Choosing Our Future
Climate Change in California
Solutions for the Golden State

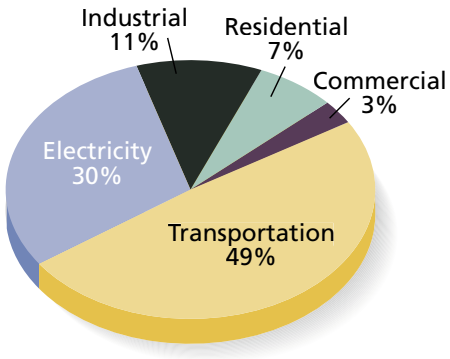
Our global climate is changing because humans are adding large amounts of heat-trapping gases to the atmosphere, and if these changes are left unchecked, the impact on California's health, economy, and environment could be significant. Practical solutions exist today to address the problem, and California can and must lead the way.

The latest projections for the Golden State show that regional warming and its consequences depend on the rate at which we continue to release heat-trapping gases into the atmosphere:

- Summer temperatures could increase more rapidly than previously expected, rising about four to eight degrees Fahrenheit by 2100 under a lower-emissions scenario and 7.5 to 15°F under a higher-emissions scenario.
- Heat waves are projected to become more common, more intense, and last longer, with serious implications for human health and quality of life.

- Spring snowpack in the Sierra Nevada could decline as much as 70 to 90 percent by century's end.
- California's $30 billion agricultural industry could be hurt by more frequent summer water shortages and the effect of higher temperatures on the quality and production of valuable goods such as wine grapes and dairy products.

Figure 1: California CO_2 Emissions (1999)



Note: Includes emissions from imported electric power.
Source: California Energy Commission. 2002. Inventory of California Greenhouse Gas Emissions and Sinks: 1990–1999. November.

Some warming is inevitable because past emissions of carbon dioxide (CO_2) and other heat-trapping gases will continue to exert their influence on the atmosphere for decades. If we are to reduce the severity of climate change and its impact, we must minimize human pressures on our environment. We must also anticipate those consequences of climate change that cannot be avoided, and develop long-term management strategies for dealing with them.

The most severe consequences for California and the world can be avoided if responsible measures are taken now. With one of the world's largest economies and a history of environmental innovation, California is uniquely positioned to provide leadership in addressing the threat of global warming and reducing its impact on our children and grandchildren.

The state can take advantage of cost-effective solutions for reducing heat-trapping emissions and delivering energy cost savings, cleaner air, water, and new jobs. Although power plants and transportation are California's largest sources of emissions, accounting for more than three-quarters of its heat-trapping CO_2 (Figure 1), solutions can and should be pursued in all sectors of the economy. Improvements in forestry practices and agriculture can not only increase the amount of carbon stored naturally in trees, food crops, and soils, but also reduce heat-trapping emissions from cattle production and fertilizer use.

Energy Solutions

Nearly half of California's heat-trapping CO_2 emissions result from energy consumption in power plants, industry, businesses, and homes; electric power generation alone accounts for 30 percent of the total. While California's power sources emit less than the national average, the state's electricity consumption is the second highest in the nation, making its contribution to global warming substantial.

Forward-thinking energy policies can significantly reduce emissions by promoting energy efficiency, renewable energy, and cleaner fossil fuel generation. By taking these actions, California's leadership can demonstrate for the western states and the nation that developing clean energy resources can benefit both the environment and the economy:

• **Strengthen California's renewable electricity standard.** California state law currently requires its largest electric utilities to increase their use of wind, solar, and other renewable electricity sources to 20 percent by 2017, but municipal power producers are currently exempt from the standard. A strong standard would include all electric utilities and suppliers, move the 20 percent target year up to 2010, and increase the share of renewable energy beyond 20 percent.

