



FACTS CALIFORNIA

A M E R I C A N S E C U R I T Y P R O J E C T

Pay Now, Pay Later: California

Under a high-emissions scenario, by the close of the century sea levels throughout the state are projected to rise 22-30 inches¹ and protecting coastal areas from sea level rises around the San Francisco Bay alone could cost \$6-30 billion each year.²

California has the most polluted air in the country; this pollution (ozone and particulates) causes 8,800 deaths and costs the state \$71 billion annually. These numbers will rise with the projected increases in temperature and air pollution levels across the state.³

California has distinguished itself as a leader in fighting climate change. In 2008, the state enacted the most comprehensive climate change legislation in the nation: by 2050, California pledges to cut emissions to 80% below 1990 levels.⁴

According to a new study, a failure to mitigate the effects of climate change could begin to cause serious gross domestic product and job losses as early as 2010 through 2050. In the short-term, the Californian economy is projected to suffer from the effects of climate change, but the state could benefit in the later years from an increase in migrants and an upturn in economic output as other U.S. states are comparatively less capable of adapting. Ultimately, Californians could gain \$25.1 billion in GDP and over 152,000 jobs by 2050.*

**Possibly eclipsing the positive projections, the study's calculations do not include snowfall and icepack melt, which Californians depend on for much of the water supply. GDP numbers are based on a 0% discount rate. Job losses are measured in labor years, or entire years of fulltime employment. Backus, George et al., "Assessing the Near-Term Risk of Climate Uncertainty: Interdependencies among the U.S. States," Sandia Report (Sandia National Laboratories, May 2010), 137, 141. https://cfwebprod.sandia.gov/cfdocs/CCIM/docs/Climate_Risk_Assessment.pdf (accessed March 23, 2011).*

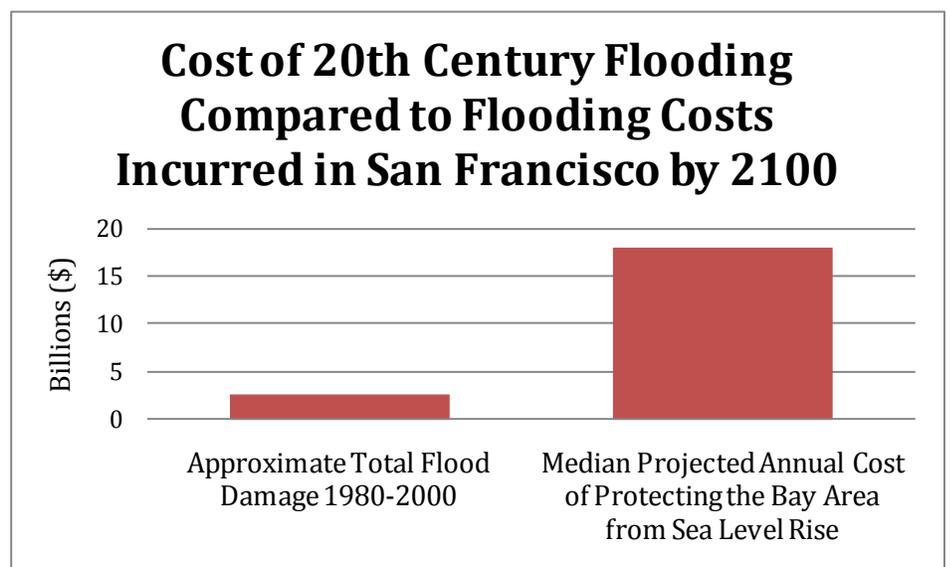
Admittedly, the effects of climate change, a complex and intricate phenomenon, are difficult to predict with precision. Informed scientific and economic projections, as we have used in our research, however, allow us to see that California faces significant losses in industries crucial to its economy if no action is taken.

Moreover, data shows California is poised to benefit from the research, development, and distribution of renewable energy technologies. By achieving the goals set out in its 2008 legislation, California will not only see billions of dollars in investment and thousands of new jobs, but also lose its reputation as the 12th largest emitter of greenhouse gases in the world.⁵ Should

we fail to take action against climate change, Californians have much to lose.

Pay Later: The Cost of Inaction

California will experience significant losses—billions of dollars in revenue and thousands of jobs—if the effects of climate change are not mitigated. The state's iconic beaches and coasts may be lost, and the security of the agricultural and tourism industries will be in jeopardy. The Golden State will lose if serious action is not taken.



