect SoCal also focuses on improving public health outcomes in the SCAG region. Some key performance results include a reduction in our regional obesity rate and a reduction in the share of our population that suffers from pathologies related to lack of regular physical activity, such as hypertension and type 2 diabetes. The total annual healthcare costs for respiratory disease will be reduced under the Plan by more than 5 percent compared to the Baseline. Implementation of Connect SoCal would provide more than \$346 million in healthcare cost savings per year as a result of reductions in several chronic diseases and would bring significant benefits for the regional economy. When looking specifically at air-pollution related health incidences, the region is expected to save over \$180 million in healthcare expenditures annually. These

public health improvements are the result of Connect SoCal investments in active transportation, more walkable and bikeable communities and improved regional air quality.

## PERFORMANCE GOALS & REQUIREMENTS

The Connect SoCal performance measurement process provides a means for determining how well the program of investments included in the Plan correspond to the overall goals and desired vision for the future of the SCAG region. As part of the development of Connect SoCal, a set of 10 high level goals for the Plan were adopted. The goals are intentionally general in nature, and the Connect SoCal performance measures are not intended to correspond specifically to each of the Plan goals. However, they are complementary, with most of the performance measures supporting multiple goals. While the Connect SoCal goals are visionary in nature, the performance outcomes provide a more specific framework to guide the region toward achievement of the higher level goals. Performance measures, in turn, are the quantitatively defined variables used to assess progress within each of the outcome categories.

Performance measures are also used to ensure that the Plan meets all federal and state mandates. These requirements will be discussed in detail in a subsequent section of this chapter.

## PERFORMANCE OUTCOMES & MEASURES

Senate Bill 375 (SB 375) provided a strong regulatory foundation for addressing the daunting challenges presented by climate change. The ambitious GHG reduction goals and associated sustainability planning requirements mandated by SB 375 served to further fortify SCAG's already firm commitment to the monitoring of regional GHG emissions reductions and achievement of regional sustainability objectives, as well as promoting the integration of transportation and land use planning.

The Connect SoCal performance measures are focused on specific outcomes that will serve to strengthen the land-use transportation connections in the SCAG region and enhance the physical health of our region's residents, while also facilitating attainment of GHG emissions reduction goals and ameliorating the consequential impacts of climate change. The set of outcomes and performance measures used to evaluate various scenarios for Connect SoCal are presented in the Performance Measures Technical Report.

## USES OF PERFORMANCE MEASURES

The Connect SoCal performance measures serve to gauge progress toward meeting the goals and objectives for our region as outlined in the Plan, as well to ensure that the region meets state requirements for reducing GHG emissions and planning for a more sustainable future. The results of SCAG's performance analysis and assessment process allow us to conclude that implementation of the integrated program of projects, strategies and policy recommendations of Connect SoCal will result in significant benefits to our region, not only in respect to the transportation-related objectives of improved mobility and accessibility; but also for better air quality, stimulated regional economic activity and job creation, community and environmental sustainability, social equity, and environmental justice.

Performance monitoring is an invaluable tool to facilitate linkage of the regional goals and desired outcomes identified in Connect SoCal with actual performance at the implementation level. The monitoring of local and regional progress is key to understanding which projects, programs, and strategies are proving successful in meeting our regional goals and which ones may require modification or reconsideration. Ultimately, progress toward our regional objectives is made through implementation at the local level.

Ongoing performance monitoring serves to guide future planning efforts and support local and regional transportation system investment decision-making. The assessment of regional performance over time allows us to set meaningful performance targets and milestones so that progress and setbacks may be effectively evaluated and addressed in a timely manner. On-going performance monitoring also helps to identify emerging trends in the region that may need to be accounted for in our interim planning activities, as well as to inform development of the next RTP/Sustainable Communities Strategy (SCS).

# CONNECT SOCAL PERFORMANCE OUTCOMES

This section summarizes how well the Connect SoCal program of transportation improvement projects, land use strategies and sustainable communities policy recommendations are expected to perform when fully implemented. The performance of the Plan is assessed through the modeling of several discretely defined outcome scenarios. The modeling outputs are then compared, using standardized performance measures, to quantify differences in the model results between various scenarios.

Three planning scenarios are referenced in Connect SoCal: Base Year, Baseline and Plan.

- **Base Year** represents existing conditions in the SCAG region as of 2016. This includes our regional transportation system, land use patterns and socio-economic characteristics (households and employment). The year 2016 was selected as the 'Base Year' for this analysis because it is the year of the most recent available data for all variables related to Connect SoCal performance outcomes.
- **Baseline** represents the future regional transportation system that will result from the continuation of current programs, including projects currently under construction or undergoing right-of-way acquisition, those transportation plans and projects programmed and committed to in the 2019 Federal Transportation Improvement Program (FTIP), and/or transportation projects that have already received environmental clearance.
- **Plan** represents future conditions in 2045 wherein the transportation investments, policy recommendations and strategies identified in Connect SoCal are fully implemented.

The Base Year, Baseline and Plan scenarios discussed in this chapter were developed to help evaluate the performance of the strategies, programs and projects presented in Connect SoCal and to meet various state and federal requirements.

**TABLE 5.1** presents the Connect SoCal performance outcomes and the associated measures used to forecast Plan performance. The table also includes specific performance results for both the Baseline and the Plan.

## PERFORMANCE OUTCOME CATEGORIES

The Connect SoCal performance monitoring program is based upon performance goals, outcomes and measures. As discussed previously, the goals refer to high level regional objectives for the Plan. The performance goals correlate to how we envision the future of the SCAG region and what planning priorities need to be emphasized through the Plan to achieve that vision. Connect SoCal includes 10 overall performance goals as presented in the Performance Measures Technical Report.

For Connect SoCal, eight outcome categories have been designated, each representing a primary performance focus area for the Plan. These performance outcome categories include:

1. Location Efficiency
2. Mobility and Accessibility
3. Safety and Public Health
4. Environmental Quality
5. Economic Opportunity
6. Investment Effectiveness
7. Transportation System Sustainability
8. Environmental Justice

An additional set of performance measures to be used for SCAG's on-going regional monitoring effort are described and discussed in the Connect SoCal Performance Measures Technical Report. The next section of this chapter defines these categories and introduces the specific measures used to evaluate the performance of Connect SoCal.

# CONNECT SOCIAL PERFORMANCE PROFILE

## LOCATION EFFICIENCY

High Quality Transit Area Household Growth Share

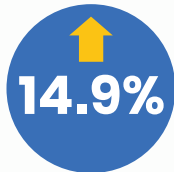
**45.2%**  
Baseline



**51.2%**  
Plan

High Quality Transit Area Employment Growth Share

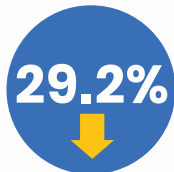
**44.8%**  
Baseline



**59.7%**  
Plan

Rural Land Consumption

**100** sq. miles  
Baseline



**71** sq. miles  
Plan

## LESS TIME SPENT DRIVING

Daily Miles Driven per capita

**21.8** mi  
Baseline



**20.7** mi  
Plan

Daily Traffic Delay per capita

**11.3** mins  
Baseline



**8.4** mins  
Plan

Heavy Duty Truck Delay Highway

**186,276** hrs  
Baseline



**144,744** hrs  
Plan

Heavy Duty Truck Delay Arterial

**32,027** hrs  
Baseline

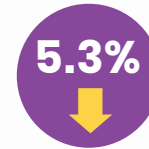


**23,492** hrs  
Plan

## IMPROVED AIR QUALITY

Reactive Organic Gas Emissions

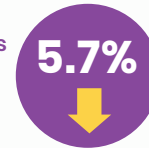
**46.5** tons  
Baseline



**44.1** tons  
Plan

Carbon Monoxide Emissions

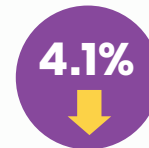
**325.8** tons  
Baseline



**307.3** tons  
Plan

PM<sub>2.5</sub> Emissions

**12.9** tons  
Baseline



**12.4** tons  
Plan

**GHG** Reductions

YEAR	TARGET	PLAN
2020	<b>8%</b>	<b>8%</b>
2035	<b>19%</b>	<b>19%</b>

## ECONOMIC OPPORTUNITY

Benefit/Cost Ratio



**\$346 Million**  
Saved in Annual Healthcare Expenditure



Annual New Jobs Supported by Improved Competitiveness



Annual New Jobs Supported by Transportation Investments

# CONNECT SOCAL PERFORMANCE RESULTS

## Daily Vehicle Miles Traveled (VMT)\* per capita



Baseline to Plan  
Comparison

**-5.0%**



Base Year to Plan  
Comparison

**-10.8%**

## Daily Minutes of Person Delay per capita



Baseline to Plan  
Comparison

**-25.7%**



Base Year to Plan  
Comparison

**-20.0%**

	2016 BASE YEAR	2045 BASELINE	2045 PLAN	
DAILY VMT per capita	30.7 MILES	32.6 MILES	32.4 MILES	IMPERIAL COUNTY
DAILY DELAY per capita	3.3 MINUTES	12.1 MINUTES	8.1 MINUTES	
DAILY VMT per capita	22.2 MILES	20.4 MILES	19.2 MILES	LOS ANGELES COUNTY
DAILY DELAY per capita	13.4 MINUTES	13.4 MINUTES	10.5 MINUTES	
DAILY VMT per capita	24.1 MILES	22.9 MILES	22.3 MILES	ORANGE COUNTY
DAILY DELAY per capita	10.0 MINUTES	11.0 MINUTES	8.0 MINUTES	
DAILY VMT per capita	23.0 MILES	21.6 MILES	20.6 MILES	RIVERSIDE COUNTY
DAILY DELAY per capita	5.6 MINUTES	8.4 MINUTES	5.4 MINUTES	
DAILY VMT per capita	26.1 MILES	25.6 MILES	24.5 MILES	SAN BERNARDINO COUNTY
DAILY DELAY per capita	5.4 MINUTES	8.3 MINUTES	5.2 MINUTES	
DAILY VMT per capita	22.3 MILES	21.0 MILES	19.6 MILES	VENTURA COUNTY
DAILY DELAY per capita	5.6 MINUTES	6.1 MINUTES	3.4 MINUTES	

Note: Base Year: 2016 Existing Conditions, Baseline: Continuation of current trends without Plan, Plan: Full implementation of Connect SoCal  
\*VMT per capita refers to automobiles & light trucks only

