PPIC

Climate Change

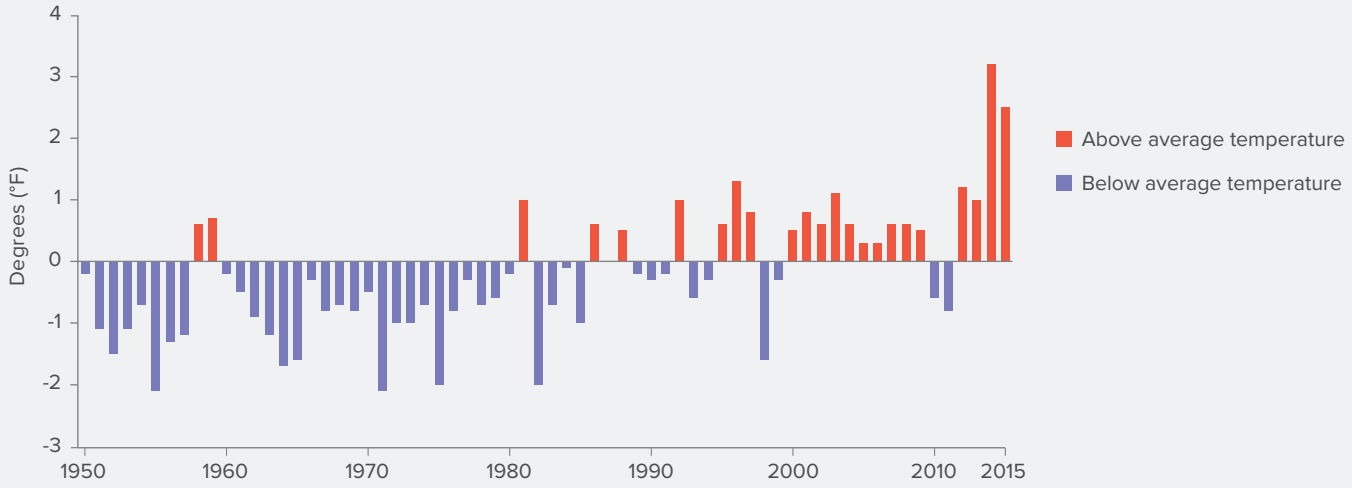
CALIFORNIA'S FUTURE

JANUARY 2017

Climate change threatens California's future

Global emissions of greenhouse gases (GHGs) 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. The sea level is predicted 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 result in more precipitation falling as rain and less as snow, which will increase both the frequency and magnitude of flooding and diminish water reserves in the Sierra snowpack. Even if all GHG emissions ceased today, some of these changes would be unavoidable because the climate system changes slowly.

CALIFORNIA IS GETTING WARMER



SOURCE: National Oceanic and Atmospheric Administration.

NOTE: The figure reports degrees above or below the average statewide temperature for 1981–2000 (58.3°F).

