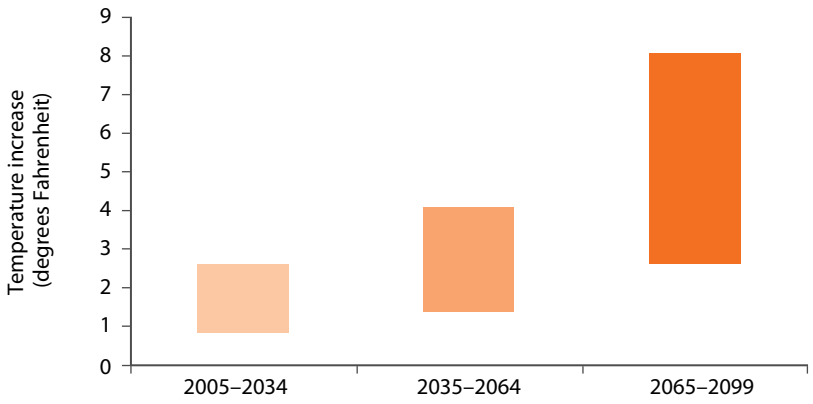
CALIFORNIA CLIMATE CHANGE

PPIC PUBLIC POLICY INSTITUTE OF CALIFORNIA

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 heat waves, wildfires, floods, and droughts is expected to increase. Higher temperatures will result in more rain and less snow, diminishing the 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, A. L. Luers, et al., "Overview of the California Climate Change Scenarios Project," *Climatic Change* 87 (2008): S1–S6.
NOTE: Projected temperature increase relative to 1961–1990.

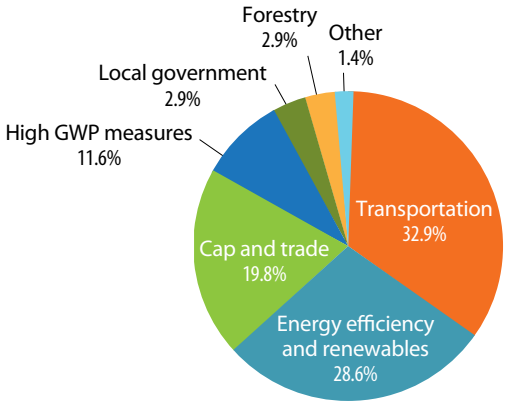
In the face of these threats, California has taken the lead in global efforts to reduce emissions. Assembly Bill (AB) 32, the Global Warming Solutions Act of 2006, requires the state to reduce greenhouse gas emissions to 1990 levels by 2020; this would result in emissions roughly one-third less than 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 the least expensive 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. But its actions are crucial because they set an example for other states, regions, and parts of the world. The state 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 MULTI-FACETED 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. Because this is the first comprehensive plan of its kind within the United States (and one of the first such plans internationally), many are looking to California as a model.

ENERGY AND TRANSPORTATION ARE THE LARGEST COMPONENTS OF THE SCOPING PLAN



SOURCE: CARB, "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 2004. These standards, which began to apply in the 2009 model year, will reduce emissions from new passenger vehicles by approximately 30 percent by 2016. The federal government has set national standards that match California's.