**TABLE 5.1** Connect SoCal Performance Measures & Results

Outcome Group	Performance Measure	Definition	Objective	Category	2045 Performance Results		
					Baseline	Connect SoCal	Trend
Location Efficiency	Share of regional household growth occurring in HQTAs	Percent of the region's total household growth occurring within HQTAs	Improvement (increase) over Baseline	Percent of households located in HQTAs	45.2%	51.2%	↑
	Share of regional employment growth occurring in HQTAs	Percent of the region's total employment growth occurring within HQTAs	Improvement (increase) over Baseline	Percent of jobs located in HQTAs	44.8%	59.7%	↑
	Land consumption	Total acreage of greenfield or otherwise rural land uses converted to urban use	Improvement (decrease) over Baseline	Greenfield land consumed	100 sq miles	71 sq miles	↓
	VMT per capita	Daily vehicle miles driven per person	Improvement (decrease) over Baseline	Automobiles and light-duty trucks	21.8 miles	20.7 miles	↓
	Average distance traveled	Average daily distance traveled for work and non-work trips (in miles)	Improvement (decrease) over Baseline	Work Trips	17.9 miles	17.7 miles	↓
				Non-Work Trips	5.8 miles	5.7 miles	↓
	Percent of trips less than 3 miles	Percentage of work and non-work trips which are less than 3 miles in length	Improvement (increase) over Baseline	Work Trips	14.0%	14.3%	↑
				Non-Work Trips	40.5%	41.4%	↑
	Work trip length distribution	Statistical distribution of work trip length	Improvement (increase in share of short trip lengths) over Baseline	Trip Length: 10 miles or less	42.3%	42.4%	↑
				Trip Length: 25 miles or less	76.6%	76.6%	↔



**TABLE 5.1 Connect SoCal Performance Measures & Results – Continued**

Outcome Group	Performance Measure	Definition	Objective	Category	2045 Performance Results		
					Baseline	Connect SoCal	Trend
Mobility & Accessibility	Person delay per capita	Average minutes of delay experienced per capita due to traffic congestion	Improvement (decrease) over Baseline	Daily minutes of delay per capita	11.3 mins	8.4 mins	↓
	Person hours of delay by facility type	Excess travel time resulting from the difference between a reference speed and actual speed	Improvement (decrease) over Baseline	Highway	1,648,575 hrs	1,224,572 hrs	↓
				HOV	127,650 hrs	31,740 hrs	↓
				Arterial	2,006,711 hrs	1,523,701 hrs	↓
	Truck delay by facility type	Excess travel time for heavy duty trucks resulting from the difference between a reference speed and actual speed	Improvement (decrease) over Baseline	Highway	186,276 hrs	144,744 hrs	↓
				Arterial	32,027 hrs	23,492 hrs	↓
	Travel time distribution by mode	Percentage of PM peak period trips completed within 45 minutes by travel mode	Improvement (increase) over Baseline	Transit Trips	46.70%	47.20%	↑
				HOV Trips	78.30%	83.90%	↑
				SOV Trips	80.10%	85.40%	↑
	Transit mode share	Percentage of trips that use transit (work and all trips)	Improvement (increase) over Baseline	All Trips	3.60%	4.90%	↑
				Work Trips	4.00%	6.10%	↑
	Mean commute time	Average travel time to work (all modes)	Improvement (decrease) over Baseline	Average commute time (minutes)	32.1	30.2	↓

**TABLE 5.1** Connect SoCal Performance Measures & Results – Continued

Outcome Group	Performance Measure	Definition	Objective	Category	2045 Performance Results		
					Baseline	Connect SoCal	Trend
Safety & Public Health	Vehicle collision rate by severity	Collision rate per 100 million vehicle miles traveled	Improvement (decrease)	Fatality rate	N/A	0.12	N/A
				Serious injury rate	N/A	1.97	N/A
	Air pollution-related health measures	Annual air pollution-related respiratory disease incidence and cost	Improvement (decrease) over Baseline	Pollution-related respiratory health incidences	192,400	182,200	↓
				Pollution-related respiratory health costs	\$3.34 billion	\$3.16 billion	↓
	Physical activity-related health measures	Health incidences and costs related to lack of physical activity and/or obesity	Improvement (decrease) over Baseline	Daily per capita walking	5.8 mins	6.7 mins	↑
				Daily per capita biking	0.5 mins	0.7 mins	↑
				Daily per capita driving	48.4 mins	43.2 mins	↓
				Obesity rate	30.30%	30.10%	↓
				Hypertension rate	26.40%	26.30%	↓
				Cardiovascular disease rate	4.37%	4.36%	↓
				Diabetes (type 2) rate	8.10%	7.90%	↓
	Active transportation mode share*	Percentage of trips using either walking or biking (by trip type)	Improvement (increase) over Baseline	Walk share (work trips)	2.70%	3.00%	↑
				Bike share (work trips)	1.00%	1.20%	↑
				Walk share (non-work trips)	9.10%	10.10%	↑
				Bike share (non-work trips)	1.80%	2.30%	↑
				Walk share (all trips)	7.80%	8.70%	↑
				Bike share (all trips)	1.70%	2.10%	↑

\*Values do not include off-model adjustment factors, see "Active Transportation Mode Share" section for additional details.

**TABLE 5.1 Connect SoCal Performance Measures & Results - Continued**

Outcome Group	Performance Measure	Definition	Objective	Category	2045 Performance Results		
					Baseline	Connect SoCal	Trend
Environmental Quality	Greenhouse gas (GHG) emissions reduction	Percent reduction in per capita GHG emissions (from 2005 levels)	Meet state and regional GHG reduction targets	2020	N/A	8%	N/A
				2035	N/A	19%	N/A
	Criteria pollutant emissions	ROG, CO, NOx, PM10, and PM2.5 emissions (tons per day)	Meet federal air quality conformity requirements	Reactive organic gases (ROG)	46.5 tons	44.1 tons	↓
				Carbon monoxide (CO)	325.8 tons	307.3 tons	↓
				Oxides of nitrogen (NOx)	82.9 tons	79.5 tons	↓
				Particulate matter (PM10)	31.7 tons	30.4 tons	↓
				Particulate matter (PM2.5)	12.9 tons	12.4 tons	↓
	Non-SOV mode share	Percentage of trips using a travel mode other than single occupancy vehicle (SOV)	Improvement (increase) over Baseline	All Trips	62.8%	64.9%	↑
Work Trips				30.9%	33.3%	↑	
Economic Opportunity	New jobs supported by improved economic competitiveness	Number of new jobs supported by improved regional economic competitiveness	Improvement (increase) over Baseline	Annual number of new jobs generated by Connect SoCal	N/A	264,500	N/A
	New jobs supported by transportation system investments	Number of new jobs supported by Connect SoCal transportation system investments	Improvement (increase) over Baseline	Annual number of new jobs generated by Connect SoCal	N/A	168,400	N/A

\* Comparative figures shown for Criteria Pollutant Emissions are for the 2016 Base Year

**TABLE 5.1** Connect SoCal Performance Measures & Results – Continued

Outcome Group	Performance Measure	Definition	Objective	Category	2045 Performance Results		
					Baseline	Connect SoCal	Trend
Investment Effectiveness	Transportation system investment benefit/cost ratio	Ratio of monetized user and social benefits relative to transportation system investment expenditures	Benefit/cost ratio greater than 1.0	Benefit ratio per \$1 investment	N/A	2.06	N/A
Transportation System Sustainability	Cost per capita to preserve the regional multimodal transportation system in current state of good repair	Annual cost per capita required to preserve the regional multimodal transportation system to current conditions	Improvement (decrease) over Baseline	Cost per capita (per year)	N/A	\$562	N/A
Environmental Justice	See Table 5.5: Connect SoCal Environmental Justice Performance Measures		Meet federal Environmental Justice requirements: No unaddressed disproportionately high and adverse effects on low income or minority communities				

Source: SCAG

# CONNECT SOCAL PERFORMANCE OUTCOMES

## OUTCOME 1: LOCATION EFFICIENCY

The 'Location Efficiency' performance outcome reflects how improved coordination of land use and transportation planning affects the movement of people and goods throughout the SCAG region. This outcome has seven associated performance measures to assess progress provided by Connect SoCal toward achieving our Location Efficiency objectives:

- Share of Household Growth in High Quality Transit Areas
- Share of Employment Growth in High Quality Transit Areas
- Land Consumption
- Vehicle Miles Traveled per Capita
- Average Distance Traveled
- Percent of Trips Less than Three Miles
- Work Trip Length Distribution

The following is a summary of the Location Efficiency performance measures:

### SHARE OF HOUSEHOLD GROWTH IN HIGH QUALITY TRANSIT AREAS

By 2045, the share of new households located within designated High Quality Transit Areas (HQTAs) is projected to increase by 6 percent between the Baseline (45.2 percent) and Connect SoCal (51.2 percent).

### SHARE OF EMPLOYMENT GROWTH IN HIGH QUALITY TRANSIT AREAS

Growth in the share of new regional employment located within HQTAs is projected to increase by 15.3 percent between the Baseline (44.8 percent) and Connect SoCal (60.1 percent) by 2045.

## LAND CONSUMPTION

The land consumption metric is used to assess the amount of previously agricultural or otherwise undeveloped land that has changed from rural to more intensive development. 'Greenfield' land consumption refers to new urban development occurring on land that has not previously been developed, or otherwise impacted by, urbanized use, including agricultural lands, forests, deserts and other open spaces. Rural land consumption under Connect SoCal would be substantially less (71 square miles) than under the Baseline (100 square miles).

## VEHICLE MILES TRAVELED PER CAPITA

Vehicle miles traveled (VMT) per capita is an essential metric used for monitoring the impact of population and economic growth on our regional transportation system. VMT measures the total number of miles traveled by motor vehicles within the SCAG region. Increases in VMT may impact traffic congestion, air quality and the overall quality of life in our region. As a region with an ever-growing population and a vibrant economy, it is expected that more people will be making use of our regional transportation system to get to their places of employment and to engage in other daily economic, service, and entertainment activities. The challenge is to identify effective solutions to balance our regional mobility needs with the imperative to address the consequential impacts of climate change.

The monitoring of VMT per capita (for automobiles and light trucks) became even more important with the passage of SB 375, which led to state-mandated reduction targets for regional GHG emissions. According to the U.S. Environmental Protection Agency (U.S. EPA), the transportation sector produces about 30 percent of all GHG emissions, with automobiles contributing approximately 60 percent of transportation sector emissions.

SB 375 engendered the passage of several subsequent legislative measures for purposes of implementing its GHG reduction mandate. SB 743, passed in 2013, directed the Governor's Office of Planning and Research (OPR) to identify a new metric for assessing California Environmental Quality Act (CEQA) transportation impacts that would serve to promote achievement of statewide GHG reduction goals. Ultimately, VMT was selected as the most viable of several alternatives evaluated to replace the previously used 'Level of Service' (LOS) methodology,

which focused exclusively on vehicle delay. Replacing the LOS methodology with a VMT-based assessment metric satisfies the SB 743 objectives of reducing GHG emissions, promoting mixed-use and infill development, and encouraging the provision of active transportation infrastructure. The new VMT-based CEQA transportation impact assessment requirement will take effect statewide on July 1, 2020, further elevating the importance of monitoring VMT at the regional and local levels. Connect SoCal has not taken any credits in regard to potential per capita VMT reduction through SB 743 implementation. By monitoring progress in reducing per capita VMT through implementation of the various transportation investments and land use strategies outlined in Connect SoCal, we are better able to accurately gauge progress toward achieving our regional GHG emissions reduction goals.

