CHAPTER 7 System Performance

Performance-based planning is a strategic approach that uses key information to help inform investment decisions. The performance of the previous regional transportation plan for Santa Cruz County completed in 2014 was analyzed in detail to determine how well the constrained list of transportation projects and programs advance the goals and targets established for the 2014 RTP and affect the county's future. The analysis that was performed is still largely applicable to the 2040 RTP given that the project list for the 2040 RTP has not changed substantially from the 2014 version. The performance measure analysis that was developed for the 2014 RTP can be found in **Appendix D** for reference. The 2040 Monterey Bay Area Metropolitan Transportation Plan – Sustainable Communities Strategy also presents a performance measures analysis for the larger AMBAG region and this analysis can be found on the AMBAG website (http://www.ambag.org).

The 2040 RTP focuses the system performance on presenting available data that monitors the performance of the transportation system to date. Data to monitor the transportation system can be challenging and expensive to acquire. The information presented below utilizes data that was gathered from a variety of sources. Data is not available at this time to monitor all of the measures in the 2040 RTP although many of the more fundamental indicators (injuries and fatalities, vehicle miles traveled, greenhouse gas emissions, pavement condition) are presented below.

GOAL 1. Establish livable communities that improve people's access to jobs, schools, recreation, healthy lifestyles and other regular needs in ways that improve health, reduce pollution and retain money in the local economy.

Improve people's ability to meet most of their daily needs without having to drive. Reduce smog-forming pollutants and greenhouse gas emissions.

Target: Reduce per capita fuel consumption and greenhouse gas emissions by 1 percent by 2020, 5 percent by 2035 and 6 percent by 2040 through a reduction in vehicle miles traveled and improved speed consistency.

If there was information for only one measure to monitor the performance of the transportation system, vehicle miles traveled is the measure to monitor. Vehicle miles traveled or VMT is the total number of miles of vehicle travel within a specified area. Changes in vehicle miles traveled provides information about whether congestion, air quality (including GHG emissions), health, and ability to walk, bike or take transit, is increasing or decreasing over time. The number of vehicle miles traveled for Santa Cruz County

can be determined a few different ways. **Figure 7.1** shows estimates of average daily VMT since 2005 from the Highway Performance Monitoring System (HPMS) implemented by Caltrans. The vehicle miles traveled data estimated through the HPMS is calculated using traffic count data collected on both the highway system and the local street and road network. This VMT represents the amount of travel for all vehicles within Santa Cruz County borders. The data shows that the high was in 2005 with a gradual decrease in total VMT until 2011 and then a slightly upward trend to 2015. [Note: The 2010 data point likely represents an error in the counts used to determine the VMT.] The changes in total VMT can be due to a change in population and/or a change in the amount people drive a vehicle.

On this same figure (**Figure 7.1**) is the average daily VMT per capita that is calculated by dividing the total vehicle miles traveled by the population of the county. VMT/capita represents the average amount people drive daily. The data shows that the maximum amount of VMT/capita occurred in 2005. The amount of driving per person steadily decreased since 2005 and then has leveled off in the last few years.

The GHG emissions/capita target due to changes in VMT (and not vehicle technology changes) is represented by the VMT/capita data. **Figure 7.1** shows that the 2015 VMT/capita from the HPMS is reduced by more than 7% compared to the 2005 base year and if the trend continues there will be a 15% reduction in VMT/capita by 2020 compared to 2005.

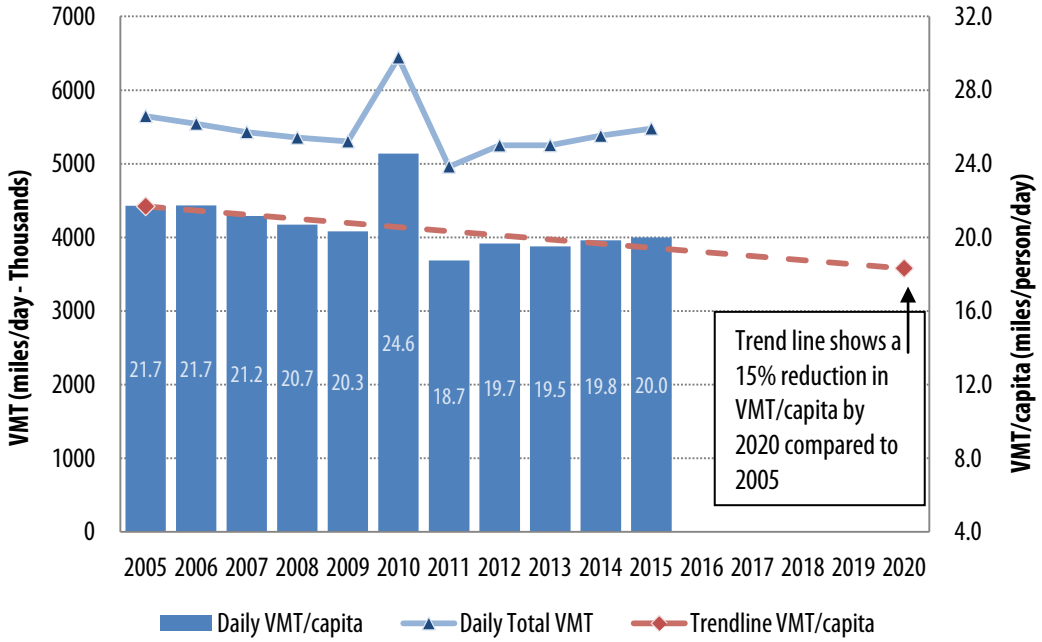


Figure 7.1 – Daily Vehicle Miles Traveled (Total and Per Capita)

Source: Highway Performance Monitoring System, Caltrans.
Data from 2010 was removed from trend line calculation due to likelihood of inaccurate count data used to determine VMT.