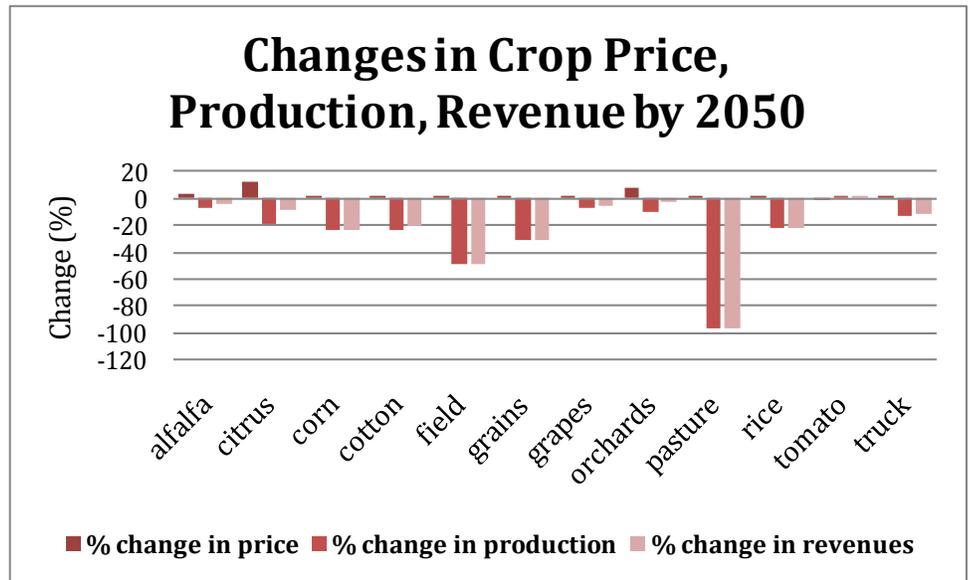
Sources: Kabrl; Union of Concerned Scientists, Climate Change in the United States: the Prohibitive Costs of Inaction

Water Scarcity

The management of water resources in California is projected to be the state's largest financial burden created by climate change. **Simultaneous increases in demand for, and pressure, on California's already intricate water supply system may cost an estimated \$500 million to \$1.5 billion each year by 2085,** according to California's Energy Department.⁶ As early as 2050, another study estimates, costs of scarcity could reach \$121 million a year, while operational costs are projected to reach \$369 million.⁷ The water distribution system, which takes water from the mountains in northern California and distributes it to southern California, relies on the snowpack during the spring and summer months. The system will be further stressed as snowfall decreases throughout the Sierra Nevada Mountains—under a high emissions scenario, snowpack is expected to decrease by 70-90%.⁸

Coastal flooding will compound the impending water crisis. An increase in "saltwater would degrade estuaries, wetlands, and groundwater aquifers."⁹ The Sacramento/San Joaquin River Delta is a major source of fresh water; if this is overrun by saltwater, it would only increase the severity of the current and future water crisis.

California is no stranger to wildfires; changes in precipitation and weather patterns, namely rising temperatures, will increase the risk of large wildfires by as much as 55%.¹⁰ In 2008, the federal government spent \$200 million to fight wildfires in California, including three that cost \$50 million each. A large expenditure in its own right, this does not include the additional costs to the state—estimated to be another 25%—or damage to



Source: Howitt et al

infrastructure, private residences, and businesses.¹¹



Source: Bureau of Economic Analysis¹²

Beach Bummer

California's iconic beaches will also suffer at the hands of climate change. Coastal flooding and beach erosion will likely prove an increasing problem as a result of intensified and more frequent storms and warmer water temperatures. **The sea level along the 1,100 miles of California's coast has**

risen about seven inches in the past century, and is projected to rise an additional 22-35 inches by 2100.

This will accelerate coastal erosion, disrupt wetlands and other natural habitats with flooding saltwater, and threaten levees.¹³ **The impact of flooding on water supplies could cost farmers in the Central Valley and southern California's cities alone between \$2-14 billion over the last 30 years of the century.**¹⁴ Coastal "armoring," building structures to protect coastal infrastructure, is projected to cost an initial \$14 billion and an additional \$1.4 billion annually thereafter to reinforce and strengthen.¹⁵ Total flood damage from 1980-2000 equaled a fraction of this amount—\$2.4-2.8 billion.¹⁶

Another study finds that a one-meter rise in sea level (predicted as early as 2083 by the Pacific Institute under one scenario¹⁷) would likely cost \$75 million annually in lost expenditures and consumer surplus, as well as \$4 billion in beach nourishment, the replacement of eroded sand.¹⁸

Crops Fall below the Gold Standard

California's agriculture industry—which employs over one million workers and is worth \$30 billion—is expected to suffer heavy losses due to rising temperatures and water shortages. Warmer temperatures will lead to shifts of pest and weed habitats. A primary cotton pest in the south of the state, the pink bollworm, will likely reach the crops of northern Californian farmers.¹⁹ In addition, crop yields are projected to fall across the state; revenues are projected to drop by nearly 50% by 2050, from \$2.78 billion in 2006.²⁰ **Compared to agricultural revenues which are calculated to be historically possible for the year 2050, Sacramento will likely see a 15.5% drop, San Joaquin, 10.4%, Tulare, 9.1% and the southern California region a 12.2% drop.** Californians in these regions alone stand to lose over \$3 billion under a business as usual situation.²¹

California's world-renowned \$3.2 billion wine industry will suffer as well. High temperatures can cause premature ripening, reducing grape quality. By the century's close, wine grapes could mature as much as 30 to 60 days earlier, reducing the quality of both the grape and the wine.²² These smaller, lower quality fruits will likely garner lower prices on the market.