Daily per capita VMT in the SCAG region is projected to decrease in 2045 from 21.8 miles under the Baseline to 20.7 miles with Connect SoCal. **FIGURE 5.1** shows per capita VMT by county.

## AVERAGE DISTANCE TRAVELED

In 2045, the average distance traveled one-way for work trips in the SCAG region is projected to decrease slightly from 17.9 miles under the Baseline to 17.7

miles with Connect SoCal. The average distance traveled one-way for non-work trips in 2045 is also projected to decrease, from 5.8 miles to 5.7 miles.

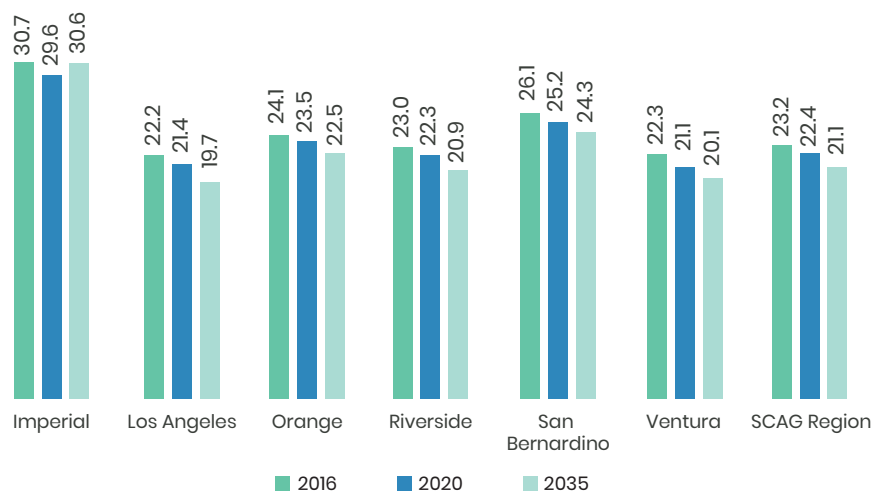
## PERCENT OF TRIPS LESS THAN THREE MILES

The majority of trips in Southern California are made by people driving alone in their vehicles. As trip lengths become shorter, particularly to within a few miles, people become more amenable to the use of transit, bicycling, walking or using other travel modes instead of driving alone. By 2045, the share of work trips less than three miles in length is projected to increase from 14 percent to 14.3 percent; and from 40.5 percent to 41.4 percent for non-work trips. Land use strategies that emphasize location efficiency, investments in active transportation, and transit system enhancements contribute to achieving these results.

## WORK TRIP LENGTH DISTRIBUTION

A primary objective of Connect SoCal is the reduction of commuting distances in the SCAG region. The share of work trips under 25 miles one-way is projected to remain unchanged at 76.6 percent. However, a subset of this group, the share of work trips less than 10 miles in length one-way, is expected to increase slightly from 42.3 percent to 42.4 percent.

**FIGURE 5.1** Daily Vehicle Miles Traveled (VMT) per Capita by County



Source: SCAG Regional Travel Demand Model

## OUTCOME 2: MOBILITY & ACCESSIBILITY

The 'Mobility and Accessibility' outcome is defined as the ability to reach desired destinations with relative ease and within a reasonable time, using available transportation choices. This section discusses the mobility and accessibility performance measures for Connect SoCal.

### MOBILITY

Mobility performance measures are based on the metric of travel delay. Delay is defined as the difference between an actual travel time and the expected travel time at a reference speed for a specified mode. Travel delay is measured in vehicle-hours of delay, from which person-hours of delay is derived. The measures used to evaluate alternatives for the mobility outcome include:

- Person Delay per Capita
- Person Hours of Delay by Facility Type

- Truck Delay by Facility Type

## PERSON DELAY PER CAPITA

**FIGURE 5.2** shows daily minutes of delay experienced per capita for each of the six counties, and for the entire SCAG region. Normalizing delay by the number of people living in an area provides insight as to how well the region is mitigating traffic congestion within the context of increasing population growth. Daily minutes of delay per capita would be expected to increase by 2045 in all six counties of the region under Baseline conditions. However, implementation of Connect SoCal would reduce delay substantially, to about 20 percent below 2016 levels and about 26 percent below the Baseline.

## PERSON-HOURS OF DELAY BY FACILITY TYPE

Travel delay is also assessed by comparing the number of person-hours of delay experienced on different facility types. The person-hours of delay by facility type metric differentiates the amount of delay experienced by commuters traveling on mixed flow lanes, carpools using high-occupancy vehicle (HOV) lanes, and on our arterial roadways. As shown in **FIGURE 5.3**, person delay experienced on the mixed flow lanes of our highways would improve upon Baseline conditions with Connect SoCal by approximately 26 percent, while delay on HOV facilities will be reduced even more significantly, by more than 75 percent. Delay on arterial roadways in the SCAG region would be reduced by about 24 percent between the Baseline and the Plan.

## TRUCK DELAY BY FACILITY TYPE

The Truck Delay by Facility Type performance measure estimates average daily delay experienced by heavy-duty trucks on freeways and arterials in the SCAG region. Connect SoCal includes significant investments in transportation system improvements to facilitate goods movement. **FIGURE 5.4** summarizes heavy duty truck delay projections for freeways and on major arterials in the SCAG region for the Base Year, Baseline, and Connect SoCal.

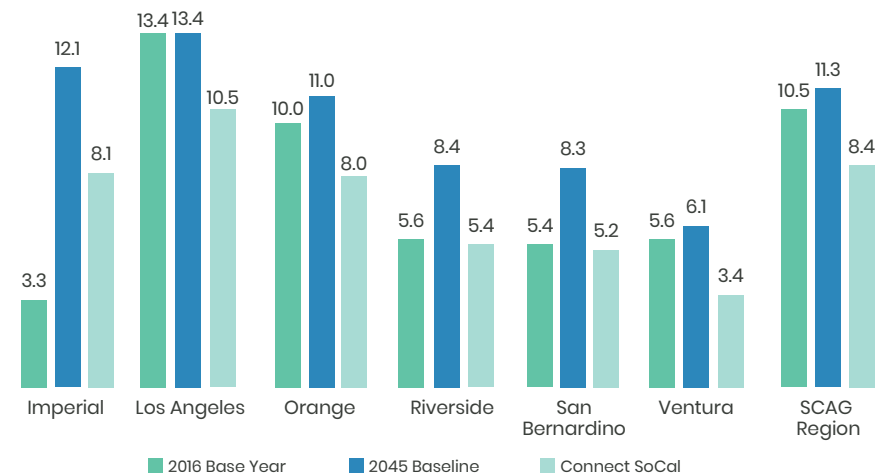
Connect SoCal will reduce heavy-duty truck delay on both our regional freeways and arterial highways as compared to 2045 Baseline projections by 22 percent and 27 percent, respectively. However, truck delay under the Plan will still be expected to be above 2016 levels due to projected growth in regional economic activity and the associated increased demand for freight movement by truck.

## HIGHWAY NON-RECURRENT DELAY

Another measure for delay that is useful for ongoing performance monitoring, but is not readily modeled, is non-recurrent delay. Recurrent delay is the expected daily traffic congestion that occurs as a result of there being too many vehicles being on the road at the same time. Non-recurrent delay refers to unexpected conditions of excessive traffic congestion caused by vehicle collisions, adverse weather, special events or other atypical incidents.

Non-recurrent delay may be mitigated or reduced by improving incident response times, implementation of traveler information systems, and deployment of other intelligent transportation technologies, such as traffic signal coordination and highway ramp metering systems. Dynamic travel information technologies providing real-time information about unexpected delays allow travelers to make better-informed decisions regarding the availability of transportation alternatives, including transit. Non-recurrent delay as an ongoing regional monitoring measure is discussed in greater detail in the Connect SoCal Performance Measures Technical Report.

**FIGURE 5.2** Daily Person Delay per Capita by County, Minutes



Source: SCAG Regional Travel Demand Model

**FIGURE 5.5** shows the relative proportion of freeway congestion experienced in each county that is caused by non-recurrent events. Please note that data for Imperial County is not currently available for this metric.

## ACCESSIBILITY

The 'Accessibility' outcome is used to evaluate how well the regional transportation system performs in providing access to various types of opportunities. Opportunities may include jobs, education, medical care, recreation, shopping, or any other activities that may help enhance a person's quality of life. For Connect SoCal, accessibility is assessed by the distribution of trips by mode and by travel time.

A useful metric for evaluating accessibility is to determine the percentage of peak period work trips that are completed within 45 minutes in comparison with the 2045 Baseline and the 2016 Base Year scenarios. Peak commute periods are those times during the weekday when travel demand on regional roadways reaches its highest levels. Peak periods typically occur twice daily, first

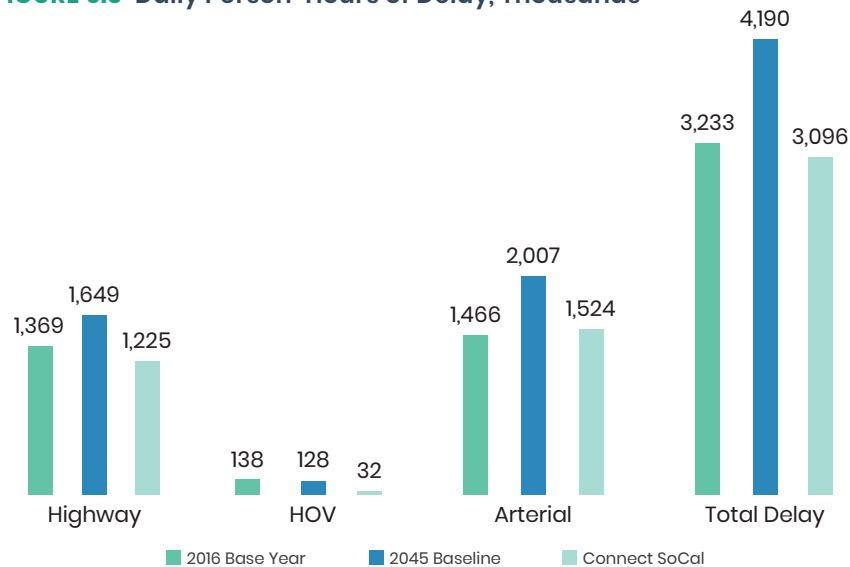
during the morning commute when people are traveling to their workplaces, and again in the late afternoon when people are returning home from work.