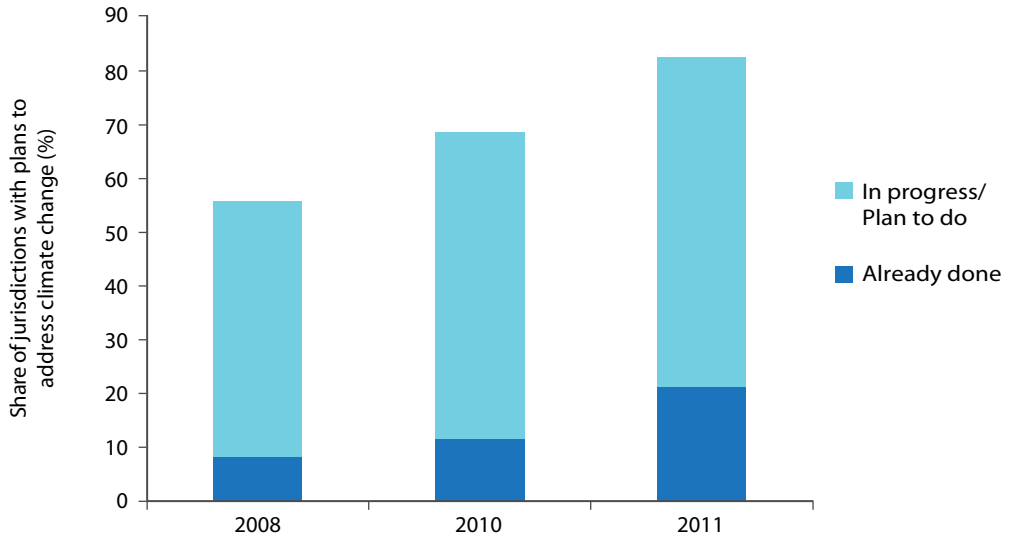
- **So are ambitious renewable energy goals.**
  California's Renewable Portfolio Standard, established in 2002 and expanded in 2006 and 2011, sets one of the nation's most ambitious targets for expanding renewable energy. The program now requires utilities to provide 33 percent of total procurement from renewable energy resources by 2020. Although certain storage, distribution, and financing challenges remain, the state is projected to meet this target three years ahead of schedule.

- **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 will be allowed to trade emission reduction credits with firms that can reduce emissions at lower cost. The auctions—successfully launched in late 2012—initially cover electric utilities and large industrial emitters, and will eventually cover 85 percent of the state's GHG emissions. Talks are underway to link the program with Quebec's cap-and-trade program, and other western states and Canadian provinces in the Western Climate Initiative expect to join in the future.

- **California has also adopted other pathbreaking strategies.**
  Adopted in 2008, Senate Bill (SB) 375 aims to reduce emissions 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 September 2010, CARB adopted regional per capita GHG emission reduction targets from passenger vehicles for 2020 and 2035. Reduction targets for the four largest regions range from 13 to 16 percent, relative to 2005 levels, by 2035. By late 2012, Southern California, Sacramento, and San Diego had plans in place to meet these reduction targets, and the Bay Area's plan will be adopted in 2013. The 15 smaller regions covered by the bill face lower targets, and their plans are expected to be in place by 2014.

- **California's local governments are also addressing climate change.**
  Roughly 80 percent of California's cities and counties 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 also suggest continued public support for meeting the state's climate goals, even in difficult economic times.

GROWING NUMBERS OF LOCAL GOVERNMENTS ARE ADDRESSING CLIMATE CHANGE



SOURCES: 2008 data from Hanak et al., "Climate Policy at the Local Level: A Survey of California's Cities and Counties" (PPIC, 2008) (sample size 309); 2010 data from Bedsworth, Hanak, and Stryjewski, "Views from the Street: Linking Transportation and Land Use" (PPIC, 2011) (sample size 347); 2011 data from Office of Planning and Research, "Annual Planning Survey Results 2012" (OPR, 2012) (sample size 451). The 2008 survey refers to climate action plans; the 2010 survey refers to climate action plans or similar plans that address climate change; and the 2011 survey 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)
Global Warming Solutions Act of 2006	71
Emission standards for new passenger vehicles	78
Increasing the use of renewable energy	77
Requiring local governments to change land-use patterns so people drive less	77
Requiring an increase in energy efficiency for residential and commercial buildings and appliances	77
Requiring industrial plants, oil refineries, and commercial facilities to reduce emissions	82
Cap and trade	53*

SOURCE: Baldassare et al., *PPIC Statewide Survey: Californians and the Environment* (July 2012).
* For cap and trade, an unusually large share of respondents (11%) replied "don't know."

CALIFORNIA NEEDS TO PREPARE FOR THE EFFECTS OF CLIMATE CHANGE

California is well 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.**
  Spring runoff from snowpack is occurring 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.
- **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., sea walls or breakwaters) can help protect infrastructure and homes along the coast, but these are expensive remedies 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 Delta levees, which are important for the state's water supply.