Unhappy Cows are from California

California is responsible for roughly one-fifth of the country's milk products, bringing in \$3 billion for the state's economy.²³ Under a high-emissions scenario, milk production is projected to fall by as much as 20% due to the almost constant heat stress of the animals toward the end

of the century. At temperatures as low as 77°F, dairy cows begin to feel stress and production begins to fall; this drop off becomes more significant at 90°F. Depending on the level of emissions, temperatures are predicted to rise by up to 10.5°F by the end of the century. This multi-billion dollar industry is at risk for profit and job loss as a direct result of climate change.²⁴

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Public Health Costs

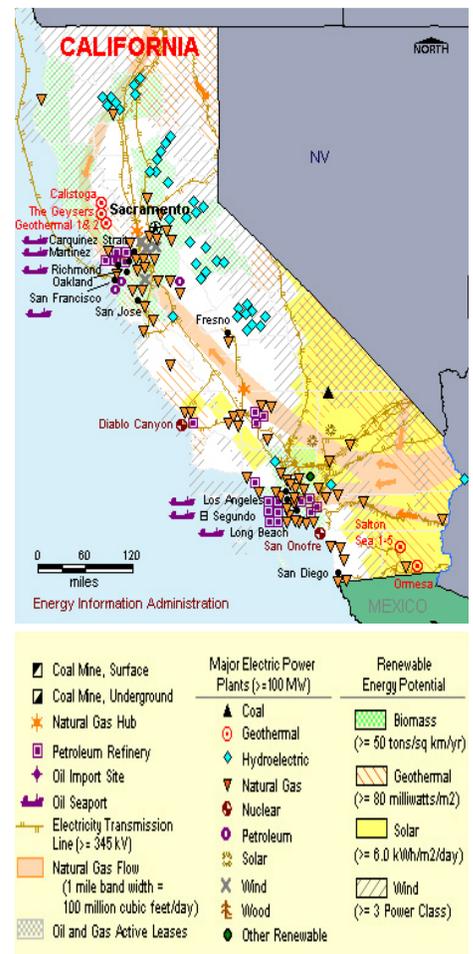
California has the worst air quality in the U.S.; over 90% of Californians live in areas in which the air does not meet current ozone or air particulate matter state standards. These pollutants can lead to an array of health problems including asthma, emphysema, cardiovascular disease, and decreased lung function. Combined, these “contribute to 8,800 deaths and \$71 billion in healthcare costs” annually. If temperatures rise between 5.5°F and 8°F, there will be 75-85% more days during which air pollution can be produced in Los Angeles and the San Joaquin Valley. Smog and deteriorated air quality will be even more common.²⁵

By the end of the century, there could be 100 or more days per year with

temperatures greater than 90°F in Los Angeles and 95°F in Sacramento. By 2050, extreme heat in cities such as Los Angeles could cause twice as many—or even three times as many—heat-related deaths than currently occur each year.²⁶

Pay Now: Benefits of Taking Action

Although climate change could devastate vital sectors of California's economy, the state is well-poised to benefit from developing renewable sources of energy. This is especially pertinent considering that California is the 12th largest greenhouse gas emitter in the world.²⁷



Currently, 23% of the state's energy is derived from renewable sources. In 2008, Californians generated 208 million MWh of energy and produced 48 million MWh from renewable sources.²⁸ Its capacity for renewable energy generation is projected to be as high as 246 million MWh each year,²⁹ yet the state imports more energy from the rest of the U.S. than any other state. Fortunately, it has embarked on a path to reach this potential; California passed a cap-and-trade program in December 2010.³⁰

California's Mojave Desert is home to the world's largest solar energy plant. In 2009, six new large solar plant proposals were submitted to the state for review³¹—**two of which together would cover 12.5 square miles and generate up to 800 MW of power, more than 12 times the output of the Mojave plant.**³² The Southern Desert received the National Renewable Energy Laboratory's highest potential rating for solar power; about a decade ago, 90% of the world's commercially available, concentrated solar power was housed there.³³ California's solar industry is booming in attempts to reach the 33% renewable standard by 2020 passed by the state's legislature.³⁴

Laudably, California is already harnessing its wind power; it produces almost 10% of the nation's wind power³⁵ and in 2007, 2.3% of the state's gross system power was generated by wind.³⁶ Many areas around the state, including much of its eastern border, has been designated as "good" or "excellent" for future wind power generation.³⁷ Since the early 1990s, wind energy has created 5,200 direct and indirect jobs in California and attracted \$3.2 billion in direct investment.³⁸

California also houses the largest source of geothermal power in the United States, just north of San Francisco.³⁹ Magma and Hot Dry Rock also have the potential to provide geothermal energy. Geothermal energy produced 4.5% of the state's total energy in 2007, and the state has an estimated 4,000 MW of potential geothermal production, using current technologies.⁴⁰ Californians must continue to build on their progress.

Conclusion

California must consider action on climate change not just in terms of cost, but also in terms of opportunities. If we give California's population, businesses, and investors clear and consistent signals by properly offering initiatives and cultivating demand, investment and innovation in renewable technologies will follow.

Californians will have to pay for the effects of climate change. The only remaining question is whether they will pay now, or pay later and run the risk of paying significantly more.

(Endnotes)

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