**FIGURE 5.6** shows the results of the accessibility analysis conducted for the afternoon (PM) peak period. In all cases, Connect SoCal improves performance for the share of work trips in the SCAG region completed within 45 minutes. In support of the accessibility performance analysis for Connect SoCal, travel time distribution tables are prepared for transit, single-occupant vehicle (SOV) and HOV travel modes, for both work and non-work trips. The results of these mode specific accessibility analyses may be found in the Connect SoCal Performance Measures Technical Report.

## TRANSIT MODE SHARE

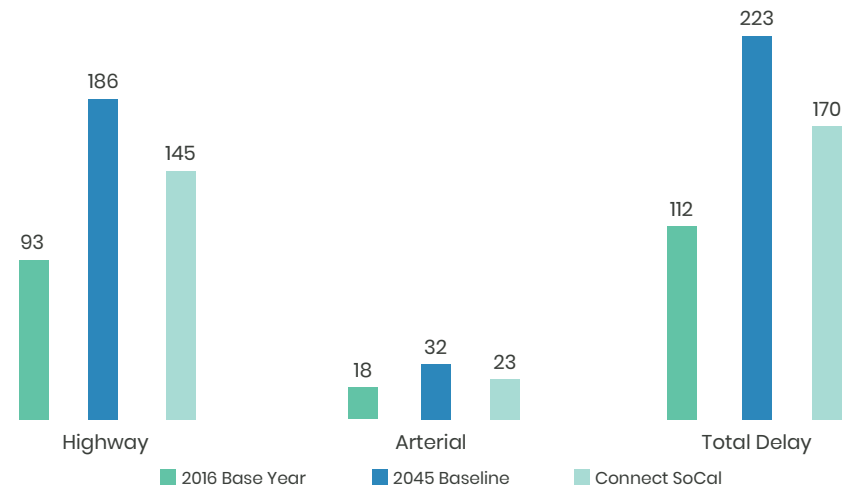
The Transit Mode Share performance measure reports the share of work trips, and all trips that use transit. This metric helps identify how effectively the transit improvements and strategies proposed in Connect SoCal work toward providing better and more diverse commuting options for the travelers. Ideally, with better and more reliable transit service, more commuters will

**FIGURE 5.3** Daily Person-Hours of Delay, Thousands



Source: SCAG Regional Travel Demand Model

**FIGURE 5.4** Daily Heavy-Duty Truck Hours of Delay by Facility Type, Thousands



Source: SCAG Regional Travel Demand Model



choose transit over driving alone, facilitating reduction of VMT and regional GHG emissions. **TABLE 5.2** shows transit mode shares by county. These 2045 projections are for work trips and for all trips under Connect SoCal.

### ACTIVE TRANSPORTATION MODE SHARE

The Active Transportation Mode Share performance measure reports the share of work trips, and all trips that use active transportation (walking, bicycling, and other human-powered transportation) using the SCAG Activity-Based Model (ABM). Due to the general lack of data collected regarding active transportation infrastructure, SCAG conducted an additional “off-model” analysis for Connect SoCal. This analysis takes into account Safe Routes to School safety enhancements, first-last mile improvements, pedestrian infrastructure improvements, and bike share and micro-mobility. While the ABM shows active transportation mode share of 8.7 percent for walking (all trips) and 2.1 percent for bicycling (all trips), the most accurate Connect SoCal mode share estimate includes an addition of 1.3 percent for walking (all trips) and 0.4 percent for bicycling (all trips) for a total of 10 percent walking mode share (all trips) and 2.5 percent bicycling mode share (all trips). Additional details

on the active transportation off-model analysis can be found in the Active Transportation Technical Report.

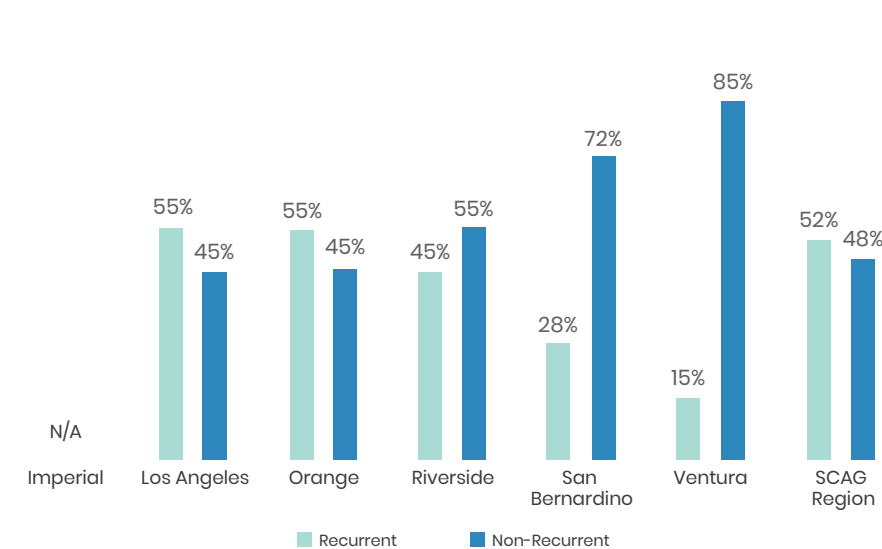
### MEAN COMMUTE TIME

Mean commute time is a new performance metric introduced for Connect SoCal. This measure reports the average time it takes for a commuter in the SCAG region to get to work by various travel modes. In 2045, the mean commute time by automobile in the region will improve from 30.6 minutes under the Baseline to 27.8 minutes with Connect SoCal. For transit, the average commute time will decrease from about 71 minutes under the Baseline to 70 minutes under the Plan.

### OUTCOME 3: SAFETY & PUBLIC HEALTH

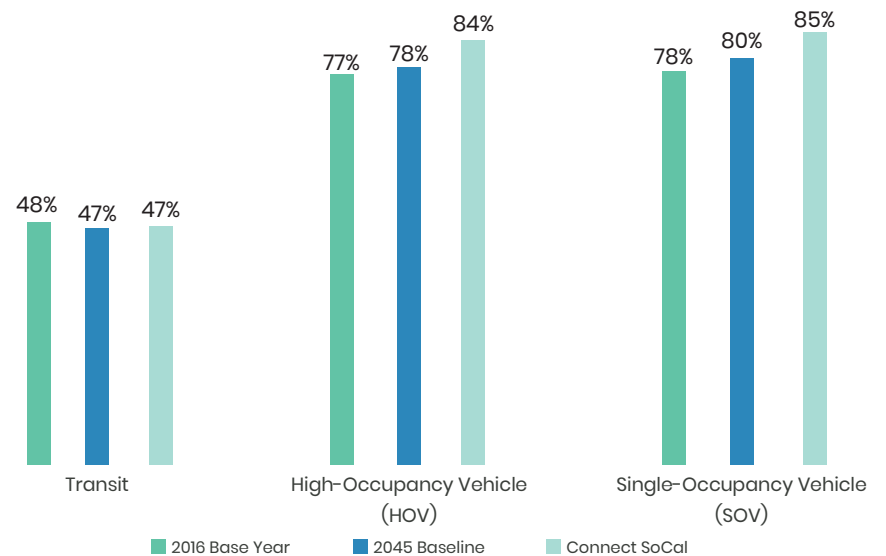
Connect SoCal includes several performance measures to evaluate the ‘Safety and Public Health’ outcome. The totality of impacts of regional transportation improvements on safety and public health are not easily modeled. However, the assessment of the number and severity of collisions occurring on our roadways

**FIGURE 5.5** Non-Recurrent Congestion Share by County



Source: SCAG Regional Travel Demand Model

**FIGURE 5.6** Work Trips Completed within 45 Minutes, PM Peak Period



Source: SCAG Regional Travel Demand Model

provides a useful means for monitoring the relative safety of the regional transportation system. The total number and rate of fatalities and of serious injuries resulting from collisions are the primary performance measures used to assess safety. It should be noted, however, that this methodology does not account for safety improvements specific to individual transportation modes. For purposes of ongoing regional performance monitoring, this measure is reported over time and by mode (including for active transportation modes). Please see the Connect SoCal Transportation Safety and Security Technical Report for more detailed analysis on regional safety performance and trends.

Connect SoCal seeks to improve the integration of transportation and land use planning with the recognition that our regional multimodal transportation system generates a wide range of impacts that significantly affect public health and quality of life. To assess public health outcomes of the Plan, SCAG consolidated several health-related performance measures. Please see the Public Health Technical Report for an analysis on Plan performance related to health outcomes. SCAG models several specific health-related metrics to evaluate how the Plan affects the public health outcome. These measures include:

- Incidences of air pollution-related respiratory illness
- Healthcare expenditures related to air pollution-related illnesses
- Mode share walking and bicycling
- Reduced rates of chronic disease and obesity due to improvements in physical activity
- Healthcare expenditures related to hypertension, heart disease, and type 2 diabetes for adults ages 18-65

Air quality significantly impacts public health in the SCAG region, as the amount of air pollutants released into the atmosphere is highly correlated to respiratory health issues, including asthma. There are four common criteria air pollutants that are monitored in the SCAG region in accordance with federal air quality regulations. These air pollutants include ozone, particulate matter (PM10 and PM2.5), carbon monoxide (CO), and nitrogen dioxide (NO2). These pollutants require careful monitoring because of their known adverse effects on human health. While children, older citizens and persons with existing respiratory illnesses are most vulnerable to the effects of air pollutants, the health impacts of long-term exposure are a concern for everyone in the region.

Airborne particulate matter comes in all sizes, however particles smaller than 10 micrometers in diameter are considered the most dangerous to human health because they are small enough to be absorbed into the lungs. High levels of carbon monoxide are also considered a health hazard, especially for people with compromised respiratory or coronary function, as CO is known to reduce the flow of oxygen through the human body. Long-term exposure to high levels of nitrogen dioxide, which is produced primarily through the burning of fossil fuels, may cause a narrowing of the bronchial airways, resulting in chronic wheezing or aggravation of asthma symptoms. For more detailed information regarding the performance of the criteria pollutant measures, please see the Connect SoCal Performance Measures Technical Report.

