

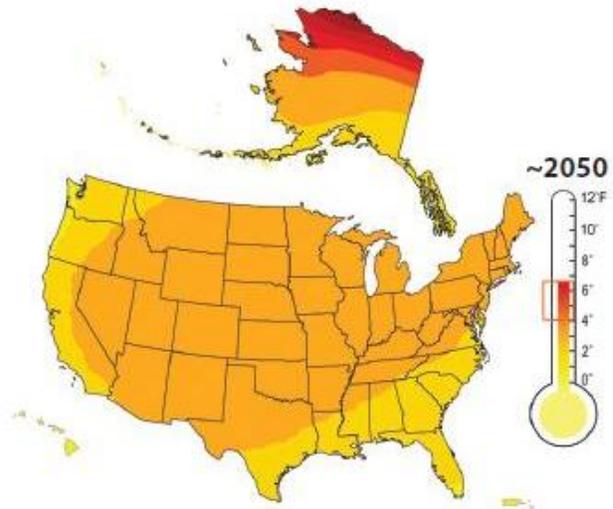
Millions of Americans suffer from the harmful effects of ground-level ozone pollution, which exacerbates lung diseases such as asthma and can cause breathing difficulties even in healthy individuals. The result is more time spent in hospital emergency rooms, as well as additional sick days and premature death. These health impacts not only involve suffering; they are also costly, constituting a significant drag on the U.S. economy.

While power plants and cars are among the main sources of ozone-forming pollutants (the chemical precursors to ozone), ozone's formation is dependent on temperature, among other conditions. As a result, climate change has the potential to increase ozone pollution—and its health and economic burdens—across large parts of the country both now and in the future.

This report from the Union of Concerned Scientists combines projections of future climate-induced temperature increases with findings on the relationship between ozone concentrations and temperature to illustrate a potential “climate penalty on ozone.” This penalty demonstrates how higher temperatures could increase ozone pollution above current levels, assuming that emissions of ozone-precursor pollutants remain constant.

The report analyzed this climate penalty's health consequences expected in 2020 and 2050, including increases in respiratory symptoms, hospital visits for the young and old, lost school days, and premature mortality, for most of the continental United States. It also projected the economic costs of these health impacts in 2020.

Projected Temperature Increases for the United States: Mid-Century higher emissions scenario



Average U.S. temperatures have increased more than 2° Fahrenheit (F) during the past century. If global warming emissions continue increasing, average U.S. temperatures could rise 3° to 5.5° F by 2050.

Adapted from Karl, Mellilo, and Peterson 2009.

Key findings¹ include:

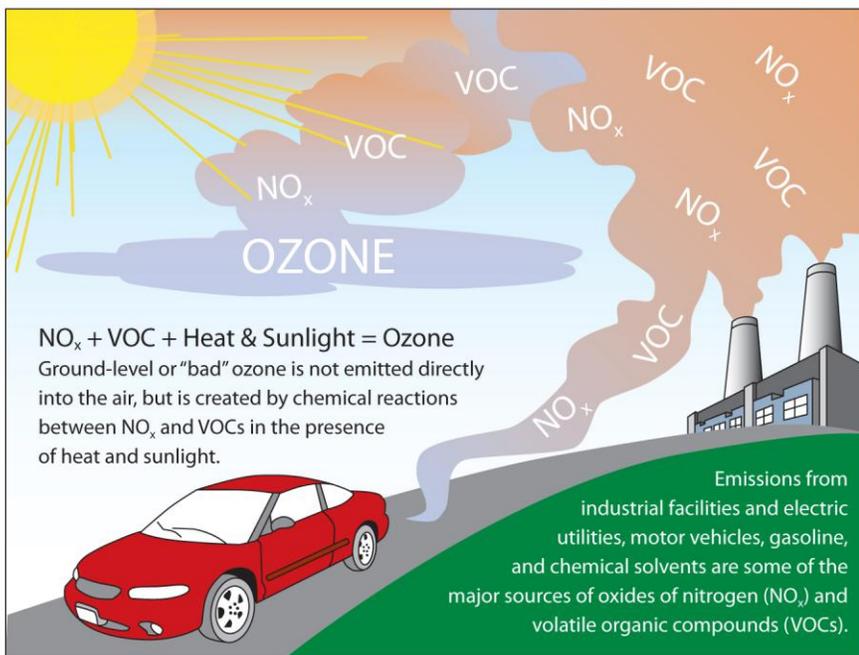
CALIFORNIA IMPACTS:

- Climate change-induced ozone increases in California could result in nearly 443,000 additional cases of serious respiratory illnesses. These and other health-related impacts could cost more than \$729 million (in 2008 dollars) in 2020 alone.

US IMPACTS:

- Just nine years from now, in 2020 alone, we estimate that the continental United States could pay an average of \$5.4 billion (2008\$) in health impact costs associated with the climate penalty on ozone.
- Higher ground-level ozone concentrations due to rising temperatures could lead to an average of 2.8 million more instances in 2020 of acute respiratory symptoms such as asthma attacks, shortness of breath, coughing, wheezing, and chest tightness for the higher ozone level analyzed. In 2050, that could rise to an average of 11.8 million additional occurrences.
- Higher ozone concentrations due to rising temperatures could lead to an average of 3,700 more seniors and 1,400 more infants hospitalized for respiratory related problems in 2020. In 2050, that could rise to 24,000 more seniors and 5,700 more infants hospitalized.

FIGURE 1. Illustration of Ground-Level Ozone Formation



Source: Adapted from EPA 2010.

"Bad" ozone can be distinguished from "good" ozone, which is present at high altitudes in the atmosphere and beneficial because it protects the earth from excessive ultraviolet radiation. But bad, or ground-level, ozone—the primary component of smog—is harmful to health. Human activities such as driving cars and generating electricity are major sources of the ingredients that form smog.⁵

¹ Key findings are reported using the "central" numbers, from the 2 ppb ozone-increase case in 2020 and the 7 ppb ozone-increase case in 2050, presented in Tables 2, 3, and 4 of the full report. Health impacts modeled were acute respiratory symptoms, emergency room visits, hospital admissions, lost school days, and premature deaths.

Full report and technical appendix online at <http://www.ucsusa.org/climateandozonepollution>

The Union of Concerned Scientists is the leading science-based nonprofit working for a healthy environment and a safer world.



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