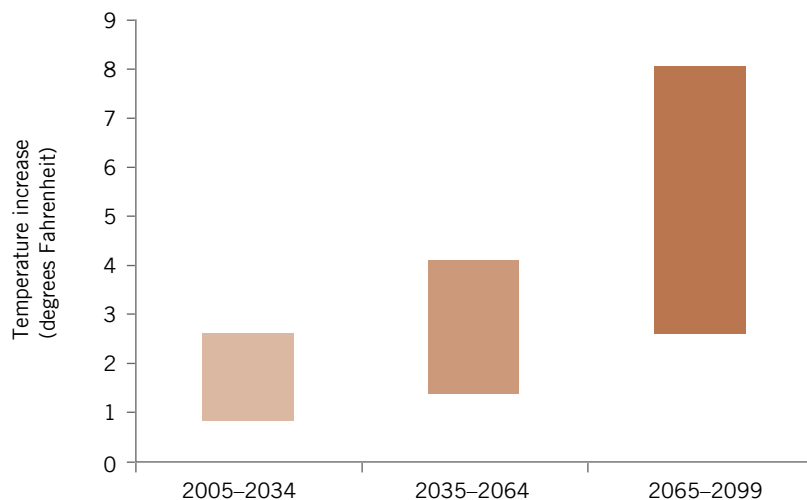


CLIMATE CHANGE THREATENS CALIFORNIA'S FUTURE

Increases in global emissions of greenhouse gases (GHGs) are leading to higher air and water temperatures as well as rising sea levels, with serious consequences for California. Air temperatures are projected to increase throughout the state over the coming century. Sea level is expected to rise 17 to 66 inches by 2100, and the frequency of extreme events such as droughts, heat waves, wildfires, and floods is expected to increase. Higher temperatures will result in more precipitation falling as rain (and less as snow), diminishing reserves of water in the Sierra Nevada snowpack. Even if all GHG emissions ceased today, some of these developments would be unavoidable because the climate system changes slowly.

AIR TEMPERATURES ARE PROJECTED TO RISE IN CALIFORNIA, ESPECIALLY UNDER HIGH EMISSIONS SCENARIOS



SOURCE: D. R. Cayan, et al., "Climate Change Scenarios for the California Region," *Climatic Change* 87 (2008): S21-S42.

NOTE: Projected temperature increase relative to 1961-1990. The projections are statewide annual averages across six global climate models, considering both low (B1) and "business as usual" (A2) GHG emission scenarios.

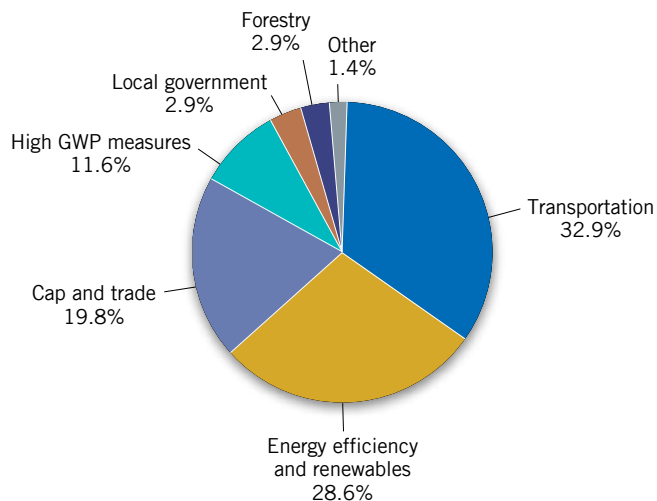
In the face of these threats, California has taken the lead in global efforts to reduce emissions. Assembly Bill (AB) 32, the Global Warming Solutions Act of 2006, requires the state to reduce greenhouse gas emissions to 1990 levels by 2020; this will result in emissions roughly one-third less than what would be expected under "business as usual." An executive order calls for emissions to be reduced to 80 percent below 1990 levels by 2050. Reductions of this magnitude are needed on a global scale to stabilize the earth's climate. California now faces a twofold policy challenge: finding cost-effective ways to reduce emissions and preparing for the climate changes that are expected even if emissions are successfully reduced.

California is not alone in tackling this global issue, and the state now has collaborative climate policy agreements with Quebec, China, and Mexico. California must continue to forge new strategies, even though the nature and timing of climate change are uncertain and global efforts to reduce emissions may or may not be successful.