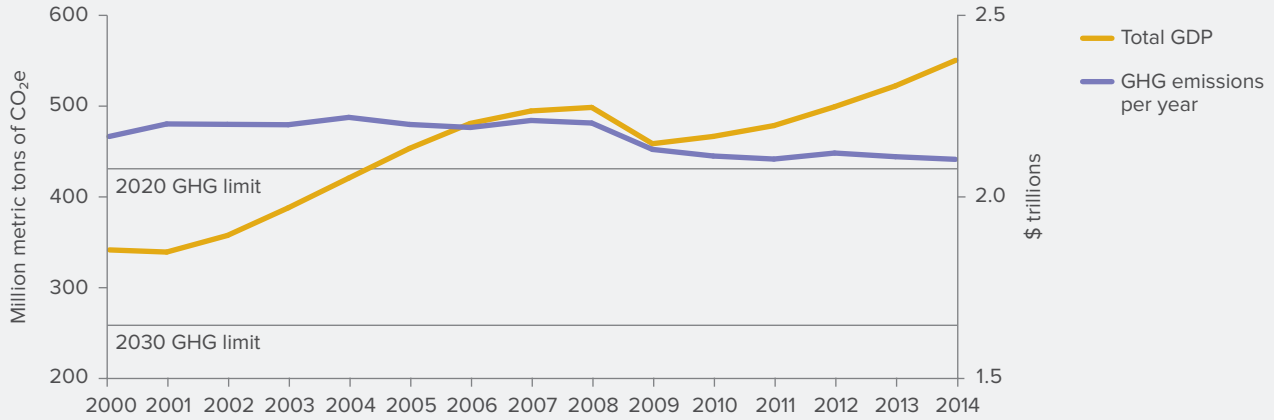
In the face of these threats, California has emerged as a leader in global efforts to reduce GHG emissions. In 2006, California enacted Assembly Bill (AB) 32, the Global Warming Solutions Act, which requires the state to reduce GHG emissions to 1990 levels by 2020. In 2016, the enactment of Senate Bill (SB) 32 extended this commitment by raising the emission-reduction target to 40 percent below 1990 levels by 2030. And an executive order calls for GHG emissions to be reduced to 80 percent below 1990 levels by 2050. The July 2016 PPIC Statewide Survey found that two in three Californians favor the state's emission-reduction goals.

Reductions of this magnitude are needed on a global scale to stabilize the earth's climate. California faces a twofold policy challenge: finding cost-effective ways to reduce GHG emissions and preparing for the climate changes that are expected even if emissions are reduced.

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. This was the first comprehensive plan of its kind within the United States (and one of the first such plans internationally). A 2014 update found that California is on track to meet the 2020 target but will need to significantly increase the pace of GHG emission reductions to meet its longer-term goals. Laws enacted in 2015 and 2016 take steps in this direction.

CALIFORNIA'S ECONOMY IS GROWING DESPITE REGULATIONS REDUCING GHG EMISSIONS



SOURCES: California Air Resources Board (emissions) and US Bureau of Economic Analysis (GDP).

NOTES: Gross domestic product (GDP) is expressed in 2016 dollars. GHG emissions are in millions of metric tons of CO_2 equivalent (CO_2e), a measure used to compare the relative contribution to global warming of various greenhouse gases.

- **Reducing transportation emissions is key.**
  Although this sector has cut emissions by 10 percent since the early 2000s, transportation is still California's largest GHG source. Policies to reduce GHGs include: the Low Carbon Fuel Standard Program, which aims to reduce the carbon intensity of fuels by 10 percent by 2020; a Zero-Emission Vehicle (ZEV) Action Plan to add 1.5 million ZEVs—or electric vehicles—to roadways by 2025; and SB 375, which would reduce miles traveled by integrating investments in land use and transportation.
- **The state is increasing reliance on cleaner energy.**
  California's Renewables Portfolio Standard requires power utilities to provide 33 percent of total electricity from renewable energy sources by 2020. In 2015, SB 350 increased this target to 50 percent by 2030. The state is on track to meet the 2020 goal—22 percent of electricity came from renewable sources in 2015—but achieving the goal for 2030 will require additional shifts away from natural gas as a power source.
- **A statewide cap-and-trade program brings flexibility to efforts to reduce emissions.**
  California adopted the nation's first GHG cap-and-trade program in 2011. By allowing businesses to trade emissions permits, the program gives them flexibility to reduce emissions at lower cost. The auctions began in 2012 with electric utilities and large industries and added transportation and heating fuels in 2015. The program now covers 85 percent of the state's GHG emissions. It is currently scheduled to run through 2020. Uncertainties over its future weakened market participation in 2016.
- **Methane and other potent GHGs are targeted under new policies.**
  Short-lived climate pollutants—methane, black carbon, and most fluorinated gases (hydrofluorocarbons, or HFCs)—are powerful climate-warming gases and harmful air pollutants. Together, they account for more than 12 percent of all GHG emissions, with methane the largest source at 9 percent. SB 1383 (enacted in 2016) mandates cutting methane and HFCs by 40 percent and black carbon by 50 percent below 2013 levels by 2030, following a strategy proposed by CARB. The proposal could threaten the viability of the state's dairy industry, which is responsible for more than half of California's total methane emissions.
- **Forests, farms, and wetlands provide opportunities to capture and store carbon.**
  Carbon dioxide can be removed from the atmosphere by plants and stored in vegetation or in soils. The state is developing a strategy to align traditional environmental and economic benefits of natural and working lands with potential carbon storage, using integrated land-use approaches.