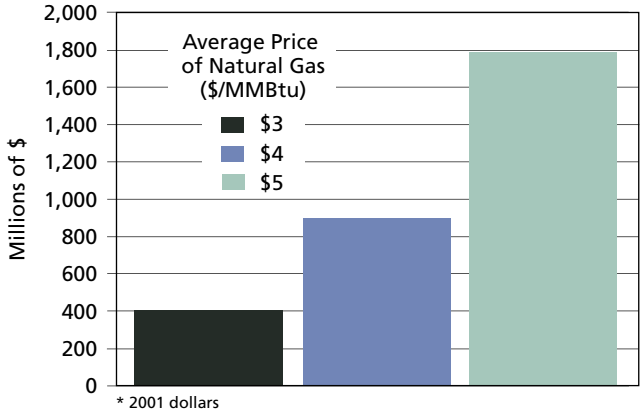
Increasing the amount of renewable electricity available will help reduce California's heavy reliance on natural gas and proposed investments in new coal-fired power plants. It will also yield cleaner air, higher employment, and lower and more stable electricity and natural gas prices, while conserving resources for future generations. Renewable energy makes economic sense (Figure 2).

• **Strengthen clean energy investment funds.** About $110 million per year is currently available to residential, small business, and commercial customers in incentives for installing emerging renewable energy technologies such as solar panels and small wind turbines. A higher state funding level is needed to sustain the growing use of these technologies and continue driving their costs down.

• **Provide incentives for cleaner fossil fuel generation.** Large energy facilities should be encouraged to invest in combined heat and power systems that efficiently produce both heat and electricity from a single fuel source. In addition, utilities should be required to clean up older, higher-polluting power plants and employ cost-effective renewable energy and energy efficiency technologies. Only then should they be allowed to buy energy from fossil fuel plants that employ the best available environmental controls.

• **Build upon the success of California's energy efficiency programs.** Efficiency incentive programs, together with efficiency standards for buildings and appliances, saved enough electricity and natural gas between 1975 and 2001 to heat and power the entire state for more than two years. California should pursue additional energy- and money-saving electricity efficiency measures, increase investments in natural gas efficiency, and continue to improve building and appliance standards. A clean energy strategy should also promote "demand response" programs, which encourage customers to curb energy use during peak periods.

Figure 2: Savings from Renewable Electricity Standards (2003–2010)*



* 2001 dollars

Source: Donovan, D. et al. 2001. *Powering Ahead: A New Standard for Clean Energy and Stable Prices in California*. Union of Concerned Scientists. September.

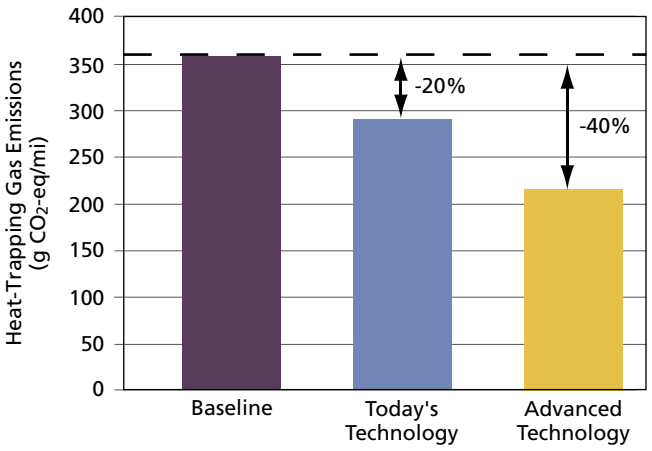
Vehicle Solutions

Roughly half of California's heat-trapping emissions are associated with the movement of people and goods. In fact, passenger cars and trucks alone account for nearly 30 percent of the state's CO_2 emissions. If California is to protect itself from the effects of global warming, therefore, it must reduce vehicle emissions by taking the following steps:

• **Set aggressive vehicle global warming standards.** California has a strong track record of global leadership in setting clean-car standards. As a result, new cars in California are the cleanest in the world when it comes to smog-forming pollution, and the state is now developing tailpipe standards for global warming emissions. Technologies to reduce heat-trapping emissions from cars and passenger trucks are readily available and cost-effective; the added costs for existing technologies that could reduce heat-trapping emissions by 20 percent, for example, would be offset by lower fueling costs in about three years of driving (Figure 3). The added costs for slightly more advanced technology that could reduce emissions by 40 percent would be offset in a little more than four years.

