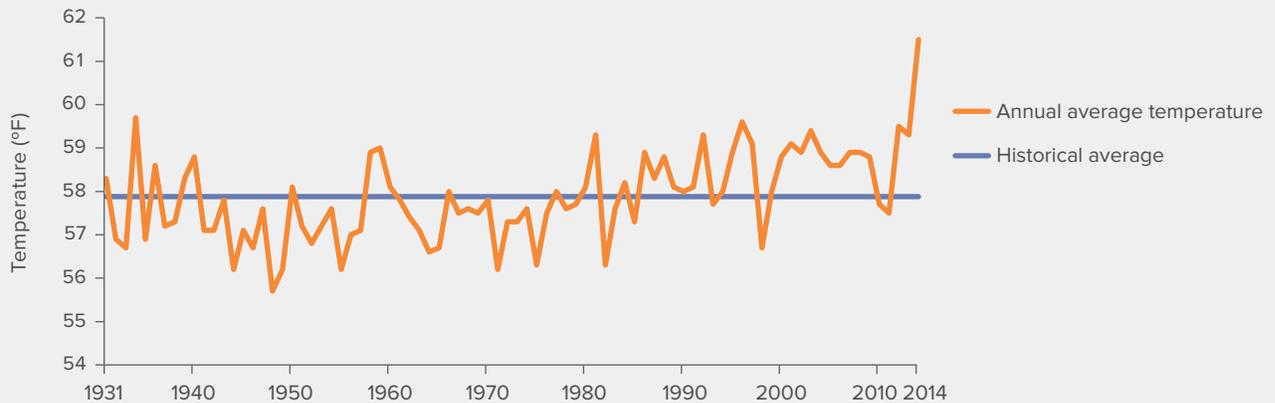


Climate change threatens California's future

Increases in global emissions of greenhouse gases (GHG) are raising air and water temperatures and sea levels, with serious consequences for California. The state has recently experienced record-high temperatures, and warming is expected to continue over the century. By 2100, the sea level is expected to rise between 17 and 66 inches, threatening coastal infrastructure, homes, and habitat. Extreme events such as droughts, heat waves, wildfires, and floods are expected to become more frequent. Higher temperatures cause more precipitation to fall as rain and less as snow, diminishing water reserves in the Sierra snowpack. Even if GHG emissions ceased today, some of these changes would be unavoidable because the climate changes slowly.

CALIFORNIA IS GETTING WARMER



SOURCE: National Oceanic and Atmospheric Administration.

NOTE: The figure reports average annual statewide temperatures starting in 1931; the number of measuring stations prior to this date makes long-term comparisons more difficult.

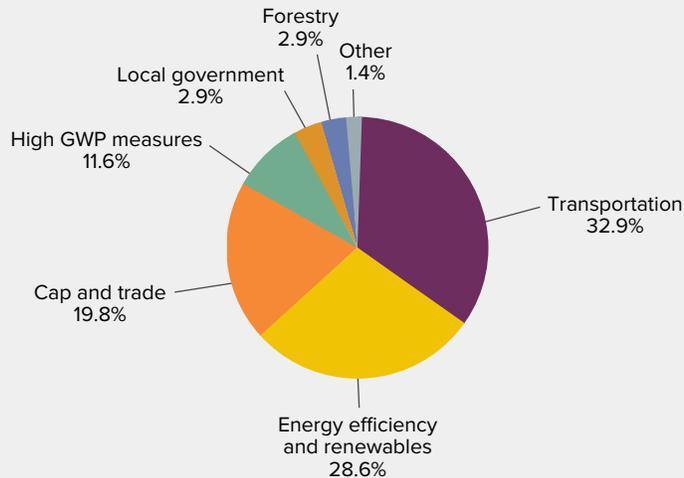
In the face of these threats, California has emerged as a notable leader in global efforts to reduce emissions. Assembly Bill (AB) 32, the Global Warming Solutions Act of 2006, requires the state to reduce greenhouse gas emissions to 1990 levels by 2020. That is roughly a third less than what would be expected had California continued business as usual. In addition, two executive orders call for emissions to drop 40 percent below 1990 levels by 2030 and 80 percent below 1990 levels by 2050. The July 2015 PPIC Statewide Survey found that two in three Californians favor these emission reduction goals.

To stabilize the earth's climate, reductions of this magnitude are needed globally. California now faces a twofold policy challenge: finding cost-effective ways to reduce emissions and preparing for climate changes that will occur even if emissions are cut.

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 outlining steps for reaching the 2020 target. This was the first comprehensive climate plan in the United States and one of the first of its kind internationally. A 2014 plan update found that the state is on track to meet the 2020 target but will need to significantly step up the pace of GHG emission reductions to meet its ambitious longer-term goals. Enacted in 2015, Senate Bill (SB) 350 takes a step in this direction. It mandates raising renewable energy to half of the state's electricity and doubling the energy efficiency of buildings by 2030.