Vehicle miles traveled for Santa Cruz County can also be estimated using a travel demand model (**Figure 7.2**). The Association for Monterey Bay Area Governments (AMBAG) runs the travel demand model for the region. The AMBAG model is used for developing the Metropolitan Transportation Plan – Sustainable Communities Strategy which is developed in collaboration with the Santa Cruz County RTP (as well as the Monterey and San Benito RTPs). The model results shown here are the Santa Cruz County portion of the full fleet vehicle miles traveled results for the 2040 MTP-SCS. Results also include

postprocessing VMT reductions for 2040 for projects that the model is not sensitive to based on analysis from the 2014 RTP. A postprocessing reduction of 4.6% was used, down from 5.46%, due to less transit projects in the 2040 RTP in comparison to the 2014 RTP. See **Appendix D** for postprocessing discussion from the 2014 RTP.

The modeled data shows a reduction in VMT/capita relative to the 2005 base year of approximately 8% by 2020 and 10.7% by 2040 (**Figure 7.2**). The modeled *total* VMT in future years is increasing primarily due to population growth. Through prioritization of projects that promote transit use, biking, and walking, as well as changes in land use that shorten the distance people travel from home to work and home to shopping, per capita VMT and thus per capita CO_2 emissions will continue to be reduced. This RTP prioritizes numerous projects that encourage walking, bicycling, and taking transit as an alternative to driving especially near major activity centers. Approximately 12% of the constrained RTP project list is designated for pedestrian and bicycling improvements and programs and approximately 37% is designated for transit services. See **Chapter 6** for more details on projects that will help to advance this goal.

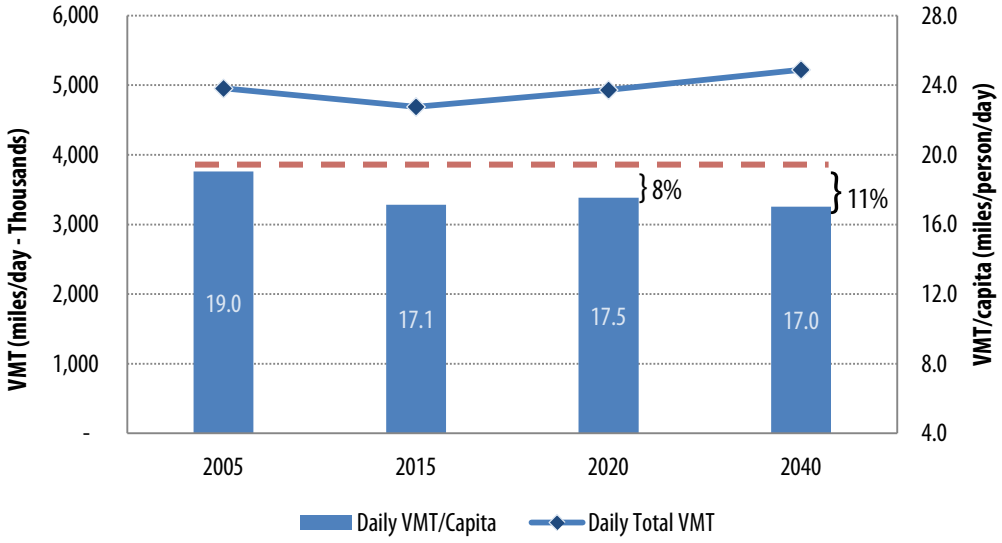


Figure 7.2 – Model Results of Santa Cruz County Daily Vehicle Miles Traveled (Total and Per Capita)

Source: AMBAG Travel Demand Model Projections and Postprocessing Reductions. Based on Implementation of 2040 RTP Project List

Target: Reduce total greenhouse gas emissions from transportation by 1 percent by 2020 and 60 percent by 2040 (compared to 2005) through electric vehicle use, other emerging technologies, reduction in vehicle miles traveled and improved speed consistency.

Climate change is the most significant global challenge of the 21st century. Reducing greenhouse gas emissions from all sectors in order to reduce the effects of climate change is a top priority for California. Gasoline and diesel fuels used to power our cars are significant contributors to greenhouse gas emissions. Reducing these emissions is a goal of the 2040 RTP. A sixty percent reduction in total greenhouse gas emissions by 2040 is consistent with California Executive Order B-16-12 to reduce total greenhouse gas emissions from transportation by 80 percent below 1990 levels by 2050, and California Executive Order B-30-15 to reduce greenhouse gas emissions by 40 percent below 1990 levels by 2030.