Improved opportunities for daily physical activity and adoption of healthy lifestyle choices are also quite relevant to the discussion of public health in the SCAG region. Connect SoCal improves physical activity-related public health outcomes through the promotion of more efficient and better coordinated land use and transportation planning. By increasing the share of shorter trips, more

**TABLE 5.2 Transit Mode Share: 2045, Connect SoCal**

County	Work Trips	All Trips
Imperial County	0.7%	1.4%
Los Angeles County	9.8%	7.0%
Orange County	2.2%	2.6%
Riverside County	1.2%	2.1%
San Bernardino County	1.7%	2.4%
Ventura County	2.0%	2.1%
<b>SCAG Region</b>	<b>6.1%</b>	<b>4.9%</b>

Source: SCAG Regional Travel Demand Model

opportunities are provided for use of active transportation. With development of an enhanced active transportation network, first/last mile improvements, Safe Routes to School projects and improved regional bikeway infrastructure, opportunities for healthy lifestyle choices are increased. Connect SoCal also improves access to natural lands, open space and parks, thereby increasing opportunities for physical activity and adoption of healthy lifestyle choices.

The linkage between obesity and chronic disease has been well documented. Providing the appropriate community design and infrastructure to support a more active lifestyle is an important first step toward promoting healthy communities in the SCAG region. Implementation of Connect SoCal is expected to contribute to a 15 percent increase in daily minutes walking per person and an increase in daily minutes of bicycling per capita of about 40 percent. This increase in daily physical activity would improve health outcomes related to obesity, hypertension, heart disease and type 2 diabetes. For a more detailed discussion of the Plan's public health implications, please see the Connect SoCal Public Health Technical Report.

As the health benefits associated with an active lifestyle have become increasingly recognized over recent years, there has been growing support for improving the walkability and bikeability of the communities where we live and work. To promote active lifestyle choices, the Plan evaluates mode share for both walking and bicycling. Connect SoCal increases the mode share for walking from 7.8 percent under the Baseline to 8.7 percent. For bicycling, the share increases from 1.7 percent under the Baseline to 2.1 percent with Connect SoCal.

## OUTCOME 4: ENVIRONMENTAL QUALITY

The 'Environmental Quality' performance outcome is assessed in terms of criteria air pollutant and GHG emissions. Based on the modeling results of SCAG's activity-based Regional Transportation Demand Model (RTDM), emissions are estimated using the California Air Resources Board (ARB) Emission Factors (EMFAC) model. Criteria air pollutant emissions are reported in detail as part of the Connect SoCal Transportation Conformity Analysis Technical Report. The impact of air quality on public health is discussed in the Safety and Public Health section of this chapter and monitoring of regional GHG emissions is further discussed in the Connect SoCal Performance Measures

Technical Report. A new 'Environmental Quality' outcome performance measure introduced for Connect SoCal is mode share for travel other than driving alone in a motor vehicle (non-SOV mode share). This metric is also supportive of federal MAP-21/FAST Act performance management and reporting requirements.

## OUTCOME 5: ECONOMIC OPPORTUNITY

Performance measures used to quantify the 'Economic Opportunity' outcome include the number of new jobs created due to an improved level of economic competitiveness in the SCAG region occurring as a result of Connect SoCal regional transportation system investments. This improved regional economic climate would result in the creation of approximately 264,500 new jobs generated annually over a wide range of employment sectors. In addition, an average of 168,400 new jobs would be generated each year directly through Connect SoCal transportation system construction and operations expenditures. Through implementation of the strategic investments contained in Connect SoCal, the SCAG region will save over \$346 million each year in healthcare expenditures associated with high blood pressure, heart disease and type 2 diabetes. These health cost savings may result in new economic activity due to increased disposable income.

The continued strength of the Southern California economy depends on a modern, well maintained regional multimodal transportation system. Goods movement, freight logistics and distribution, tourism, manufacturing and other primary employment sectors are key job generators for all six counties in the SCAG region, and each is very much dependent upon the availability of efficient, high quality transportation infrastructure. The robust investments in our regional transportation system provided through Connect SoCal will serve not only to improve mobility for people and goods throughout our region, but will also ensure the sustained health and vigor of our regional economy, fortifying Southern California's pivotal position within the state, national and global economies for generations to come. Additional economic co-benefits derived through Connect SoCal are referenced in the Economic and Job Creation Analysis Technical Report.

## OUTCOME 6: INVESTMENT EFFECTIVENESS

The 'Investment Effectiveness' performance outcome evaluates the degree to which the Plan's transportation system expenditures generate direct benefits to residents of the SCAG region in relation to the amount invested.

The benefit/cost ratio is the quantitative measure used to assess the 'Investment Effectiveness' outcome, as it compares the incremental benefits generated by Connect SoCal expenditures with the incremental costs of regional transportation system capital investments. The benefits are categorized into several categories, including:

- Travel time savings resulting from reduced travel delay
- Air quality improvements
- Safety improvements
- Reductions in vehicle operating costs

For these categories, travel delay and air quality models are used to estimate the benefits generated by Connect SoCal as compared with the Baseline. Many of these benefits are a function of reductions in travel distance (vehicle miles traveled) and in travel time (vehicle hours traveled).

To estimate the Connect SoCal benefit/cost ratio, the benefits generated for each category are converted into dollars and added together. These monetized benefits are then divided by the total incremental costs of the Plan's regional transportation system investments to produce a ratio.

The investments provided in Connect SoCal would provide a return of \$2.06 for every dollar invested. For this analysis, all benefits and costs are expressed in 2016 dollars. Benefits are estimated over the Connect SoCal planning period from 2020 through 2045. The user benefits are estimated using the California Benefit/Cost (Cal-B/C) framework and incorporate SCAG Regional Transportation Demand Model (RTDM) outputs. The costs include incremental capital expenditures over the entire 25-year Connect SoCal planning horizon.

## OUTCOME 7: TRANSPORTATION SYSTEM SUSTAINABILITY

A regional transportation system may be considered 'sustainable' if it maintains its overall performance over time in an equitable manner with minimal impact to the environment, while not compromising future transportation needs. Essentially, sustainability refers to how decisions made today impact future generations. One of the performance measures used to evaluate transportation system sustainability is the total inflation-adjusted cost per capita to maintain our existing regional multimodal transportation system in a state of good repair. Connect SoCal provides two additional measures to support preservation of our existing transportation system infrastructure: state highway system pavement condition and local roadways pavement condition.

Connect SoCal is committed to maintaining a sustainable transportation system by allocating a total of more than \$316 billion toward maintaining and operating the system in a state of good repair. This amounts to an average annual per capita investment of about \$562 per person for each year of the Plan. More details on the 'Transportation System Sustainability' performance measures and analysis results are presented in the Connect SoCal Chapter 4 (Paying our Way Forward) and the Performance Measures Technical Report.

## OUTCOME 8: ENVIRONMENTAL JUSTICE

Environmental Justice (EJ) is a federal and state requirement designed to ensure the fair treatment and meaningful involvement of all people and communities in the regional planning process regardless of race, color, national origin, or income. SCAG conducted a comprehensive EJ community outreach process and prepared a wide-ranging analysis during the development of Connect SoCal. A separate set of performance measures were developed for use in the EJ analysis and these measures are described later in this chapter.

The results of SCAG's comprehensive EJ analysis and community outreach process are presented in detail in the Connect SoCal Environmental Justice Technical Report.

## CONNECT SOCAL CO-BENEFITS

Connect SoCal provides substantial regional benefits and cost savings that extend beyond the performance variables used to evaluate the Plan. The more focused and compact land use patterns promoted by Connect SoCal serve to reduce the need for significant capital investments. Since most new development would be directed into areas where urban infrastructure already exists, there will not be as much need to extend or build new local roads, water and sewer systems and parks, although existing infrastructure may require enhancement. There will also be savings in operations and maintenance (O&M) costs. O&M costs include the on-going municipal expenditures required to operate and maintain the urban infrastructure needed to serve new residential growth.

The Connect SoCal land use strategies also reduce average household costs associated with driving and residential energy and water use. A land use configuration that features more mixed-use/walkable and urban infill development accommodates a higher proportion of growth in more energy-efficient housing types such as townhomes, apartments and smaller single-family homes, as well as more compact and energy efficient commercial buildings.

As California continues to experience constraints on water supplies due to periodic drought conditions throughout the state, which are likely to become more prevalent as we continue to encounter the challenges presented by climate change, there is a need to do what is possible to reduce residential water use. Residential water use is a function of both indoor and outdoor water needs, with outdoor use (landscape irrigation) accounting for much of the difference among housing types. Because homes with larger yards require more water for landscape irrigation, lot size is generally highly correlated with a household's overall water consumption. Therefore, a prevailing land use configuration with a greater proportion of large lot single-family homes will typically consume more water than one that features compact and urban infill development, which includes attached and multi-family homes.

**TABLE 5.3** presents some of the supplemental co-benefits provided by Connect SoCal.

## MEETING STATE & FEDERAL PLANNING REQUIREMENTS

In addition to meeting the ambitious regional goals and performance outcomes discussed in previous sections of this chapter, Connect SoCal prioritizes the attainment of all applicable federal and state performance requirements. As presented in depth in the Transportation Conformity Analysis Technical Report, Connect SoCal meets all federal provisions for transportation conformity as defined under the federal Clean Air Act (CAA). Cleaner fuels and emergent vehicle technologies will help to significantly reduce many of the pollutants that contribute to smog and other airborne contaminants that impact public health in the SCAG region.

## TRANSPORTATION CONFORMITY

Pursuant to the CAA, the U.S. EPA establishes and regularly updates the National Ambient Air Quality Standards (NAAQS), along with a set of planning and reporting requirements for designated criteria air pollutants. To comply with CAA requirements for achieving NAAQS, the ARB periodically prepares a State Implementation Plan (SIP) for each federally designated 'non-attainment' area (an area that does not meet NAAQS for one or more criteria pollutants), and 'maintenance' area (a previously designated non-attainment area that now meets NAAQS) within the State of California. The SIP provides a comprehensive plan of action for how an area will work toward achieving attainment and maintenance of NAAQS. Development of the SIP requires the collaboration of all applicable local air agencies and the ARB, working cooperatively with federal, state, and local agencies, including MPOs.

Demonstration of transportation conformity is required under the CAA to ensure that federally supported highway and transit project activities conform to, or are consistent with, the purpose of the applicable SIP. Conformity for the purpose of the SIP means that transportation activities including regional transportation plans, transportation improvement programs and transportation projects will not cause new air quality violations, worsen existing air quality violations, or delay timely attainment of the relevant NAAQS. Air quality conformity regulations apply to areas designated by the U.S. EPA as being in non-attainment or maintenance for the following transportation

**TABLE 5.3** Connect SoCal Co-Benefits

Benefit Category	Comparative Benefit Performance			
	2045 Baseline	Connect SoCal	Savings	% Savings
Local Infrastructure and Services Costs: Capital, operations, and maintenance costs to support new growth: 2016-2045	\$40.3 billion	\$36.4 billion	\$3.9 billion	9.7%
Household Costs: Annual transportation and home energy/water use: 2045	\$13,953	\$13,272	\$681	4.9%
Land Consumption: New (greenfield) land consumed to accommodate new growth: 2016-2045	100 square miles	71 square miles	29 square miles	29.2%
Building Energy Use: Residential and commercial buildings: Cumulative 2016-2045 (British Thermal Units)	15,546 trillion	15,396 trillion	150 trillion	0.9%
Building Energy Costs: Residential and commercial buildings: Cumulative 2016-2045	\$671.4 billion	\$666.4 billion	\$5.0 billion	0.7%
Building Water Use: Residential and commercial buildings: Cumulative 2016-2045 (Acre Feet)	89.7 million	88.1 million	1.6 million	1.8%
Building Water Costs: Residential and commercial buildings: Cumulative 2016-2045	\$122.5 billion	\$120.4 billion	\$2.2 billion	1.8%
Total Annual Vehicle Miles Traveled (VMT): 2045	483.5 million	459.1 million	24.4 million	5.0%

Source: SCAG Scenario Planning Model

related criteria pollutants: carbon monoxide (CO), nitrogen dioxide (NO<sub>2</sub>), ozone, and particulate matter (PM<sub>2.5</sub> and PM<sub>10</sub>).