CALIFORNIA'S PLAN EMPHASIZES CUTS IN TRANSPORTATION AND ENERGY EMISSIONS



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

NOTES: GWP = global warming potential; gases with high GWP include refrigerants and solvents. Total is not 100 percent because of rounding.

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

Transportation is the largest GHG contributor. California's Low Carbon Fuel Standards (LCFS) are essential for reducing emissions. The updated 2015 version of the LCFS will use a 2010 baseline to reduce the carbon intensity of transportation fuels by 10 percent by 2020, which is expected to account for about 20 percent of the total GHG emission reductions needed to meet AB 32. The Zero-Emission Vehicle (ZEV) Action Plan envisions more than 1.5 million ZEVs in California by 2025.

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

California's Renewable Portfolio Standard, established in 2002 and expanded in 2006 and 2011, requires power utilities to use renewable energy sources for 33 percent of total procurement by 2020. California is on track to meet this target, as well as the goals of the US Environmental Protection Agency's Clean Power Plan. But more must be done to achieve SB 350's tougher renewable goals.

- **A statewide cap-and-trade program is in place.**

California adopted the nation's first GHG cap-and-trade program in 2011, giving businesses flexibility to reduce emissions less expensively. The auctions started successfully in late 2012 with participation of electric utilities and large industrial emitters; transportation and heating fuels were added in 2015. The auctions now cover 85 percent of California GHG emissions.

- **California has implemented innovative strategies to reduce driving.**

SB 375, adopted in 2008, aims to reduce automobile travel by integrating investments in land use and transportation. The bill eases environmental review requirements for qualifying projects.

- **California local governments are addressing climate change.**

By 2013, nearly 60 percent of the state's cities and counties—home to 75 percent of Californians—had put in place or were adopting climate change policies and programs.

- **California must build on current efforts to meet longer-term emission reduction goals.**

Reaching the ambitious post-2020 goals as the state's population grows will require larger-scale deployment of clean technologies and more low-carbon options for energy generation, transportation, and other sectors.

California must prepare for the effects of climate change

- **The state is already seeing the effects of climate change.**

The mountain snowpack is melting earlier now than in the early 20th century. The spring 2015 snowpack was the lowest on record. Average annual temperatures are rising and wildfires are increasing. Some plant and animal species normally found in the southern part of the state have been observed farther north.

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.

- **Air quality will worsen, threatening public health.**

Rising temperatures and other factors will worsen air quality. Additional pollution controls may be needed to meet state and federal air quality standards. An increase in such extreme events as heat waves, wildfires, and floods will threaten public health and challenge the state's medical infrastructure and emergency preparedness agencies.

- **Rising sea level presents multiple threats.**

The Pacific Institute found that 55 inches of sea level rise, near the high end of projections for 2100, will put nearly half a million residents at high risk of flooding and threaten critical infrastructure, including airports and 3,550 miles of roadways. Risk prevention plans that also protect coastal ecosystems are needed.

- **Water management faces challenges.**

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

- **Agriculture will have to adapt.**

Reduced water supply reliability and higher temperatures will pose challenges for crop management. Research on heat- and drought-tolerant crops, and such tools as localized climate information, can help.

- **Biodiversity is threatened.**

Climate change is stressing many California plants and animals, threatening some species with extinction. The latest drought has put 18 native fish species at high risk of extinction. As temperatures rise, many species will be forced to migrate, but current land development patterns could hinder this movement.

- **Readiness varies widely.**

Water and electric utilities have begun long-term planning for climate change, the California Natural Resources Agency has developed an adaptation strategy, and some regions, including San Diego and the Bay Area, are taking steps to prepare. In areas such as ecosystem management and flood control, however, institutional and legal frameworks are ill equipped to address climate change.

- **Two state-supported online tools can help local governments prepare.**

Cal-Adapt, a web-based tool, allows users to identify potential climate impacts in their regions. The California Climate Adaptation Planning Guide outlines climate effects by region and describes measures local governments can take.

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

In the July 2015 PPIC Statewide Survey, 61 percent of Californians said it is very important, and 25 percent somewhat important, for the state to act now to prepare for global warming.

Looking ahead

California is on track to meet its 2020 emission reduction goals and has begun to consider how to meet the more ambitious 2050 goals. But large emission reductions are needed on a global scale and must happen soon to avoid the most severe consequences. Even if such reductions are achieved, the state must prepare for climate change's inevitable effects.

- **Develop an integrated climate change policy.**
An integrated policy that includes emission reductions 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. Near-term emission reductions are essential for future climate stabilization.
- **Undertake some “no regrets” measures now to reduce the effects of climate change.**
For example, considering climate change in current land-use planning could facilitate migrations of species. Limiting development in flood-risk areas will avoid future costs.
- **Reduce policy uncertainty by gathering more information.**
Better information is needed to evaluate policy options and assess progress toward emission reduction goals. Detailed studies of local climate effects will help pinpoint vulnerabilities and develop priorities for adaptation.
- **Continue to play a leadership role.**
California, long a leader in environmental policy, has been a standout on climate change. This example encourages other governments to address climate change. Without global cooperation to reduce emissions, California’s economy and society face severe consequences.

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