Data for assessing trends in greenhouse gas emissions from Santa Cruz County can be gathered from a couple of different sources. **Figure 7.3** shows the total amount of CO_2 generated from gasoline and diesel fuel sales in Santa Cruz County from 2010 to 2016. [Note: the 2014 data point is likely not representative of fuel sales for this year given the low value compared to other years.] The decrease in GHG between 2010 and 2016 is approximately 6% which represents reductions in GHG emissions from transportation due to changes in vehicle miles traveled, speed consistency, population and vehicle technology that affect the vehicle fleet mix on the road. The targets for 2020, 2030 and 2050 reflect the 0% and 40% and 80% reduction targets for total GHG relative to 1990 set by the state but given the lack of fuel sales data for 1990 (or 2005 which is base year used for SB 375), the reductions are compared to the 2010 fuel sales. CO_2 reductions per capita are also plotted in **Figure 7.3.** The GHG per capita emissions are reduced by 11% between 2010 and 2016. The per capita percent reduction is greater than the reduction in total GHG due to the increase in population.

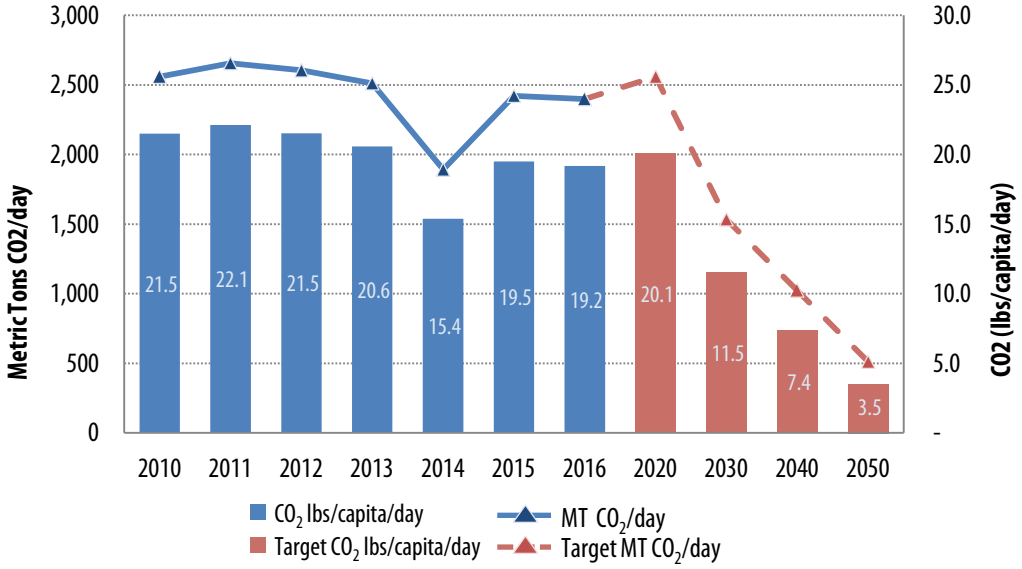


Figure 7.3 – Historic and Target Santa Cruz County Greenhouse Gas Emissions from Transportation

Source: *California Energy Commission, Retail Fuel Outlet Annual Report Results*[1]

Greenhouse gas emissions can also be estimated using a combination of a travel demand model and the California Air Resources Board emission factors model (EMFAC2014). The travel demand model estimates vehicle miles traveled based on future transportation scenarios and the emission factors model takes the VMT data along with existing and projected vehicle fleet mix data to estimate CO_2 emissions. **Figure 7.4** is based on the VMT of the full fleet of vehicles on Santa Cruz County roadways from the AMBAG model, the VMT postprocessing reductions discussed earlier and the CO_2 emissions data from the EMFAC2014 model. The modeled data that is forecasted for 2040 shows a decrease in total GHG emissions of 45% which does not meet the target of 60% reduction in total GHG emissions by 2040. The reduction in GHG by 2040 is based on projecting many factors one of which is the number of electric vehicles on our roadways in future years. The EMFAC2014 model was written prior to Executive Order B-16-12 to increase the number of electric vehicles to 1.5 million on our roadways by 2025 and that all personal transportation would be electric by 2050. The EMFAC2014 model assumes only 9% of the vehicle miles traveled in 2040 (**Figure 7.5**) would be due to electric vehicles which is likely to be significantly underestimated due to the more recent California legislation and work that is being done to meet this requirement.

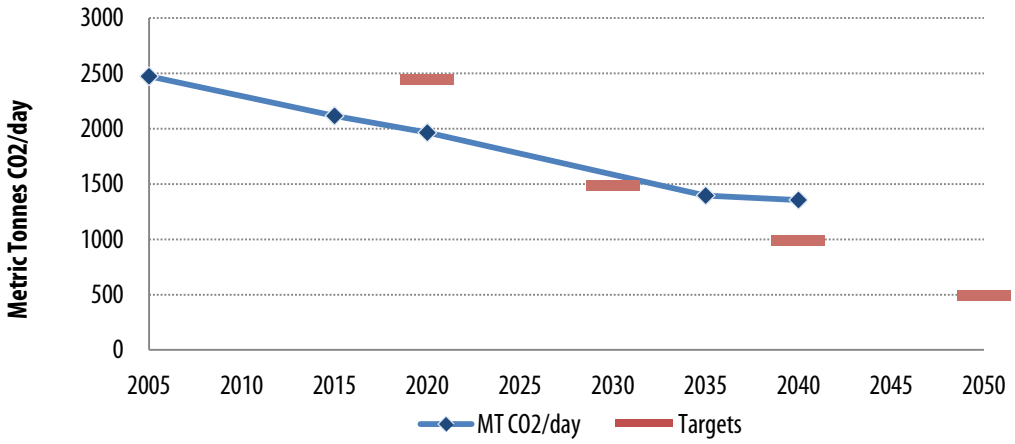


Figure 7.4 – Total Modeled CO2 Emissions from Transportation in Santa Cruz County