Under the U.S. Department of Transportation Metropolitan Planning Regulations and the U.S. EPA's Transportation Conformity Regulations, Connect SoCal is required to pass the following four conformity tests in order to demonstrate transportation conformity:

- Regional Emissions Analysis
- Timely Implementation of Transportation Control Measures
- Financial Constraint
- Interagency Consultation and Public Involvement

The Regional Council adopts the initial Connect SoCal transportation conformity determination, while the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA) approve the final transportation conformity determination.

## CONFORMITY ANALYSIS & FINDINGS

As documented in the Transportation Conformity Analysis Technical Report, Connect SoCal meets all federal transportation conformity requirements and therefore demonstrates transportation conformity. The findings associated with the conformity tests are described in detail in the Connect SoCal Transportation Conformity Analysis Technical Report.

## GREENHOUSE GAS EMISSIONS REDUCTION

Although transportation conformity is a federal requirement and the reduction of GHG emissions is a state mandate, both requirements are highly interrelated. First, each of the Connect SoCal policies, strategies, programs and projects that contribute to meeting federal transportation conformity requirements are the same policies, strategies, programs and projects that support achievement of state GHG emissions reduction targets. Secondly, although transportation conformity addresses emissions of federally designated criteria pollutants and their precursors, these pollutants originate from the same source as GHG emissions: the combustion of fossil fuels in motor vehicles.

Plans and strategies that result in the reduction or elimination of the use of fossil fuels in motor vehicles serve to help Connect SoCal meet both federal transportation conformity requirements and state GHG emission reduction targets. In addition, the regional emissions analysis conducted to ensure transportation conformity and the analysis employed for evaluating GHG emissions reduction performance use the same regional transportation model and the same ARB EMFAC model. There is now greater awareness of the need for more concerted efforts at the federal, state and local levels to integrate the SIP development process with planning activities to address climate change. As a result, transportation conformity and GHG emissions reduction efforts will become even more interconnected and more mutually supportive.

As discussed throughout Connect SoCal, SB 375 requires SCAG to incorporate into its RTP a Sustainable Communities Strategy (SCS) to reduce per capita GHG emissions through integrated transportation, land use, housing and environmental planning.

SB 375 required the ARB to set per capita GHG emission reduction targets from passenger vehicles for each of the state's 18 MPOs. These regional targets were updated by the ARB in 2018 to ensure consistency with the more stringent statewide reduction goals subsequently introduced by the California legislature and the Governor's office. For the SCAG region, the updated targets are 8 percent below 2005 per capita emissions levels by 2020 (this value is unchanged from the previous 2020 ARB target), and 19 percent below 2005 per capita emissions levels by 2035. This revised 2035 target is significantly higher than the previous ARB target of 13 percent for the SCAG region.

Analysis of SCAG's ability to meet SB 375 targets relies on data outputs from SCAG's activity based model as well as supplemental off-model analysis. **TABLE 5.4** provides a simplified calculation overview of the performance of the plan related to GHG emissions reductions.

The Connect SoCal SCS has been found to meet state targets for reducing GHG emissions from cars and light trucks. Connect SoCal achieves per capita GHG emission reductions relative to 2005 levels of 8 percent in 2020, and 19 percent in 2035, thereby meeting the GHG reduction targets established by the ARB for the SCAG region. For the 2020 target, this achievement is based on modeled results as observed data is not yet available to confirm achievement. For more detailed information and analysis on the performance of Connect SoCal in regard to criteria air pollutant emissions and GHG reduction targets in the SCAG

region, please see the Transportation Conformity Analysis Technical Report and the Sustainable Communities Strategy Technical Report.

## FEDERAL PERFORMANCE MANAGEMENT REQUIREMENTS

In July 2012, the ‘Moving Ahead for Progress in the 21st Century’ (MAP-21) federal transportation authorization legislation was signed into law. MAP-21 was widely considered to be a groundbreaking achievement in that it provided a legislative foundation for the establishment of a national performance-based transportation planning program, which was continued with the subsequent federal authorization program, the ‘Fixing America’s Surface Transportation’ (FAST) Act, in December 2015.

MAP-21/FAST Act requires states and MPOs to establish performance targets focused on outcomes supportive of seven key national transportation goals related to transportation investment efficiency. These national performance goals include: 1) transportation system safety, 2) transportation infrastructure condition, 3) congestion reduction, 4) system reliability, 5) freight movement and economic vitality, 6) environmental sustainability and 7) reduced project delivery delay.

To provide a quantitative basis for evaluating progress toward achieving these seven national performance goals, MAP-21/FAST Act also tasked FHWA with the development of a corresponding set of performance measures and targets. The performance measures provide a standardized quantitative metric for monitoring progress toward meeting each of the national goals. Performance targets establish quantitative thresholds by which the measures may be interpreted as having made acceptable progress toward achieving a specific performance goal.

As required by MAP-21/FAST Act, FHWA established national performance measures and guidelines for the setting of statewide and regional performance targets. As provided for in the federal rulemaking, SCAG coordinated closely with Caltrans in the establishment of specific performance targets for the state and for our region in the various transportation performance areas established under MAP-21/FAST Act.

# GHG Reduction Targets for the SCAG Region

	2020	2035
ARB Target	8%	19%
Connect SoCal	8%*	19%
% Difference	0%	0%

Percent Reduction Relative to 2005 Levels (per capita)

*\*Observed data is not yet available. Achievement is based on modeled results and does not include off-model adjustment factors.*



FHWA established rules for implementing transportation system performance management planning at a national level. Rulemaking in support of MAP-21/FAST Act has provided performance management and target-setting guidance through three performance management (PM) packages:

- Transportation System Safety
- Pavement and Bridge Condition (National Highway System)
- National Highway System, Freight Movement, and CMAQ Program Performance

In addition to the three performance management packages, federal performance measures and reporting requirements were established for Transit Asset Management (TAM) and Transit Safety. Performance metrics for TAM focus on the maintenance of our regional transit system in a state of good repair. Transit assets to be monitored under this provision include:

1. Non-revenue support equipment and maintenance vehicles
2. Transit vehicles (rolling stock)
3. Rail infrastructure including tracks, signals, and guidance systems
4. Transit facilities including stations, parking structures and administrative offices

Transit safety performance monitoring is focused on assessment of the number of transit incidents resulting in fatalities or serious injuries, and on transit system reliability.

Each of the federal Performance Management packages features a corresponding set of specific performance measures for which statewide and regional performance targets must be set and reported to FHWA. A comprehensive MAP-21/FAST Act System Performance Report is included in the Connect SoCal Performance Measures Technical Report. The System Performance Report provides details regarding MAP-21/FAST Act performance measures and the associated statewide and regional targets for each of the federal performance management packages.

## ENVIRONMENTAL JUSTICE

Environmental Justice (EJ) is a federal and state mandate designed to help ensure social equity in the transportation planning and decision-making process, with the goal of protecting minority and low-income communities from incurring a disproportionate share of adverse impacts produced by regional transportation projects and plans. SCAG’s EJ program includes two essential elements: public outreach and technical analysis. Specifically, it is SCAG’s role to ensure that when transportation system investment decisions are being

**TABLE 5.4 2035 Greenhouse Gas Emission Reduction Calculation**

<b>Modeled Greenhouse Gas Emissions</b>	
This calculation reflects transportation investments, pricing strategies, transportation demand management strategies and land use strategies.	-14.89%
<b>Baseline Adjustment</b>	
Tele-Medicine and E-Commerce	-0.35%
<b>Off-Model Greenhouse Gas Emissions</b>	
Induced Demand	0.56%
Electric Vehicle Strategies	-1.76%
Emerging Technology (e.g. carshare and bikeshare)	-0.78%
Job Center and Commute Strategies (e.g. co-working)	-1.21%
Multimodal Strategies (e.g. Safe Routes to School)	-0.70%
<b>TOTAL GREENHOUSE GAS EMISSIONS</b>	<b>-19.12%</b>

made, low-income and minority communities have adequate opportunity to participate in the decision-making process and receive an equitable distribution of benefits, while not bearing a disproportionate share of burdens.

As such, SCAG adheres to all federal and state EJ directives. All public agencies that use federal funding must make EJ part of their mission and adhere to three fundamental EJ 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

Public outreach to EJ stakeholders and the EJ technical analysis conducted in support of Connect SoCal is described in detail in the Environmental Justice Technical Report. The Technical Report also provides a review of federal and state legislation pertaining to EJ, SCAG policies related to EJ, outreach efforts in communities throughout the region, SCAG's efforts to identify affected communities and an 'EJ Toolbox' which provides recommended practices and approaches that local jurisdictions and community organizations may use to guide further discussion on the identification of EJ solutions and mitigations.

In the development of the EJ analysis, SCAG identified 18 performance measures to analyze existing EJ parameters in the region and to address any potential adverse impacts that Connect SoCal may impose upon the various EJ communities throughout the region. SCAG also examined potential impacts at various geographic levels, and specifically employed a community-based approach for Connect SoCal based on guidance received from community stakeholders. A brief description of the EJ performance measures is provided in this section.

**TABLE 5.5** (at the end of this section) presents the Connect SoCal Environmental Justice performance measures.

## ENVIRONMENTAL JUSTICE PERFORMANCE MEASURES

A critical element in the development of Connect SoCal is the completion of a comprehensive EJ analysis. SCAG also conducted an extensive EJ outreach program with regional EJ stakeholders to maximize participation of all communities that may be affected by the development and implementation of Connect SoCal. SCAG established a separate set of performance measures to evaluate Connect SoCal impacts on designated EJ communities throughout the region.

