

# Summary of the Science Supporting EPA's Finding That Greenhouse Gases Threaten Public Health and Welfare



*For a full discussion of the rationale for EPA's proposed findings, please see the Proposal describing the findings as well the underlying Technical Support Document for a comprehensive synthesis of the science at: [www.epa.gov/climatechange/endangerment.html](http://www.epa.gov/climatechange/endangerment.html). All of the points in this fact sheet come from the published scientific literature, particularly from the assessments of the U.S. Climate Change Science Program, the National Research Council, and the Intergovernmental Panel on Climate Change.*

## Key Points About Climate Change:

- Heat-trapping greenhouse gases are now at record-high levels in the atmosphere compared to the recent and distant past.
- These high atmospheric levels are the clear result of human emissions of carbon dioxide and other greenhouse gases.
- Warming of the climate system is now well documented, as is evident from increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level. Eight of the 10 warmest years on record have occurred since 2001.
- The buildup of greenhouse gases in the atmosphere is very likely the cause of the observed increase in average temperatures and other climatic changes. Most of the warming cannot be explained by natural variability such as variations in solar activity.
- Future warming over the course of the 21st century, even when assuming emissions growth will be low, is very likely to be greater than observed warming over the past century.
- The effects of climate change observed to date and/or projected to occur in the future include, but are not limited to: more frequent and intense heat waves, more wildfires, degraded air quality, more heavy downpours and flooding, increased drought, greater sea level rise, more intense storms, harm to water resources, harm to agriculture, and harm to wildlife and ecosystems.
- The changes to our climate may increase the likelihood of extreme and high-impact events such as more intense hurricanes.

## Health Effects Associated With Elevated Greenhouse Gas Concentrations in the United States

### Temperature Effects:

- There is evidence that extremely hot days are already increasing. Severe heat waves are projected to intensify, which can increase heat-related mortality and sickness. A possible benefit of moderate temperature increases includes fewer deaths from exposure to extreme cold.

### Air Quality Changes:

- Climate change is expected to worsen regional ozone pollution, with associated risks in respiratory infection, aggravation of asthma, and premature death. The impact on particulate matter remains less certain.

#### Extreme Events:

- Storm impacts are likely to be more severe, especially along the Gulf and Atlantic coasts. Heavy rainfall events are expected to increase, increasing the risk of flooding, greater runoff and erosion, and thus the potential for adverse water quality effects. These projected trends can increase the number of people at risk from suffering disease and injury due to floods, storms, droughts and fires.

#### Climate-Sensitive Diseases:

- Potential ranges of certain diseases affected by temperature and precipitation changes, including tick-borne diseases, are expected to increase.

### **Welfare Effects Associated With Elevated Greenhouse Gas Concentrations in the United States**

*Under the Clean Air Act, “welfare” includes impacts such as effects on soils, water, crops, vegetation, man-made materials, animals, wildlife, weather, visibility, and climate; damage to and deterioration of property and hazards to transportation; as well as effects on economic values and on personal comfort and well-being.*

- The global sea level gradually rose in the 20th century and is currently rising at an increased rate, exacerbating storm-surge flooding and shoreline erosion.
- Rising temperatures will diminish snowpack in the Western U.S., affecting seasonal availability of water.
- Climate change will likely further constrain already over-allocated water resources in some areas of the U.S., increasing competition among agricultural, municipal, industrial, and ecological uses.
- Modest climate change, plus elevated CO<sub>2</sub>, may bring agricultural yield increases in the near term. But, as temperatures continue to rise, these crops will increasingly begin to experience failure. Increases in regional ozone levels will also adversely impact certain crops.
- Climate change has very likely already increased the size and number of forest fires, insect outbreaks, and tree mortality in the interior West, the Southwest, and Alaska, and will continue to do so.
- Changes in climate will cause species to shift north and to higher elevations and fundamentally rearrange U.S. ecosystems.
- Ocean acidification is projected to continue, which can affect the productivity of marine life such as corals.
- Climate change impacts in certain regions of the world may exacerbate problems that raise humanitarian, trade, and national security issues for the United States.

*This fact sheet is intended to assist the public understand key aspects of the proposal. However, this fact sheet is not intended to be a substitution for the proposal itself. Visit EPA’s website at the address above for more information, including the proposal, or go to [www.regulations.gov](http://www.regulations.gov) to access the rulemaking docket (EPA-HQ-OAR-2009-0171) which will be opened when the proposal is published in the Federal Register. For questions that cannot be answered through the Web site or docket, call 202-343-9927.*