Source: AMBAG Travel Demand Model and California Air Resources Board EMFAC2014 Model Results

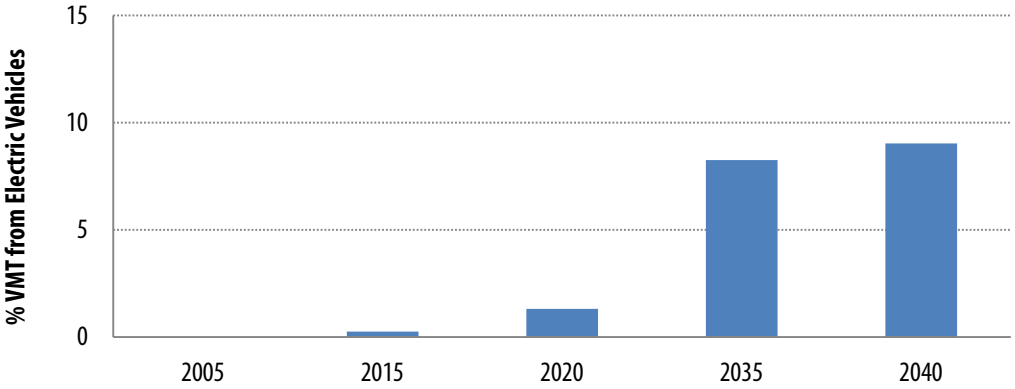


Figure 7.5 – Percentage of Vehicle Miles Traveled from Electric Vehicles by Year Assumed in California Air Resources Board Emissions Factor Model (EMFAC2014)

Source: California Air Resources Board Emission Factor Model (EMFAC2014)

A comparison of the CO2 per capita emissions based on fuel sales shows that in 2016, Santa Cruz County is in the mid to lower range of per capita GHG emissions relative to many other counties in CA (**Figure 7.6**). There is much to be done in Santa Cruz County and in the rest of California to meet the targets for total GHG emission reductions.

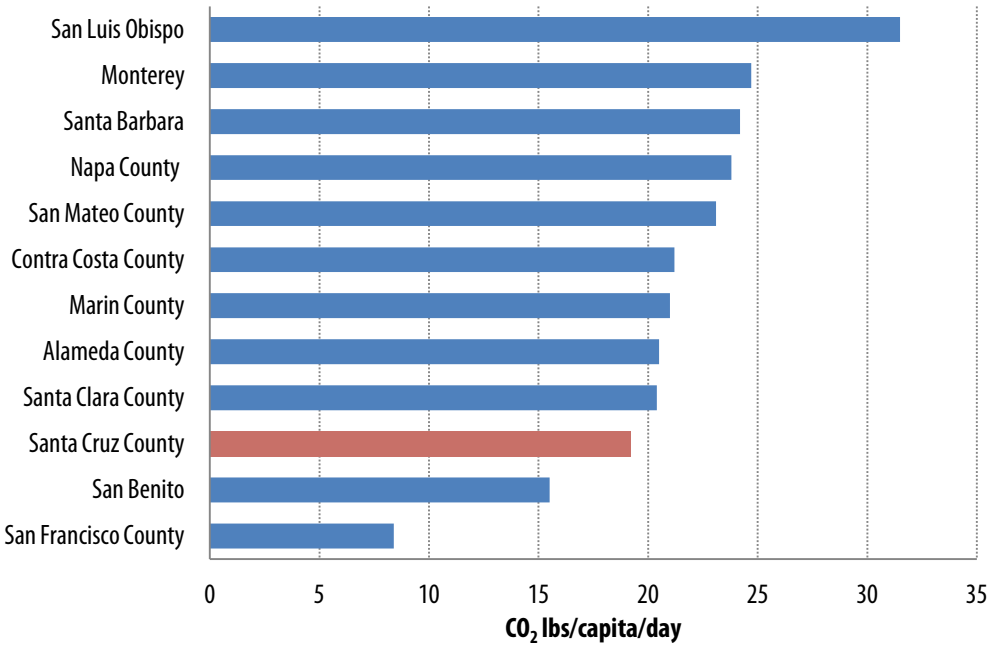


Figure 7.6 – 2016 CO2 lbs/capita/day based on fuel sales

Source: California Energy Commission, Transportation Fuels Data

Reduction in greenhouse gas emissions from transportation is based primarily on decreasing how much we drive and improvements in vehicle technologies that reduce the use of fossil fuels. This RTP prioritizes projects that promote transit use, biking and walking as an alternative to driving to reduce vehicle miles traveled as discussed above and in **Chapter 6**. Improvements in vehicle technology are not under the purview of the Regional Transportation Commission but are tracked here to provide information on how Santa Cruz County is advancing California's GHG emission reduction goals for transportation. The California Air Resources Board updated the Climate Change Scoping Plan in 2017[2]. This plan describes the existing and proposed strategies for reducing greenhouse gas emissions from all sectors including transportation. Strategies for transportation include reducing VMT through promotion of sustainable communities, increased active transportation and transit, and modernization of rail; implementing the advanced clean car program which requires vehicle manufacturers to produce an increasing number of low and zero emission vehicles; supporting federal and state incentive programs for increasing use of zero emission vehicles; and acceleration of clean fuel programs to name just a few of the strategies that are being addressed at the state level.