The Connect SoCal EJ analysis includes a set of topical areas of inquiry designed to evaluate various social equity concerns. Each of the Connect SoCal EJ performance measures are described below. The 18 EJ performance measures are categorized into four EJ-focused questions as requested by stakeholders to make the performance areas more relatable. These four relatable questions are: 1) How will this impact quality of life; 2) how will this impact health and safety; 3) how will this impact the commute; and 4) how will this impact transportation costs? For more information regarding the SCAG EJ program and the detailed results of the Connect SoCal EJ analysis, please see the Environmental Justice Technical Report.

### HOW WILL THIS IMPACT QUALITY OF LIFE?

1. **Jobs-Housing Balance:** An imbalance between employment and housing in a community is a key contributor to local traffic congestion. These types of origin/destination disparities may also be considered impediments to EJ. From an economic standpoint, transportation and driving are expensive; workers without a car or cannot afford a vehicle have to live close to their jobs where they have access to transit or are able to walk or bike to their jobs. This metric seeks to identify any significant differences in commute distances, job-to-work ratios, and jobs-housing ratios among various income levels, between coastal counties and inland counties, and over time.
2. **Neighborhood Change & Displacement:** The integration and coordination of transportation and land use planning is recognized as a key strategy for reducing VMT, air pollution and GHG emissions, while also increasing opportunities for physical activity. However, there

are some equity concerns regarding some ‘smart growth’ strategies as they relate to housing affordability, specifically in as it relates to Transit-Oriented Development (TOD). The concentration of new growth in central cities and towns to limit sprawl may lead to higher household costs. In some cases where improved transit service has spurred significant new TOD, the result has been that people with low and average incomes are no longer able to afford to buy or rent homes in or near the new developments. In response to these concerns, SCAG developed a methodology to model and monitor demographic trends occurring in and around new transit-oriented communities. This measure examines historical demographic and housing trends for areas surrounding rail and transit stations. With this methodology, demographic changes may be tracked over time in key growth areas. The results will help SCAG and our regional partners better understand demographic shifts that have occurred due to development of TOD along transit lines.

3. **Accessibility to Employment & Services:** Accessibility to key destinations is vital for social and economic interactions. As a performance metric, accessibility is evaluated by the spatial distribution of potential destinations, the ease of reaching each destination by various transportation modes 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 may be reached within a specific budget – that is, the greater the accessibility. The number of destination choices that people have is equally crucial: the more destinations and the more varied the destinations, the higher the level of accessibility. This metric analyzes the share of employment and shopping destinations reachable within 30 minutes by automobile or 45 minutes by transit during evening peak periods to determine the accessibility of services in EJ communities
4. **Accessibility to Parks & Schools:** Accessibility to parks is defined as the percentage of park acreage that may be reached within 30 minutes of travel time by automobile or 45 minutes by transit. In support of the Connect SoCal EJ assessment, analysis was conducted to evaluate accessibility to the San Gabriel National Monument. SCAG’s accessibility analysis seeks to determine how the Plan improves residents’ ability to access parks within a designated travel time and distance. This analysis

is discussed in greater detail in the Connect SoCal Environmental Justice Technical Report.

## HOW WILL THIS IMPACT HEALTH & SAFETY?

5. **Active Transportation Hazards:** Encouraging a healthier, more active lifestyle in all our communities is one of the featured goals of Connect SoCal. Making walking and bicycling safer and more convenient transportation options is key to attracting more people to choose these healthy alternatives. Bicycling or walking along roadways near motor vehicles is often perceived as dangerous and reducing hazards in the pedestrian and cycling environment is a primary strategy toward achieving our goal of promoting healthier, more active communities. The ‘Active Transportation Hazards’ performance measure evaluates incidences of motor vehicle collisions involving bicyclists and pedestrians in our communities, with the goal of promoting an improved environment for active transportation users and encouraging more residents to make the choice to walk or bicycle in their communities. As with other EJ performance measures, this indicator will be used to identify patterns of active transportation hazards and potential risk disparities among the various communities in the SCAG region. For more information on active transportation safety, please see the Active Transportation Technical Report.
6. **Climate Vulnerability:** The ‘Climate Vulnerability’ performance measure seeks to identify disparities in vulnerability to the impacts of climate change among the various communities in the SCAG region. Of specific interest for this analysis is relative risk for sea level rise and wildfires. It is understood that climate change will impact different regions in different ways. In Southern California, we may expect a general trend toward warmer temperatures, less precipitation and higher sea levels along our coasts. This combination of climatic changes will likely result in increased wildfire danger, particularly in the foothill areas, where our cities adjoin our local mountains. Due to rapidly melting polar ice caps, a steady rise in global sea levels is expected. This may impact the coastal regions of Southern California. This measure will allow SCAG to obtain a better understanding of how these anticipated changes in our local climate may impact our more

vulnerable communities.

7. **Public Health Impacts:** The 'Public Health Impacts' metric seeks to assess the potential disparity among communities in the SCAG region of public health issues that may be associated with local exposure to toxic substances and to transportation infrastructure. Like the Active Transportation Hazards measure, inclusion of this analysis is intended to advance the regional goal of fostering healthier lifestyle choices in our communities. It is a priority of Connect SoCal to provide for more and better opportunities for healthy lifestyle choices throughout the region. For more information on public health, please see the Public Health Technical Report.
8. **Aviation Noise Impacts:** The SCAG region supports the nation's largest regional airport system, in terms of the number of airports and overall aircraft operating within a complex airspace environment. The aviation system includes seven airports with commercial passenger service: Los Angeles International (LAX), Hollywood/Burbank, John Wayne (Orange County), Long Beach, Ontario, Palm Springs, and Imperial. In addition, there are four large reliever airports located in the Inland Empire and in North Los Angeles County, including San Bernardino International Airport, March Inland Port, Southern California Logistics Airport, and Palmdale Airport. The regional aviation system also includes more than 30 general aviation and reliever airports, several private-use and government airports, and 14 public use airports not included in the national airport system – for a total of more than 60 airports in the region. The primary aviation planning challenge in the SCAG region is striking a balance between the aviation capacity needs of Southern California and maintaining the quality of life for people living near airports. This performance measure provides a descriptive analysis of aviation noise in terms of trends in passenger demand and aircraft operations.
9. **Roadway Noise Impacts:** The SCAG region has an extensive roadway system, with nearly 24,000 centerline miles or over 73,000 lane miles of regionally significant roadways. It also includes one of the country's most extensive HOV systems and a growing network of high-occupancy toll (HOT) lanes. The region also has a vast network of arterials and other local roadways, and the noise generated by these facilities may cause significant environmental concerns. Noise associated with highway traffic depends on multiple factors including traffic volumes,

vehicle speed, vehicle fleet mix (cars, trucks) and the location of the highway relative to schools, daycare facilities, parks and other sensitive receptors. This performance measure assesses transportation-related noise impacts by examining how the program of projects included in Connect SoCal may affect roadway noise levels, and by determining the population groups that may potentially be most impacted by increased levels of roadway noise.

10. **Emissions Impact Analysis:** The EJ emissions impact analysis seeks to identify areas in the region that generate a disproportionate share of air pollutant emissions as a result of Connect SoCal. This analysis also includes a breakdown of demographics for those affected areas.
11. **Impacts Along Freeways & High-Traffic Roadways:** Exposure to air pollutants is an EJ issue due to the disproportionate share of minority and low-income populations living near heavily traveled corridors, particularly freeways and port and logistics activities. Exposure to unhealthy air is estimated to result in approximately 5,000 premature deaths annually in the SCAG region, as well as 140,000 incidents of asthma and symptoms of respiratory distress. More than half of all Americans exposed to PM2.5 levels that exceed the national standard live in the SCAG region. This performance metric examines the potential impact of Connect SoCal on the generation of particulate matter and ozone emissions in areas near freeways and other highly traveled corridors.

## HOW WILL THIS IMPACT THE COMMUTE?

12. **Travel Time Savings & Travel Distance Savings:** SCAG assessed the distribution of both travel time and travel distance savings that result from the implementation of Connect SoCal, through the analysis of demographic and mode share data for each Transportation Analysis Zone (TAZ) in the region. With this input, travel time and distance savings estimates were developed for various income and ethnic groups for transit trips (bus and rail) and for automobile trips.
13. **Rail-Related Impacts:** Freight rail emissions are estimated to account for 5 percent of all NOx emissions and 4 percent of all particulate matter emissions generated by regional goods movement activities. When compared with all regional particulate matter and NOx sources, the contributions by 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 may contribute to localized air pollution. In support of this outcome, SCAG conducted an extensive analysis of potential impacts to EJ communities adjacent to railroads and rail facilities and of rail-related impacts to designated sensitive receptors. For more detailed information regarding the SCAG regional rail system, please see the Goods Movement Technical Report.

## HOW WILL THIS IMPACT TRANSPORTATION COSTS?

14. **Share of Transportation System Usage:** SCAG analyzed the use of various transportation modes by race/ethnicity and by income group, with the objective of identifying transportation mode share consistencies among various ethnicity groups and income levels in the SCAG region.
15. **Connect SoCal Revenue Sources & Tax Burdens:** Various types of transportation improvement revenue sources (taxes on income, property, sales and fuel) may impose disproportionate burdens on low-income and minority populations. Sales and gasoline taxes, which are currently 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 broken down to demonstrate how tax burdens fall on various demographic and income groups. As with previous RTP EJ assessments, the Connect SoCal EJ analysis examined in detail the incidence, distribution and relative burden of taxation.
16. **Connect SoCal Investments:** The strategies that public agencies pursue to invest in transportation systems present potential impacts on EJ. Transportation investment strategies and policies determine the number and quality of transportation choices that are available to low-income and minority communities. An investment analysis that reveals a disproportionate allocation of resources for high quality transit projects, for example, may indicate a pattern of discrimination.
17. **Geographic Distribution of Transportation Investments:** This metric examines where Connect SoCal transportation investments are planned throughout the region. Building upon the community-based approach used in SCAG's overall EJ process, a summary of investments

for areas with high concentrations of minority and/or low-income populations is compiled for Connect SoCal highway, transit and active transportation investments.

18. **Mileage-Based User Fee Impacts:** This analysis is based on a potential transportation improvement financing strategy which would implement a user fee based on VMT. If implemented, the VMT user fee would replace the current gasoline tax and is estimated to cost about 2.5 cents (2019 value) per mile and would be indexed to maintain its purchasing power starting in 2030. Implementation of this financing strategy would require action by both the California State Legislature and the U.S. Congress. This performance measure evaluates the potential land use impacts that may result from implementation of such a fee.

## SUMMARY OF PLAN PERFORMANCE

The comprehensive program of transportation system improvement projects, regional sustainability strategies and land use-transportation coordination policies proposed by Connect SoCal serve to advance the regional goals. Performance outcomes and performance measures are the tools used by SCAG to evaluate how well the Plan performs toward achieving those objectives.

