

IMPACT

Transportation

"Climate change may substantially and directly impact transportation operations as well as transportation infrastructure."



Key Messages

1

Projected climate change impacts to California ports, such as sea-level rise and flooding, will require more frequent dredging of harbors and realignments of port infrastructure—such as jetties, docks, and berths—relative to rising waterline.

2

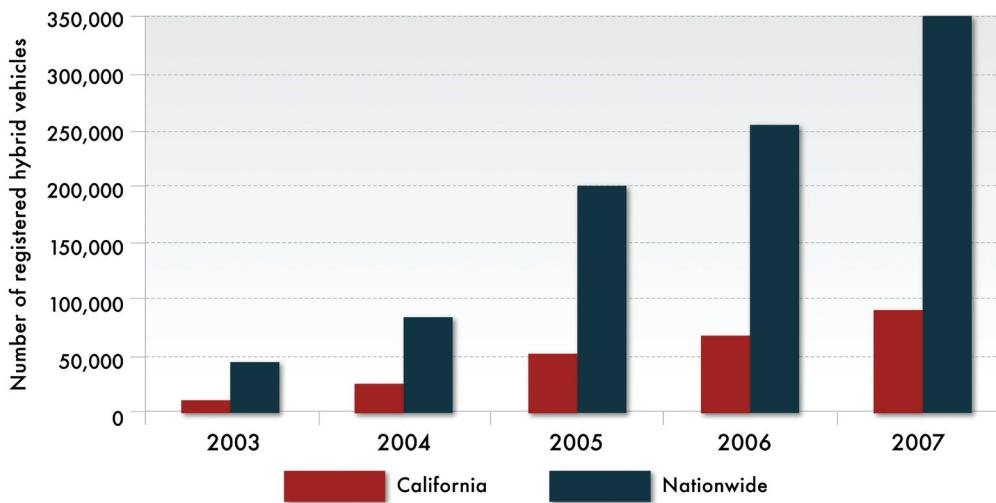
Alternative-fuel vehicle sales steadily increased throughout the Southwest until 2008. Yet, hybrid and alternative-fuel vehicles constitute less than 5 percent of the total passenger vehicle fleet in the Southwest.

3

Many transportation infrastructure projects, currently in planning, design, or construction, do not necessarily address the potential effects of climate change. As more climate-change effects begin to manifest, design and operational vulnerabilities of these transportation system elements will appear.

The fourteenth chapter of the *Assessment of Climate Change in the Southwest United States* examines climate-change issues across a broad range of transportation sectors in the Southwest, including land (passenger and freight), marine, and air transportation, beginning with current trends. “Transportation” analyzes possible direct and indirect impacts to transportation infrastructure and to the economy. The chapter concludes by examining vulnerabilities and uncertainties with respect to potential disruptions to the transportation system.

The Southwest’s transportation network includes major freeways, rail corridors of national importance, and major port- and border-crossing facilities. The seaports of Los Angeles and Long Beach comprise the largest port complex in the United States, and their regional and national importance is illustrated by the 2002 lockout at the Port of Los Angeles, which is estimated to have cost the US economy \$1 billion per day. Disruptions to the transportation system have major economic effects on all transportation system users. Climate change has the ability to impact all modes of passenger and freight transportation and the energy sources (eg., gas and electric) that fuel them.



One in four hybrid vehicles sold nationwide between 2003 and 2007 were purchased in California.

Emission Standards

The US Environmental Protection Agency sets emissions standards for motorized vehicles nationally; however, the state of California has passed its own legislation regulating vehicle greenhouse gas emissions. The California standards are stricter than the national standards and were subsequently adopted by Arizona and New Mexico. The importance of these standards is underscored by trends in both passenger and freight transport. Domestic vehicle miles travelled by both passengers and goods is closely correlated with gross domestic product. While passenger-travel trends suggest that vehicle ownership and per-capita vehicle-miles traveled may have stabilized across the Southwest, gains in rail-freight traffic are expected in the region due to containerized and bulk foreign imports.

Precipitation

Winter precipitation extremes are projected to become more frequent and more intense. Increased precipitation intensity likely will result in one or more of the following: decreases in traffic demand, reductions in traffic safety, and decreases in the efficiency of operational features, such as speed, capacity, or travel-time variability. Not surprisingly, severe weather events both decrease traffic demand and increase traffic accidents. Studies show traffic demand (measured by traffic volume) can change by anywhere from 5 to 80 percent due to severe weather events.



Extreme Heat

Increased heat events, which are confidently projected for the region, may increase vehicle air-conditioner usage and emissions and decrease fuel economy. The use of vehicular air conditioning while driving causes emissions to increase 37 percent, while fuel economy drops as much as 43 percent in high-fuel-economy vehicles and 13 percent in conventional vehicles.

Extended periods of heat can shorten the life of and deteriorate pavements, force thermal expansion of bridges (thus impacting their maritime commerce), and deform the alignment of rail lines. Roadway deterioration will have an impact on all trade including local trade circulation that occurs between the Southwest and the remainder of the United States and Mexico.

Sea-Level Rise

Without the adoption of adaptive measures, a sea-level rise as great as 4.6 feet would expose California's transportation infrastructure to the flooding of nearly 3,500 miles of roadways and 280 miles of rail lines.

Increased use of cleaner and more efficient vehicle technologies is one of the approaches to reducing greenhouse gas emissions in the Southwest.



Information from: Niemeier, D. A., A. V. Goodchild, M. Rowell, J. L. Walker, J. Lin, and L. Schweitzer. 2013. "Transportation." In *Assessment of Climate Change in the Southwest United States: A Report Prepared for the National Climate Assessment*, edited by G. Garfin, A. Jardine, R. Merideth, M. Black, and S. LeRoy, 297–311. A report by the Southwest Climate Alliance. Washington, DC: Island Press.