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 more work is needed to prepare for these changes.

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.

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

The mountain snowpack is shrinking and melting earlier; the spring 2015 snowpack was the lowest on record. Average annual temperatures are rising and wildfires are increasing. Higher temperatures and more severe droughts are threatening some plants and animals with extinction.

- **Air quality will worsen and public health will be at risk.**

Rising temperatures will increase the intensity and spread of smog, likely requiring additional pollution controls to meet air quality standards. An increase in extreme events—heat waves, wildfires, and floods—will threaten public health and challenge the state's health care and emergency preparedness systems.

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

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

- **Water management faces challenges.**

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

- **Agriculture will have to adapt to changing conditions.**
  Reduced water-supply reliability and higher temperatures will pose challenges for crop management. Research on heat- and drought-tolerant crops and tools such as localized climate information can help farmers adapt.
- **Native biodiversity is under threat.**
  Climate change places an added burden on plants and animals. As temperatures rise, many species will need to migrate to more hospitable areas, but development patterns could hinder this movement. The latest drought's hot, dry conditions have put 18 native fish species at high risk of extinction, and similar droughts are expected in the future.
- **Readiness to cope is variable.**
  Water and electric utilities have begun to factor climate change into their long-range planning, the state has an adaptation strategy for its agencies, and some local and regional governments are developing adaptation plans. But in areas such as ecosystem management and flood control, institutional and legal frameworks are ill-equipped to prepare for change.
- **The state is providing online adaptation tools for local governments.**
  Cal-Adapt, the California Climate Adaptation Planning Guide, and the California Local Energy Assurance Planning Tool can help local governments understand their vulnerabilities and prepare for climate change.
- **Californians support action to address climate change effects.**
  In the July 2015 PPIC Statewide Survey, 61 percent of Californians said it is very important for the state to act now to prepare for global warming, while 25 percent said it is somewhat important.

Looking ahead

California is on track to meet its 2020 emission-reduction goals and is working toward meeting the more ambitious goals for 2030 and beyond. But California produces only about 1 percent of global emissions—and even if international efforts such as the 2015 Paris Agreement prove successful, the state must prepare for some inevitable effects of climate change.

Achieve near-term GHG emission reductions. Large reductions are needed soon to avoid the most severe effects of climate change.

Undertake some "no regret" measures now to reduce the effects of climate change. For example, considering climate change in current land-use planning could facilitate species migrations. Limiting development in flood-risk areas will avoid future costs.

Extend the cap-and-trade program. Administrative and legislative actions can reduce uncertainties about the future of this flexible policy tool beyond 2020.

Spend cap-and-trade revenues in priority areas. The cap-and-trade auctions have made large sums available for programs to reduce GHG emissions, and about $1.4 billion was still unallocated by mid-2016. Under a 2016 agreement, some of these funds will be earmarked for programs in economically disadvantaged areas. Other priorities should include innovative programs that do not have ready access to other funding, such as improving forest management to store carbon and helping dairies transform methane into electricity.

Continue to play a leadership role. California's new GHG emissions targets for 2030 confirm the state's commitment to combating climate change. This leadership encourages other governments to take action. California can also help lead global efforts by sharing information on successful innovations to reduce emissions.

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