Common elements among the various Connect SoCal outcomes and performance metrics are a unified commitment to the strengthening of the transportation-land use connection, the promotion of sustainable land use policies throughout the region, and the reduction of GHG emissions that contribute to climate change. Connect SoCal strengthens the transportation-land use connection through its focus on orienting new housing and job growth in areas served by high quality transit, and into other infill areas where urban infrastructure already exists. This more compact and sustainable land use pattern, combined with the transportation network improvements and strategies identified in Connect SoCal, will result in an improved pedestrian and bicycle environment, access to more community amenities, shorter average trip lengths, reduced VMT and better regional air quality.

The Connect SoCal performance outcomes and measures also support the development of more livable communities that provide housing choices for all income levels, encourage conservation of our natural resources, offer more

and better transportation options and promote an improved quality of life for residents of the SCAG region.

The overall objective of Connect SoCal is to provide a means to transform the SCAG region in accordance with the vision provided by our constituent communities and jurisdictions. Among the performance outcome areas where Connect SoCal demonstrates significant transformative capacity is in Location Efficiency. As discussed earlier in this chapter, Location Efficiency refers to improvements in the coordination of land use and transportation planning and decision-making to promote development of more sustainable communities throughout the region that are less dependent on SOV travel and reduce regional VMT and GHG emissions. Focusing new residential and commercial development in HQTAs serves this outcome by situating employment centers and new housing closer to reliable transit options, thereby providing viable alternatives to driving alone to the workplace and to other destinations. HQTAs also foster the mixing of both employment and housing, further enhancing opportunities to reduce commute times and distances.

Under the 2045 Baseline scenario, just over 45.2 percent of new households would be located in HQTAs. With Connect SoCal, the share of new households in HQTAs increases by six percent to 51.2 percent. The share of employment in HQTAs, increases even more dramatically going from 44.8 percent under the Baseline to nearly 60 percent with the Plan, an increase of more than 15 percent. With more people living and working within locations proximal to efficient and convenient transit options, traffic congestion on our freeways and arterial roadways will be reduced accordingly. Another substantial Location Efficiency improvement provided by Connect SoCal is in the reduction of urban sprawl into the rural periphery of our region. Under the Baseline, urbanization would consume 100 square miles of previously rural areas. Connect SoCal reduces this expansion to only 71 square miles, a reduction of 29 percent. The preservation of rural and agricultural lands on the periphery of our region will allow future generations to enjoy the grandeur of our deserts and the rich harvests of our local farmlands.

VMT per capita is another performance area where Connect SoCal excels. Under the Baseline, SCAG region residents would drive an average of 21.8 miles per day. Connect SoCal would reduce this figure to 20.7 miles per day. While one mile per day doesn't seem like very much, when considering the SCAG region is

expected to be home to 22.5 million people by 2045, that decrease of one mile in per capita VMT becomes quite meaningful.

Another area where Connect SoCal demonstrates significant strength is in the reduction of travel delay. Person hours of delay experienced on the mixed flow lanes of our highways is expected to decrease by 26 percent in comparison to the 2045 Baseline projection, while delay on our arterial roadways will decrease by 24 percent. Traffic congestion is a significant quality of life issue in the SCAG region and these reductions in travel delay on our roadways will result in less time spent stuck in traffic, more time available to use for more satisfying activities, and therefore less stress for residents of the SCAG region.

**TABLE 5.5 Environmental Justice Performance Measures**

Performance Measure	Definition	Performance Target	Summary of Impacts
Jobs/housing balance	Comparison of median earnings for intra-county vs inter-county commuters for each county; analysis of relative housing affordability and jobs throughout the region	Establish existing conditions to evaluate future performance (not a Connect SoCal performance measure)	Higher wage workers tend to commute longer distances than lower wage workers. Coastal counties have a substantial concentration of low-wage jobs, but lack an adequate number of affordable rental units, while inland counties have a substantial concentration of affordable rental units and workers relative to the number of low-wage jobs. Connect SoCal will improve jobs/housing balance throughout the region, particularly in inland counties.
Neighborhood change and displacement	Examination of historical and projected demographic and housing trends for areas surrounding rail transit stations	Establish existing conditions to evaluate future performance (not a Connect SoCal performance metric)	New light rail stations may increase neighborhood outflow rates by up to ten percent. However, most observed moves were for middle and upper income groups. Project-based analysis provides a better understanding of local neighborhood dynamics and helps ensure equitable access to the benefits of improved infrastructure. Regional neighborhood analysis identified several communities that have experienced persistent change over recent decades, however, they are not disproportionately located in EJ communities.
Accessibility to employment and services	Share of employment and shopping destinations reachable within 30 minutes by automobile or 45 minutes by transit during evening peak period	No unaddressed disproportionately high adverse effects for low income or minority communities	Connect SoCal will improve the number of accessible destinations within 45 minutes of travel and within short distances for low income and minority communities both by auto and transit.
Accessibility to parks and educational facilities	Share of park acreage reachable within 30 minutes by automobile or 45 minutes by transit during evening peak period	No unaddressed disproportionately high adverse effects for low income or minority communities	Connect SoCal will improve the number of destinations accessible within 45 minutes of travel and short distances for low income and minority communities both by auto and transit.
Active transportation hazards	Analysis of population by demographic group for areas that experience highest rates of bicycle and pedestrian collisions	Establish existing conditions to evaluate future performance	Analysis indicates that low-income and minority communities tend to incur a higher rate of bicycle and pedestrian risk. Improvements in active transportation infrastructure and complete streets measures, such as those proposed in Connect SoCal, have been shown to reduce hazards to cyclists and pedestrians.

**TABLE 5.5 Environmental Justice Performance Measures – Continued**

Performance Measure	Definition	Performance Target	Summary of Impacts
Climate vulnerability	Population analysis by demographic group for areas potentially impacted by substandard housing, sea level rise, wildfire risk, or extreme heat effects related to climate change	Establish existing conditions to evaluate future performance (not a Connect SoCal performance metric)	Minority and low-income populations are at greater risk for experiencing negative impacts of climate change, including extreme heat and flooding. These communities have fewer resources to ameliorate climate consequences.
Public health analysis	Summary of historical emissions and health data for areas with high concentrations of minority and low income population	Establish existing conditions to evaluate future performance (not a Connect SoCal performance metric)	Air quality is generally improving throughout the SCAG region, however some areas not showing improvement feature higher proportions of minority and low income population. When examining regional public health performance, areas with the highest concentrations of minority and low-income population often incur some of the highest risks.
Aviation noise impacts	Descriptive analysis of aviation noise in terms of trends in passenger demand and aircraft operations	Establish existing conditions to evaluate future performance	Airport noise impacts affecting adjacent communities have been reduced through enhanced FAA noise certification standards, improved technology implemented by aircraft and engine manufacturers, investments by U.S. airlines in newer, quieter aircraft, and mandates by the FAA and the U.S. Congress to retire older, noisier aircraft. However, aviation noise levels and impacts will continue to be monitored for minority and low-income communities located near airports.
Roadway noise impacts	Comparison of Plan and Baseline scenarios, identification of areas that are low performing due to Connect SoCal investments; breakdown of population for impacted areas by ethnicity and income	No unaddressed disproportionately high adverse effects for low income or minority communities	Connect SoCal will reduce roadway noise impacts at the regional level, but does not specifically improve impacts for disadvantaged communities.
Emissions impact analysis	Comparison of Plan and Baseline scenarios; identification of areas that are lower performing as a result of the Plan, including a breakdown of demographics for those areas	No unaddressed disproportionately high adverse effects for low income or minority communities	Connect SoCal will result in reductions in vehicle carbon monoxide and particulate matter emissions, providing air quality benefits to minority and low-income households and to communities with a high concentration of minority and low income population.



**TABLE 5.5 Environmental Justice Performance Measures - Continued**

Performance Measure	Definition	Performance Target	Summary of Impacts
Impacts along freeways and highly traveled corridors	Comparison of Plan and Baseline scenarios and demographic analysis of communities in close proximity to freeways and highly traveled corridors	No unaddressed disproportionately high adverse effects for low income or minority communities	Connect SoCal will result in an overall reduction in emissions in areas located near highly traveled roadways, which tend to have a higher concentration of minority and low-income groups than the region as a whole.
Travel time and travel distance savings	Assessment of comparative benefits received as a result of Connect SoCal investments by demographic group in terms of travel time and travel distance savings	No unaddressed disproportionately high adverse effects for low income or minority communities	Connect SoCal travel time and distance savings for low-income households and minority communities are proportionate to each group's usage of the transportation system.
Rail-related impacts	Breakdown of population by demographic group for areas in close proximity to rail corridors and planned grade separations	No unaddressed disproportionately high adverse effects for low income or minority communities	Minority and low income communities in areas adjacent to railroad grade separation projects do not demonstrate improvement.
Share of transportation system usage	Comparison of transportation system usage by mode for low income and minority households relative to each group's regional population share	No unaddressed disproportionately high adverse effects for low income or minority communities	Low-income and minority groups show a higher usage of transit and active transportation modes and positions these communities to benefit from the investments in Connect SoCal.
Connect SoCal revenue sources in terms of tax burdens	Proportion of Connect SoCal revenue sources (taxable sales, income, and gasoline taxes) generated from low income and minority populations	No unaddressed disproportionately high adverse effects for low income or minority communities	Households in poverty would not contribute disproportionately to the overall funding of Connect SoCal. Minority households would not pay a higher proportion of taxes to fund the Plan than their relative representation in the SCAG region as a whole.
Connect SoCal investments	Analysis of Connect SoCal investments by mode (bus, HOV lanes, commuter/high speed rail, highways/arterials, and light/heavy rail transit)	No unaddressed disproportionately high adverse effects for low income or minority communities	The share of Connect SoCal transportation investments serving low-income and minority communities outpaces the relative share of financial burden on those groups.

**TABLE 5.5 Environmental Justice Performance Measures - Continued**

Performance Measure	Definition	Performance Target	Summary of Impacts
Geographic distribution of Connect SoCal transportation investments	Evaluation of Connect SoCal transit, roadway, and active transportation infrastructure investments in various communities throughout the region	No unaddressed disproportionately high adverse effects for low income or minority communities	Connect SoCal transportation infrastructure investments are distributed throughout the region in proportion to population density.
Mileage-Based User Fee impacts	Examination of potential impacts from implementation of a mileage-based user fee on low income households in the region	No unaddressed disproportionately high adverse effects for low income or minority communities	No disproportionate impact is found. Analysis indicates that a mileage-based user fee would be less regressive and more equitable to low-income residents than the current gasoline tax. Low income households currently pay more per mile in gasoline tax than their higher earning counterparts due to lower adoption rates of new (more fuel efficient) vehicles. With a mileage-based user fee system, all households will pay in proportion to their usage of the transportation system.

Source: SCAG