• **Maintain a strong Zero Emission Vehicle program.** Increasingly popular hybrid vehicles and prototype zero-polluting fuel cell vehicles are a direct result of California's Zero Emission Vehicle regulation. This rule requires the sale of zero- and near-zero-emissions vehicles in California and is projected to generate more than 125,000 hybrid vehicle sales annually by decade's end, growing to

Figure 3: Emission Reduction Potential for the California New Vehicle Fleet



Note: Estimates based on UCS modeling.

Source: Bedsworth, L.W. 2004. *Climate Control: Global Warming Solutions for California Cars.* Union of Concerned Scientists. April.

more than 200,000 hybrids per year by 2015. In addition to vital air pollution reductions, hybrid cars deliver important near-term reductions in heat-trapping emissions. And by requiring modest numbers of hydrogen-powered fuel cell vehicle demonstrations, the state is creating opportunities for long-term emission reductions.

• **Support hydrogen infrastructure.** The state has launched a Hydrogen Highways initiative focused on ensuring hydrogen fuel will be available as automakers bring fuel cell cars to market. The program is vital to the long-term success of fuel cell vehicles, but must be focused on producing clean hydrogen that minimizes heat-trapping emissions.

• **Create incentives for vehicles and fuels with low heat-trapping emissions.** State and local governments have periodically provided such incentives, but these programs need more significant, long-term funding if automakers, fuel providers, and consumers are to embrace cleaner transportation.

• **Pursue smart growth policies.** Cleaner cars are only part of the solution. Policies that encourage non-car alternatives not only cut heat-trapping emissions, but also reduce air and water pollution, land use, and congestion. Rideshare, bicycle, and pedestrian programs, mass transit promotions, and parking management are key elements. Given the rapid pace of population growth in California, it is imperative to build smart growth policies into development activities around the state.

Agriculture and Forestry Solutions

With nearly 24 million acres of forests, 60 million acres of rangelands, and 10 million acres of highly productive agricultural lands, California has a sizeable opportunity to limit global warming emissions through the sequestration (or storage) of carbon. Carbon stored in California forests, soils, and in harvested wood products currently reduces statewide CO_2 emissions by five percent; proven land-use management strategies can lead to even greater reductions. To maximize its potential for carbon sequestration, California should:

• **Reduce fire risk in state forests.** Catastrophic wildfires have been increasing in size and intensity throughout forests in the western United States, and California is no exception—the state lost almost 800,000 acres of forests and chaparral in 2003. Buildup of woody fuels is a primary risk factor for wildfires, and thinning out these fuels in an ecologically sustainable manner can help reduce the risk of catastrophic fires and carbon emissions. Fuels from reduction projects could also be delivered to California's bioenergy plants, creating further reductions in heat-trapping emissions if these fuels replace fossil fuels. Fuel reduction projects alone, however, are not sufficient to minimize the risk of catastrophic fire; this strategy must be coupled with efforts to preserve and restore the oldest, most fire-resistant forests.

• **Promote conservation tillage practices.** Agricultural activities currently account for seven percent of California's heat-trapping emissions. Preliminary research indicates that conservation tillage methods, which increase carbon stored in soils and have proven cost-effective in the Midwest, are also feasible in California. Unfortunately, these methods may not prove economical on farms where some of the highest-value crops are grown.