Improve health by increasing the percentage of trips made using active transportation options, including bicycling, walking and transit.

Target: Decrease single occupancy trip mode share by 4 percent by 2020 and by 9 percent by 2040.

Target: Increase the number of active transportation trips by 5 percent of total trips by 2020 and by 18% of total trips by 2040.

Replacing trips traditionally made in a vehicle with walking, bicycling, or taking transit can lead to improved health through regular physical activity and reduced obesity rates. Increased walking, bicycling and taking transit can also reduce congestion on our roadways. Data is available for commute trip mode share from the American Community Survey (ACS). The mode share data from the ACS is presented in **Figure 7.7** which shows that the percentage of drive alone trips has stayed constant between 2000 and 2011-2015, the percentage of shared ride has decreased and the percentage of biking and work from home have both increased.

The California Household Travel Survey (CHTS) data was collected by Caltrans in 2011-2012 to provide data on travel patterns for regional planning. The CHTS data for Santa Cruz County provides an estimate of the mode share for all trips people take (**Figure 7.8**). **Figure 7.8** also plots the target mode shares for 2020 and 2040.

While the network of bicycling and walking facilities throughout much of Santa Cruz County is substantial, improvements to this network could promote greater use. Separated or buffered bicycle facilities, wider bike lanes and lanes designed outside of the door zone of parked cars all encourage use of bicycles as a means of travel. Sidewalks exist in much of the more populated areas of Santa Cruz County but there are gaps, which limit access for people and are not always attractive due to little or no buffer between pedestrians and high volume traffic. The projects in this plan improve the quality of the active transportation network and thus will help to advance the goal of increasing the percentage of walk, bike and transit trips within key destinations by designing facilities that are safe, convenient and comfortable to the user.

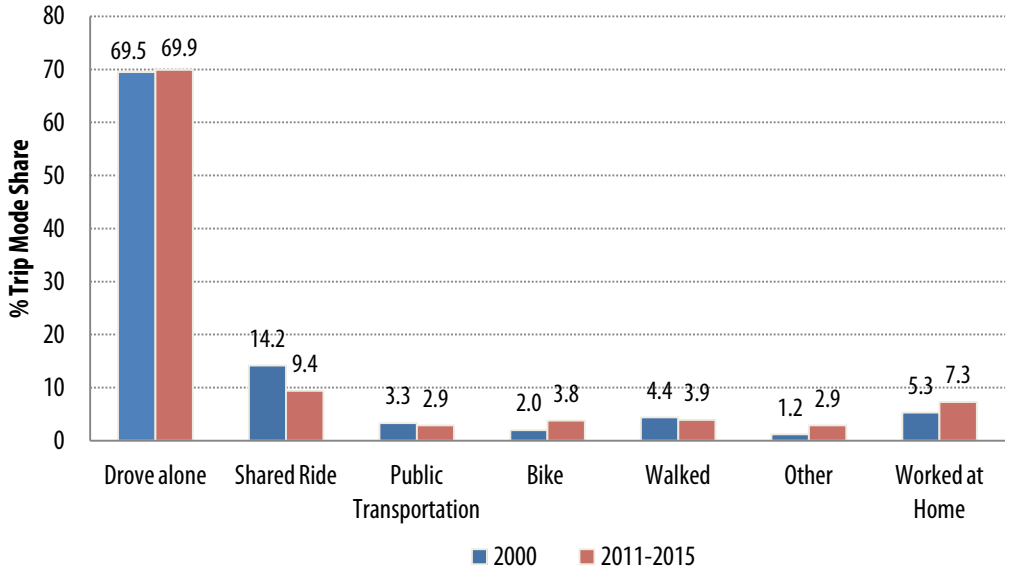


Figure 7.7 – Santa Cruz County Commute Trips Mode Share

Source: American Community Survey 2011-2015 Summary

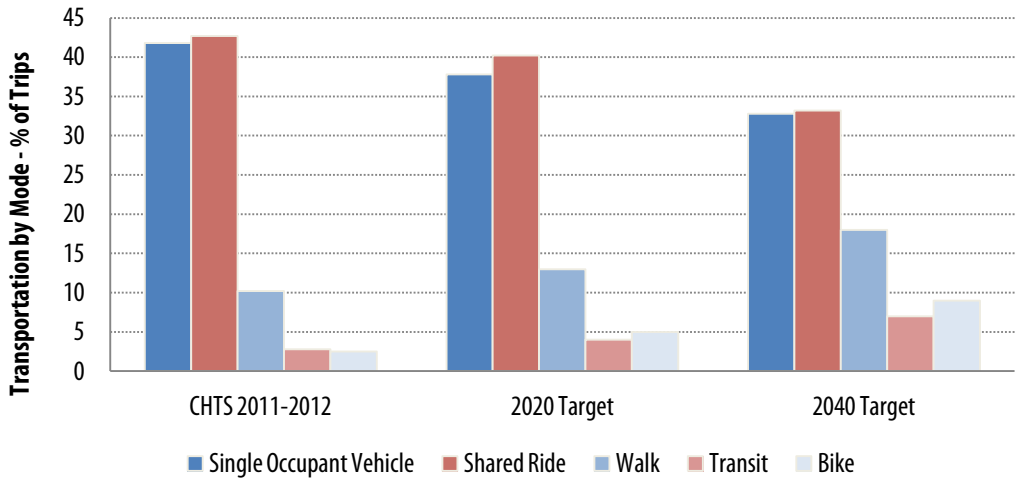


Figure 7.8 – Santa Cruz County Mode Share for All Trips
Source: California Household Travel Survey 2011-2012 and Targets

GOAL 2. Reduce transportation related fatalities and injuries for all transportation modes.