CALIFORNIA IS USING A MULTIFACETED APPROACH TO REDUCE EMISSIONS

The California Air Resources Board (CARB) is responsible for implementing the Global Warming Solutions Act. In late 2008, CARB adopted a Scoping Plan that outlines the programs designed to reach the 2020 target, the first comprehensive plan of its kind within the United States (and one of the first such plans internationally). The 2013 update to the plan found that California is on track to meet the 2020 target, but the state will need to significantly increase the pace of GHG emission reductions to meet its more ambitious longer term goals.

ENERGY AND TRANSPORTATION ARE THE LARGEST COMPONENTS OF THE SCOPING PLAN



SOURCE: California Air Resources Board, "Climate Change Scoping Plan: A Framework for Change" (2008).

NOTE: GWP = global warming potential; gases with high GWP include refrigerants and solvents.

- **New standards for passenger vehicles are key ...**

California adopted the first-ever greenhouse gas emission standards for passenger vehicles in 2002. These standards, which began with the 2009 model year, will reduce emissions from new passenger vehicles by approximately 30 percent by 2016. The federal government set national standards to match California's. In 2012, California, along with the federal government, adopted further standards, to begin with the 2017 model year, which will reduce GHG emissions by 34 percent (based on 2014 levels) by 2025. This program includes putting more than 1.4 million zero-emission vehicles on the road by 2025.

- **... so are ambitious renewable energy goals.**

California's Renewable Portfolio Standard, established in 2002 and expanded in 2006 and 2011, sets one of the nation's most ambitious targets for expanding renewable energy. The program requires utilities to provide 33 percent of total procurement from renewable energy resources by 2020. Although certain distribution, permitting, and financing challenges remain, California's three large utilities provided 22.7 percent of their electricity sales from renewable power in 2013 and are on track to meet the 33 percent standard by 2020.

- **A statewide cap-and-trade program has been adopted.**

California adopted the first GHG cap-and-trade program in the nation in 2011. Under this program, firms that would need to spend a lot to reduce emissions can trade emission reduction credits with firms that can reduce emissions at lower cost. The auctions—successfully launched in late 2012—began with electric utilities and large industrial emitters, will include transportation fuels in 2015, and will eventually cover 85 percent of the state's GHG emissions. California's program was linked with Quebec's cap-and-trade program in January 2014, paving the way for other states and regions to link their programs in the future. Auction revenues support investments to reduce GHG emissions, including clean transportation and water and energy efficiency. A portion of the revenues is also returned to customers of electric utilities as a climate credit, which consumers are encouraged to spend on energy efficiency improvements.

- **California has also implemented other innovative strategies.**

Adopted in 2008, Senate Bill (SB) 375 aims to reduce emissions from passenger vehicles by integrating investments in land use and transportation to reduce driving. This bill provides incentives to achieve these reductions by easing environmental review requirements for qualifying projects. In accordance with this bill, CARB has adopted regional per capita GHG emission reduction targets from passenger vehicles for 2020 and 2035. Fifteen of the 18 regions covered by the bill have plans in place, and most report meeting or exceeding their reduction targets. However, San Diego is under court order to strengthen its plan.

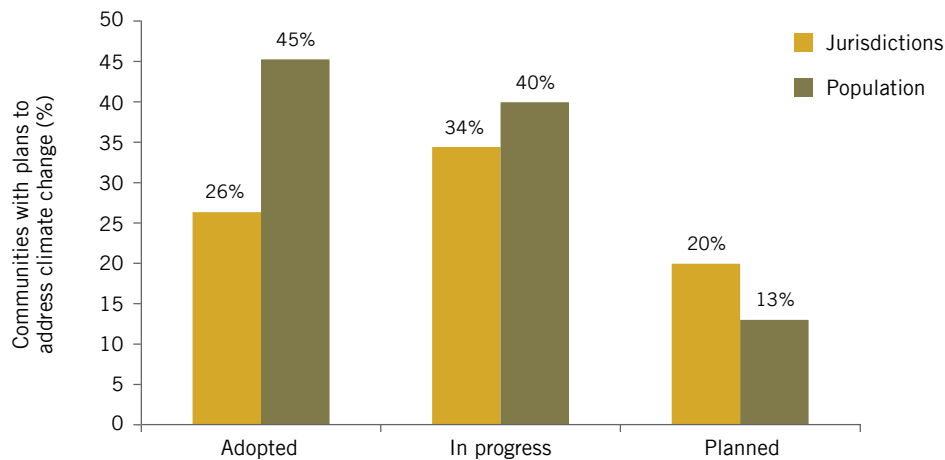
- **California’s local governments are also addressing climate change.**

Roughly 80 percent of California’s cities and counties—home to 98 percent of the state’s residents—have already adopted or are developing plans and programs to address climate change. In many instances, these measures are also being promoted as ways to reduce energy costs and work toward broader sustainability goals. Opinion polls suggest continued public support for many of these state and local efforts, though support tends to decline if measures increase costs for consumers.