SEA LEVEL RISE

THREATENS THE BAY AREA

- Inundation with 16-inch sea level rise
- Inundation with 55-inch sea level rise

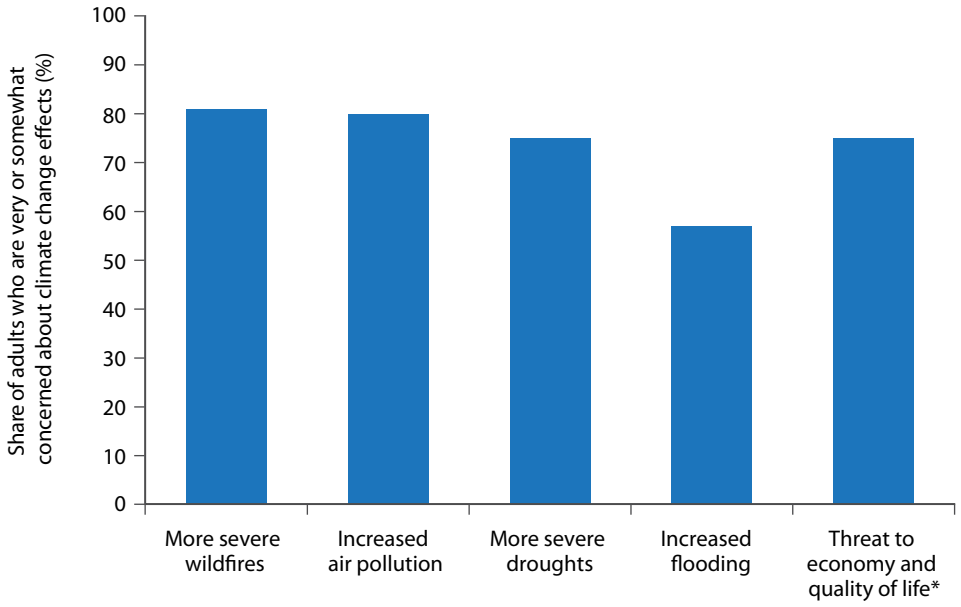
SOURCES: Map from San Francisco Bay Conservation and Development Commission; inundation data from Noah Knowles, "Potential Inundation Due to Rising Sea Levels in the San Francisco Bay Region" (California Climate Change Center, 2009).

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 and 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. Increasing 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 (to be updated in early 2013), 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.

- **New tools may help local governments prepare for climate change effects.**
  In 2010, only a quarter of local governments had begun efforts to reduce their vulnerability to climate change (according to the Governor's Office of Planning and Research). Two new state-supported tools may help them prepare. The online tool Cal-Adapt allows users to identify potential climate impacts in specific geographic regions. Knowledge of these risks can help localities begin to determine and plan for their own vulnerabilities. Another online source, the California Climate Adaptation Policy Guide, provides an overview of climate impacts and vulnerabilities by geographic region, along with adaptive measures that are within the jurisdiction of local governments.

CALIFORNIANS ARE CONCERNED ABOUT THE EFFECTS OF CLIMATE CHANGE



SOURCE: Baldassare et al., *PPIC Statewide Survey: Californians and the Environment* (July 2011 and July 2012). *For threats to the economy and quality of life, the results are from July 2012 and the figure shows the share of adults who think the problem is somewhat or very serious.

LOOKING AHEAD

To lessen the impact of climate change on California, emission reductions will be needed on a global scale; 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.**
  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' migration as the climate changes. And limiting development in areas at increasing 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. More 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.

We invite you to dig deeper at ppic.org. Related PPIC resources include:
Driving Change: Reducing Vehicle Miles Traveled in California
Climate Change Challenges: Vehicle Emissions and Public Health in California
Preparing California for a Changing Climate
PPIC Statewide Survey: Californians and the Environment
Climate Policy at the Local Level: A Survey of California's Cities and Counties

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