Improve transportation safety, especially for the most vulnerable users.

Target: Reduce injury and fatal collisions by mode by 20 percent by 2020 and by 60 percent by 2040.

Improving the safety of transportation users, especially for the most vulnerable users, such as bicyclists and pedestrians, is a priority for Santa Cruz County as well as across California and the nation. The Statewide Integrated Traffic Records System (SWITRS) collision database tracks collision data that allows the RTC to monitor the number of collisions over time to assess how the investment of projects and programs are advancing this target. The collision data by mode is graphed below. The data shows that the number of injury and fatal collisions for Santa Cruz County has increased for motor vehicles, bicyclists and pedestrians since the target base years of 2009-2011 (**Figure 7.9**). An increase in public awareness and a change in driving behavior will be needed in order to improve the safety of the transportation system in Santa Cruz County to reach the 2020 and 2040 targets of the 2040 RTP.

The State Highway Operation and Protection Program (SHOPP) projects which are implemented by Caltrans on Santa Cruz County Highways (1, 9, 17, 129, 152, and 236) focus on reducing collisions. Extra enforcement on Highway 17 through the Safe on 17 program, as well as separated or buffered bicycling and pedestrian facilities implemented by local jurisdictions have also been prioritized in this plan to improve safety. Educational programs such as "Vision Zero" implemented by the Community Traffic Safety Coalition are prioritized to promote driver awareness and changes in driving behavior. See **Chapter 6** for more details on projects that will help to improve safety on Santa Cruz County roadways.