- **California will need to build on current efforts to meet its longer term emission reduction goals.**

Meeting the more ambitious post-2020 goals will require scaling up the deployment of clean technologies and providing more low-carbon options in energy generation, transportation, and other sectors.

LOCAL GOVERNMENTS ARE ADDRESSING CLIMATE CHANGE



SOURCE: Governor’s Office of Planning and Research, “Annual Planning Survey Results 2012” (2012), updated online 6/17/14 (sample size: 471). The survey, mainly conducted in 2011, refers to policies and/or programs to address climate change and/or reduce greenhouse gas emissions.

CALIFORNIANS’ SUPPORT FOR THE STATE’S CLIMATE POLICIES IS STRONG

	% Favor (all adults)
Requiring automakers to significantly improve fuel efficiency	85
Increasing federal funding to develop wind, solar, and hydrogen technology	78
Requiring industrial plants, oil refineries, and commercial facilities to reduce emissions	77
Requiring oil companies to produce transportation fuels with lower emissions	76
Requiring one-third of the state’s electricity to come from renewable energy sources by 2020	76
Setting stricter emissions limits on power plants	75
Requiring an increase in energy efficiency for residential and commercial buildings and appliances	73
Global Warming Solutions Act of 2006	68
Imposing a carbon tax on companies for greenhouse gas emissions	58

SOURCE: Mark Baldassare et al., *PPIC Statewide Survey: Californians and the Environment*, July 2014.

CALIFORNIA NEEDS TO PREPARE FOR THE EFFECTS OF CLIMATE CHANGE

California is ahead of other states in developing information on the effects of climate change, but much work must be done to prepare for these effects.

- **The effects of climate change are already being seen around the state.**

Snowpack is melting earlier now than it did in the first part of the 20th century. Some plant and animal species normally found in the southern part of the state have been observed in more northern locations. Average annual temperatures are rising and wildfires are increasing.

- **Sea level rise threatens coastal infrastructure, homes, and habitat.**

A 2012 National Research Council study projected that sea levels in California south of Cape Mendocino will rise by 17 to 66 inches by 2100. The Pacific Institute found that near the higher end of this range (55 inches), 1,750 and 1,800 miles of highways and roads along the ocean coastline and San Francisco Bay, respectively, are at risk of inundation. Coastal armoring (e.g., seawalls or breakwaters) can help protect infrastructure and homes along the coast, but this is an expensive remedy and would eliminate some recreational and ecological uses of the coastline.

- **Water management faces challenges.**

The diminishing mountain snowpack reduces water storage and increases the risk of Central Valley flooding. Rainfall variability is also expected to increase, leading to more frequent droughts and floods. In addition, sea level rise threatens fragile levees in the Sacramento–San Joaquin Delta, which are important for the state’s water supply.

SEA LEVEL RISE THREATENS THE BAY AREA



SOURCES: Map from San Francisco Bay Conservation and Development Commission; inundation data from N. Knowles, “Potential Inundation Due to Rising Sea Levels in the San Francisco Bay Region” (California Climate Change Center, 2009).

NOTE: The map illustrates the potential inundation with 16 inches and 55 inches of sea level rise, toward the upper end of the range expected by 2050 and 2100, respectively.

- **Public health will be at risk.**

An increase in extreme events—heat waves, wildfires, and floods—will pose challenges to public health, the state’s emergency preparedness agencies, and health care infrastructure. Case in point: a prolonged heat wave in 2006 resulted in more than 140 confirmed deaths and a significant increase in emergency room visits and hospitalizations.

- **Air quality will worsen.**

The San Joaquin Valley and the Los Angeles area already have some of the worst air quality in the nation. Rising temperatures and other effects of climate change will worsen air quality, likely requiring additional pollution controls to attain state and federal air quality standards.

- **Biodiversity is under threat.**

Climate change places an additional burden on many of the state’s plants and animals. As temperatures rise, many species will need to migrate to more hospitable areas. Current development patterns could hinder this movement and threaten extinction for some species.

- **Readiness to cope is variable.**

Water and electric utilities have begun to consider climate change in their long-range planning and have tools available to develop adaptation strategies. The Natural Resources Agency has developed a statewide adaptation strategy, and some regions are taking the lead in thinking about adaptation (e.g., San Diego and the Bay Area). But in areas such as ecosystem management and flood control, the institutional and legal frameworks are ill equipped to handle the changes.