• **Pursue reductions of non-CO_2 heat-trapping gases on farms.** Significant opportunities exist to reduce methane and nitrous oxide emissions from California's farmlands. Dairy farmers, for example, have already realized both cost savings and significant methane reductions by installing "digesters" that capture emissions from decomposing manure and convert it into energy that can be used onsite or sold back to the utilities. Because most of California's dairy farmers are clustered in the Central

Valley—an area with some of the worst smog in the country—this technology also improves air quality.

• **Explore opportunities to reforest rangelands.** As many as 24 million acres of California's rangelands and grasslands share physical features (e.g., soil, water capacity) that overlap with those needed to support forests. In fact, some of these grazing areas supported forests in the past, before being cleared for settlement. Further acreage of natural woodlands could be lost due to an expected increase in fire frequency associated with climate change. Restoring native forests on historically forested lands, with appropriate consideration for the ecosystems and economies that currently exist, could potentially provide significant carbon storage at relatively low cost.

Integrated Strategies

California has taken important, comprehensive steps to address global warming in the state and region. The California Climate Action Registry, for example, creates an accounting framework for companies that reduce their global warming emissions, and the West Coast Governor's Global Warming Initiative plans coordinated government action to reduce emissions throughout California, Oregon, and Washington. In addition, the state should:

• **Develop a climate change action plan.** Despite activity on numerous fronts, California does not have a coherent action plan for reducing heat-trapping emissions. Specific reduction targets and timelines can help focus statewide efforts, spur additional progress, and demonstrate leadership. One example of a coordinated effort to reduce local emissions is the International Cities for Climate Protection Campaign, which 27 California cities have joined.

• **Create an emissions cap-and-trade program.** A mandatory cap on emissions—the best available approach to achieve significant reductions—could be focused on individual sectors, similar to an existing proposal that would cap emissions from electricity generation in nine northeastern states. Alternatively, an emissions cap could be imposed on the entire state or regional economy, similar to the federal legislation sponsored by Senators McCain and Lieberman. A program that would allow polluters to trade the right to emit heat-trapping gases could help California meet its cap in the most cost-effective manner.

California's Pivotal Leadership

California must build on its legacy as an environmental pioneer and lead the nation in confronting climate change. The state's history demonstrates that technological innovations developed here will spread quickly to the rest of the nation and the world, and climate policies enacted here will set standards for other parts of the country (as has been the case for more than three decades of energy and transportation policy). Furthermore, the fact that California represents the world's fifth largest economy means that corporate investments made here will have rippling effects globally.

Global warming is under way and already causing changes to our environment. Fortunately, the worst consequences can be avoided by adopting cost-effective solutions that not only reduce heat-trapping emissions but also deliver important economic and environmental benefits. By acting now, we can protect the rich natural heritage, vibrant economy, and well-being of California's people and communities. The state has taken important steps to begin the fight against global warming, but far more can—and must—be done.

Union of Concerned Scientists
Citizens and Scientists for Environmental Solutions

2397 Shattuck Ave., Suite 203
Berkeley, CA 94704-1567
(510) 843-1872

Two Brattle Square
Cambridge, MA 02238-9105
(617) 547-5552

ucs@ucsusa.org
www.ucsusa.org

Choosing Our Future: Climate Change in California demonstrates practical solutions for reducing the impact of climate change in the Golden State. To access recent scientific developments on projected climate changes and their consequences for California, go to *www.climatechoices.org* or contact:

- Louise Bedsworth (510-843-1872) for vehicles solutions;
- John Galloway (510-843-1872) for energy solutions; and
- Michelle Manion (617-547-5552) for forest and land use solutions.

Support was provided in part by The Energy Foundation, The Fred Gellert Family Foundation, The William and Flora Hewlett Foundation, The David and Lucile Packard Foundation, Oak Foundation, V. Kann Rasmussen Foundation, Wallace Global Fund, an anonymous foundation, and the Gunther family.

More information is available at *www.climatechoices.org*.