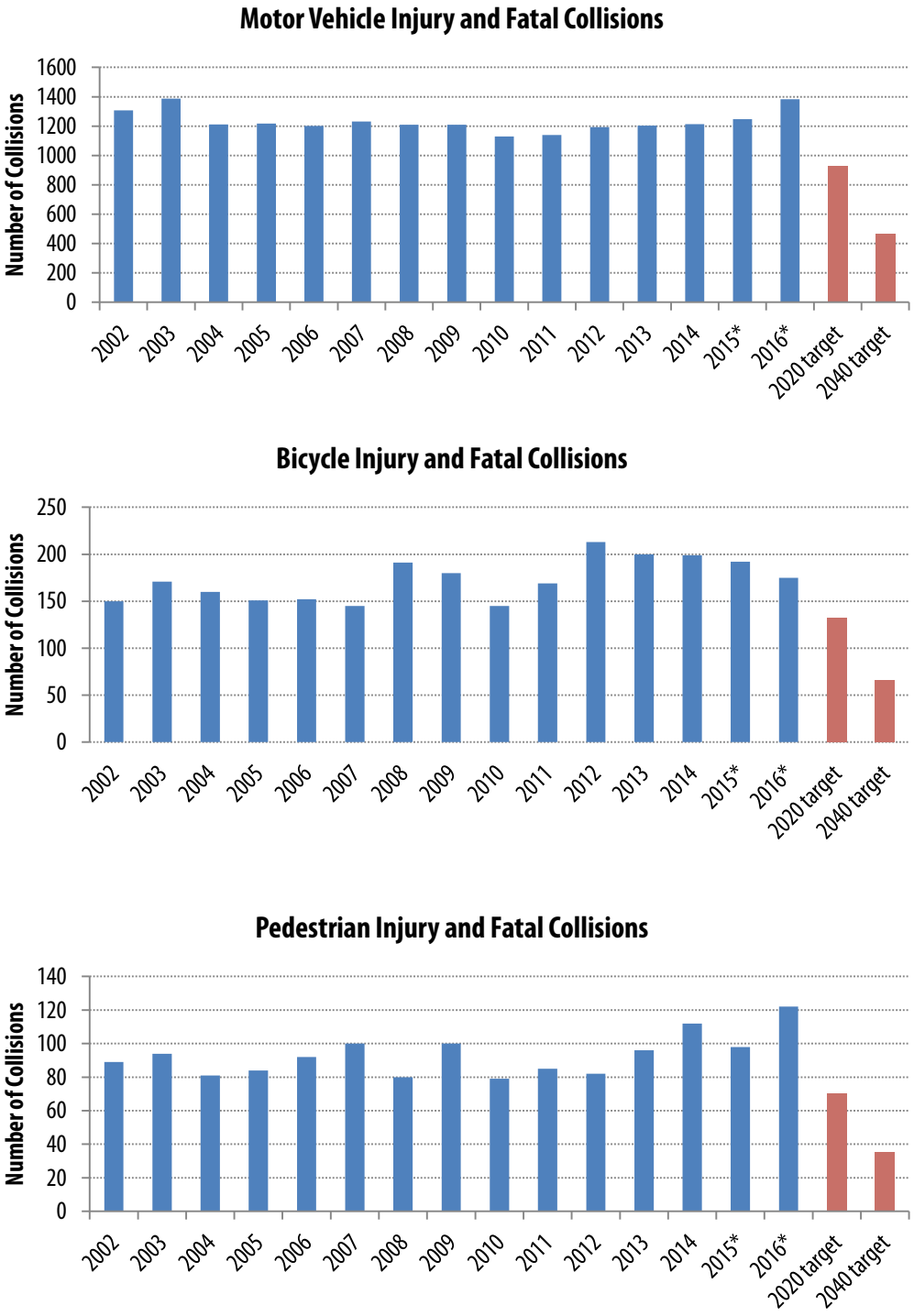


Figure 7.9 – Injury and Fatal Collisions – Motor Vehicle, Bicycle and Pedestrian

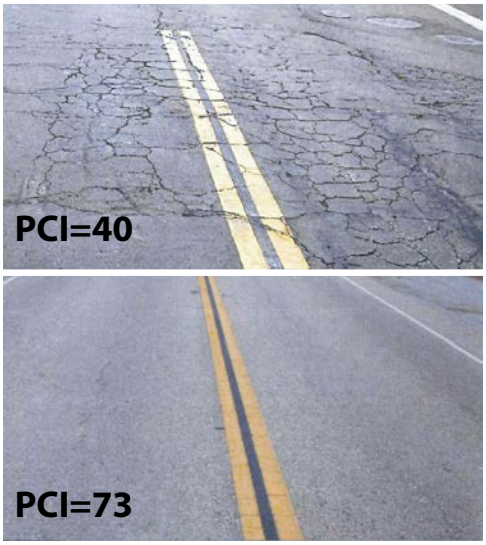
Source: Statewide Integrated Traffic Records System (SWITRS), California Highway Patrol available through the Transportation Injury Mapping System (TIMS), Safe Transportation Research and Education Center, University of California, Berkeley. 2017

** 2015 and 2016 data is provisional*

GOAL 3. Deliver access and safety improvements cost effectively, within available revenues, equitably and responsive to the needs of all users of the transportation system, and beneficially for the natural environment.

Maintain the existing system and improve the condition of transportation facilities.

Target 3A. Increase the average local road pavement condition index (PCI) to 57 by 2020 and 72 by 2040.



A key focus of this RTP is on preserving the existing transportation infrastructure. The "pavement condition index" or PCI is a measure of the average condition of the local street and road pavement on a scale of 0 to 100 where 0-24 is failed, 25-49 is poor, 50-69 is fair, and 70-100 is good. **Figure 7.10** shows the trend in the pavement condition indices for the jurisdictions in Santa Cruz County starting in 2005. A comparison of the pavement condition index for Santa Cruz County relative to other counties in California is shown in **Figure 7.11**. The countywide PCI of 50 for 2016 is on the cusp between poor and fair and indicates the need for substantial investment in maintenance. This plan invests in pavement repairs, sidewalk and bicycle lane maintenance, bus replacements, bus stops, and transit service vehicles that need upgrades and maintenance. Measure D and Senate Bill 1 funds will provide a significant source of funding for maintaining and improving the condition of transportation facilities in Santa Cruz County. Approximately 30% of the constrained RTP project list is designated for roadway maintenance.

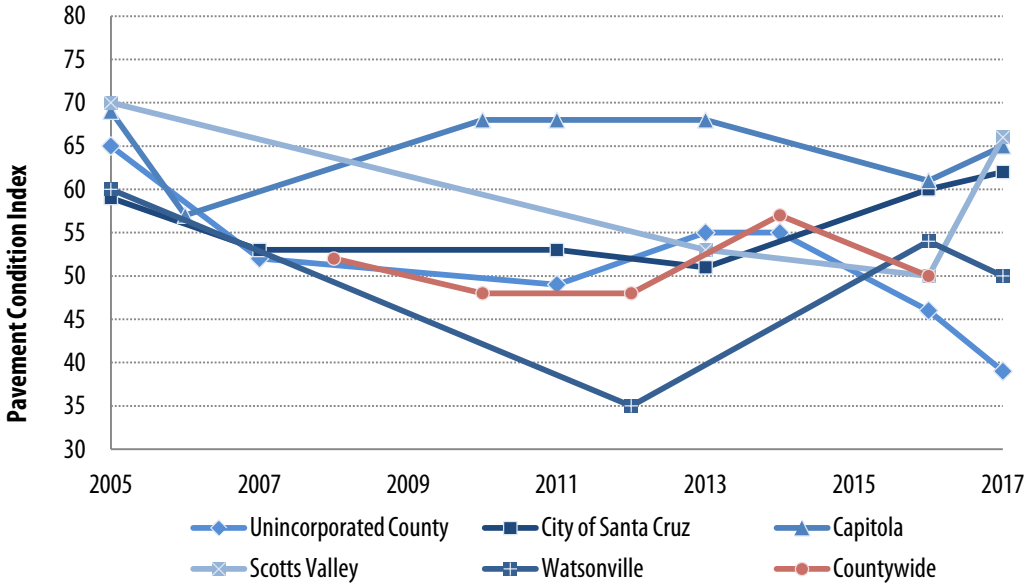


Figure 7.10 – 2005 to 2017 Pavement Condition Indices for Jurisdictions in Santa Cruz County