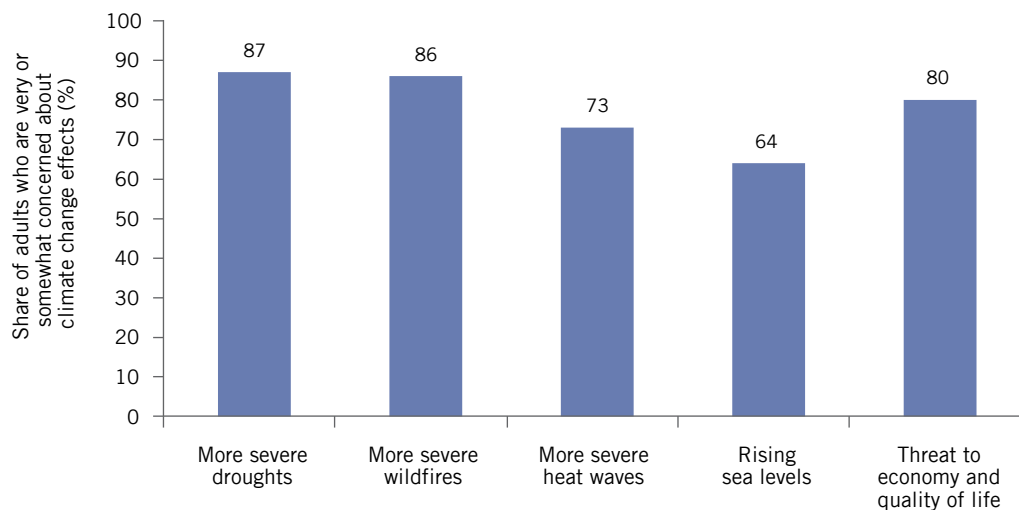
- **The state can help local governments prepare for climate change effects.**

Two state-supported online tools may help to inform local adaptation planning. The online tool Cal-Adapt allows users to identify potential climate impacts in specific regions. Knowledge of these risks can help localities begin to determine and plan for their own vulnerabilities. Another online source, the California Climate Adaptation Planning Guide, provides an overview of climate effects and vulnerabilities by region, along with adaptive measures that are within the jurisdiction of local governments.

- **Californians support action to address climate change effects.**

A strong majority of residents (82%) think it is very or somewhat important for the state to pass regulations and spend money now to prepare for the future effects of climate change (PPIC Statewide Survey, July 2013).

CALIFORNIANS ARE CONCERNED ABOUT THE EFFECTS OF CLIMATE CHANGE



SOURCE: Mark Baldassare et al., *PPIC Statewide Survey: Californians and the Environment* (July 2014).

NOTE: For threats to the economy and quality of life, the figure shows the share of adults who think the problem is very or somewhat serious.

LOOKING AHEAD

California is on track to meet its emission reduction goals for 2020 and has begun to assess actions needed to meet its more ambitious goals for 2050. But to decrease the impact of climate change on California, emission reductions will be needed on a global scale—and large reductions will be needed soon to avoid the most severe effects. Even with these reductions, the state needs to prepare for some inevitable effects of climate change.

- **Develop an integrated climate change policy.**

An integrated climate change policy that includes efforts to reduce emissions and plans to prepare for climate change will ensure that mitigation and adaptation policies are complementary.

- **Achieve near-term greenhouse gas emission reductions.**

Actions taken today will affect the concentration of greenhouse gases in the atmosphere several decades from now. Therefore, near-term emission reductions are needed to work toward future climate stabilization.

- **Undertake some “no regrets” measures now to reduce the effects of climate change.**

In some areas, accounting for future climate changes in current planning will head off unacceptably high costs. For example, considering climate change in today’s land-use planning decisions could facilitate species’ migrations. And limiting development in areas at risk of flooding will avoid future costs.

- **Tap into local enthusiasm for undertaking climate action.**

Local governments' experience and learning will be especially important in meeting the greenhouse gas emission reduction targets set under SB 375, the state's transportation and land-use law.

- **Continue to develop information to reduce policy uncertainties.**

Better information is needed to assess progress toward meeting emission reduction goals and the cost-effectiveness of policy options. Detailed assessments of local climate effects will help pinpoint vulnerabilities and develop priorities for adaptation.

- **Continue to play a leadership role.**

California has long been a leader on environmental policy, and climate change is no exception. This leadership is important in encouraging other governments to address climate change. Without global cooperation to reduce emissions, California's economy and society may face severe consequences.

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This series is funded by PPIC's Donor Circle and the S. D. Bechtel, Jr. Foundation.



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