

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. Whether tallying up the dollars lost to sick days or the high costs of emergency room visits, ozone pollution is expensive.

Now health professionals have an additional ozone pollution concern: climate change. Here's the connection: warmer temperatures affect ground-level ozone, which is formed when a complex set of chemical reactions is triggered by heat and sunlight. Hotter temperatures in a changing climate mean that ozone concentrations are likely to rise over most of the U.S. – possibly offsetting some of the gains we have made in reducing the pollutants that form ozone.

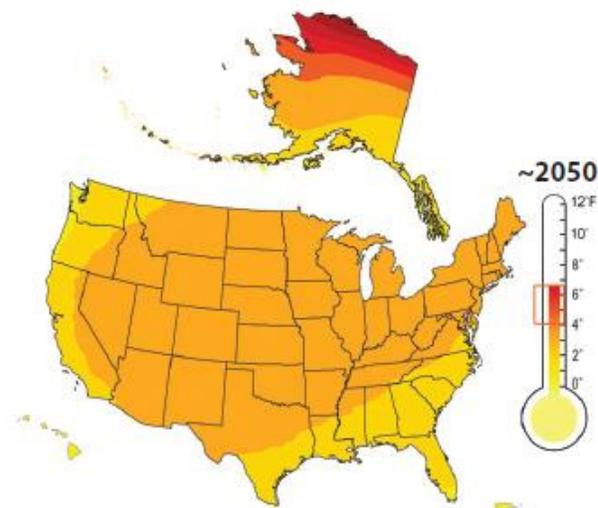
“Rising Temperatures, Worsening Ozone Pollution” explores how such a phenomenon may occur in many parts of the U.S. By combining projections of future climate-induced temperature increases with findings on the relationship between ozone concentrations and temperature, the report illustrates a potential “climate penalty on ozone.” This climate penalty is then used to model potential health consequences and costs.

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. Our results show that as we continue to work to reduce ozone pollution and its health effects in the future, we cannot ignore the consequences of ever-increasing temperatures.

MAINE IMPACTS:

- Climate change-induced ozone increases in Maine could result in almost 15,000 additional cases of serious respiratory illnesses in 2020.
- These and other related health impacts could cost the state almost \$36 million (in 2008 dollars in 2020).

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



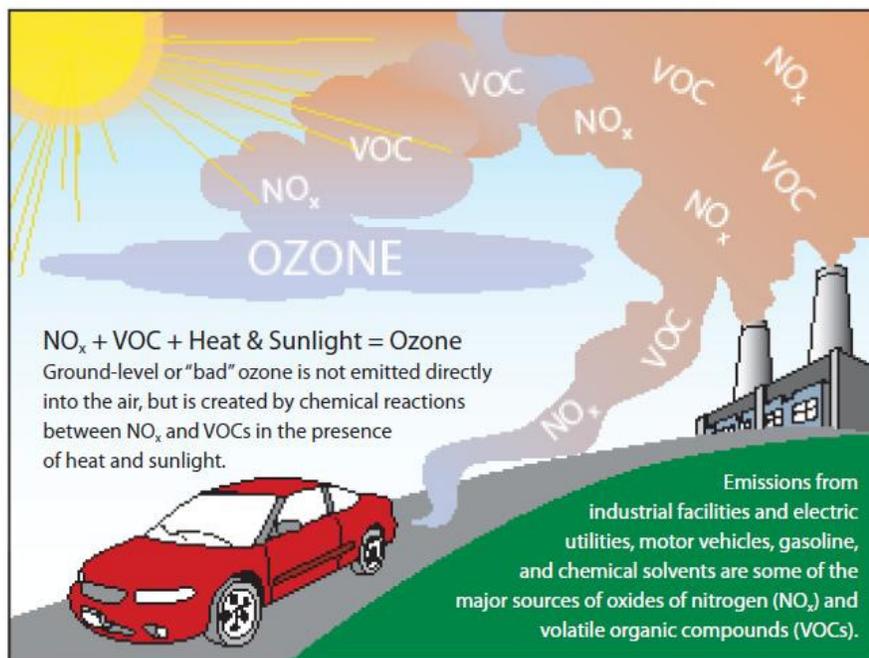
Average U.S. temperatures have increased more than 2° Fahrenheit (F) during the past century. If global warming emissions continue increasing, average U.S. temperatures could rise 3° to 5.5° F by 2050.

Adapted from Karl, Mellilo, and Peterson 2009.

U.S. 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: Figure courtesy of the EPA.

"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 a major source of the ingredients that form smog.

Results reported are 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>

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