Source: Capitola, Unincorporated County, City of Santa Cruz, Scotts Valley, Watsonville

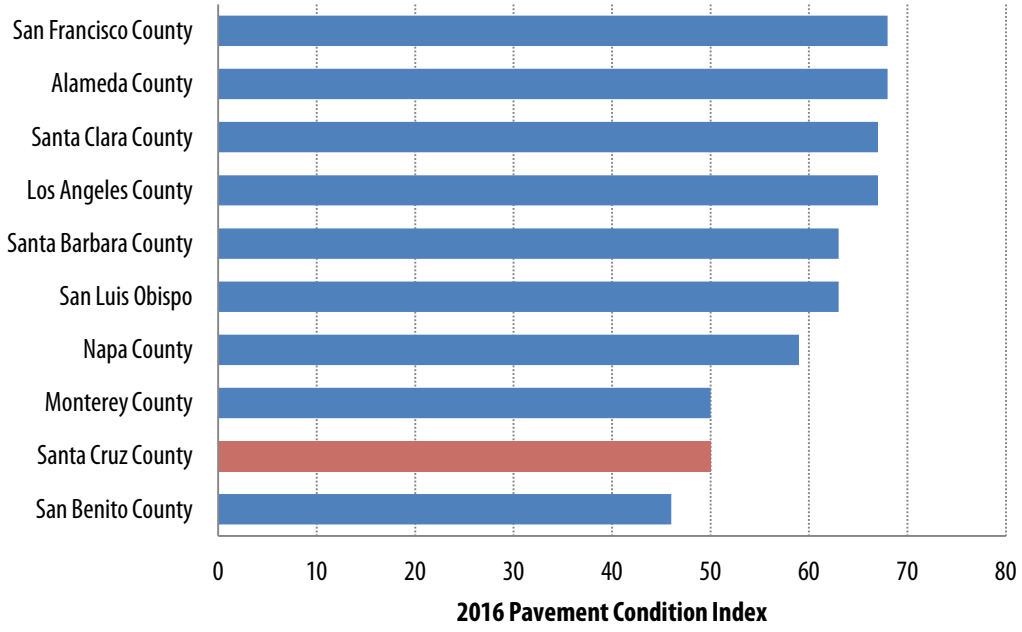


Figure 7.11 – Comparison of Santa Cruz County Pavement Condition Index with other California Counties

Source: 2016 California Statewide Local Streets and Roads Needs Assessment, Save California Streets

Target 3B. Reduce the number of transportation facilities in "distressed" condition by 3 percent by 2020 and 5 percent by 2040.

The condition of the transit system is one indicator of the level of "distressed" transportation facilities for Santa Cruz County. The Metro buses are in need of regular maintenance and/or replacement to ensure continued and cost-effective service. **Figure 7.12** shows the condition of the Metro buses from 2005 to 2017 and the 2020 and 2040 targets relative to 2005. The 2040 RTP prioritizes funding for 66% of the bus replacement need over the 22 year timeframe of this plan.

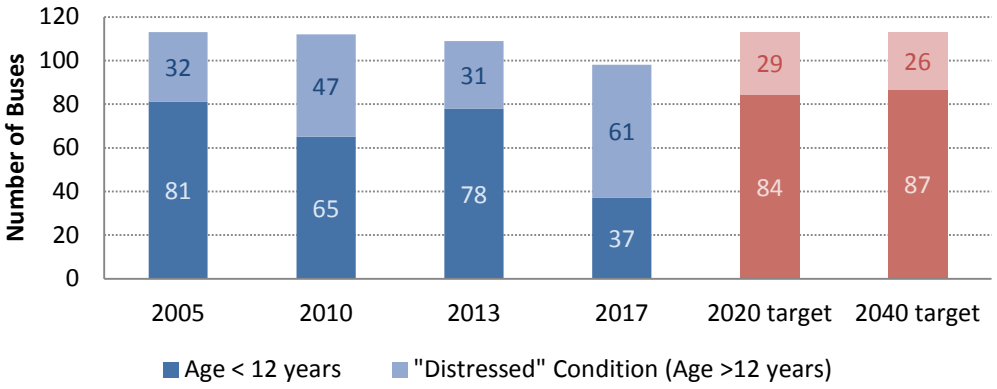


Figure 7.12 – Santa Cruz Metro Bus Condition

Source: Santa Cruz Metropolitan Transit District

Increase transportation revenues.

After decades of state and federal underinvestment in the transportation system, a supermajority of Santa Cruz County voters approved Measure D in November 2016 which invests an additional $20 million per year into the multimodal transportation system. In April 2017, the state legislature approved Senate Bill 1 (SB1) which helps stabilize transportation funding throughout the state. SB1 is expected to provide an additional $9 million per year to the County of Santa Cruz and local cities to maintain local streets and roads, an extra $3 million per year for local transit, and significant funding to maintain and repair state highways, bridges, and culverts.

Notes for Chapter 7

[1] CA Energy Commission, California Annual Retail Fuel Outlet Report Results, accessed November, 2017, http://www.energy.ca.gov/almanac/transportation_data/gasoline/piira_retail_survey.html

[2] CA Air Resources Board, The 2017 Climate Change Scoping Plan, The Strategy for Achieving California's 2030 Greenhouse Gas Target, accessed November, 2017 (https://www.arb.ca.gov/cc/scopingplan/revised2017spu.pdf)