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Climate change's effect on state air detailed

Stanford research estimates warming's role in California pollution levels.

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Published 12:00 am PST Thursday, January 3, 2008

Global warming is making breathing more hazardous for Californians than other Americans, says a pioneering Stanford University study scheduled for release today.

The research is the first to estimate the health effects of air pollution attributed solely to climate change – specifically the heat-trapping or "greenhouse" effect of carbon dioxide from tailpipes and smokestacks – experts said.

The findings contradict a Bush administration rationale for denying California the power to enforce its first-in-the-nation limits on cars, passenger trucks and SUVs, said Mark Jacobson, the Stanford atmospheric scientist who did the study.

"The study shows carbon dioxide is causing the health impacts, it quantifies those impacts and shows California has been impacted greater than other states," Jacobson said. "They should revisit their decision."

U.S. Environmental Protection Agency officials declined to respond Wednesday to Jacobson's comments or his study.

Bart Croes, research chief at the state Air Resources Board, said the Stanford study "refutes the flimsy (EPA) argument" that climate change does not affect California in any compelling or extraordinary way to warrant state limits on greenhouse gases.

"The study definitely demonstrates the disproportionate impact on California's air quality and health," Croes said.

The Stanford study says carbon dioxide-induced warming causes an estimated 1,000 additional deaths and many more cases of respiratory disease every year in the United States for each 1.8 degrees Fahrenheit temperature rise in the Earth's atmosphere.

At least 300 of those deaths are occurring in California cities already socked with air pollution, Jacobson said.

Warmer temperatures are known to speed formation of smog – mainly ozone, a colorless gas that inflames airways and triggers asthma attacks.

Jacobson broke ground with computer simulations of climate and air pollution demonstrating that warming speeds ozone production much faster in areas already choked with smog and soot.

With six of the most polluted cities in the United States, California will continue to bear an increasingly disproportionate share of air pollution-related deaths and illnesses as cars and factories continue to spew carbon dioxide, Jacobson said.

"Increased warming due to carbon dioxide will worsen people's health in those cities at a much faster clip than elsewhere in the nation," Jacobson said, referring to Los Angeles, Bakersfield, Visalia, Fresno, Merced and Sacramento.

California is the only state permitted under the federal Clean Air Act to set its own rules on auto emissions and fuels. But the state needs federal permission to enforce those regulations.

On Dec. 19, EPA Administrator Stephen Johnson denied California's petition to implement its greenhouse gas law on grounds that the state had failed to show the requisite "compelling and extraordinary conditions."

Jacobson had presented his peer-reviewed findings to dozens of EPA scientists and executives in October at an agency climate change workshop in San Francisco.

Because the study had not yet been published, California officials did not cite the work in its bid to the EPA. The research has since been accepted for publication in *Geophysical Research Letters*, a top-cited Earth sciences journal.

The Stanford study is one of only a handful of computer analyses worldwide that have attempted to project the effects of climate change on air pollution.

The study is the first to isolate the warming effects of carbon dioxide, and the first to estimate the public health impact from those changes – data scientists need to

advise regulators on how best to curtail greenhouse gases, said Michael Kleeman, a University of California, Davis, professor of civil and environmental engineering.

"It's a great study," Kleeman said, "but you would never use the results of just one study to determine the effects of carbon dioxide on air pollution and public health. You really need to look at multiple studies from multiple groups."

Daniel Jacob, an atmospheric chemist at Harvard University, said the simulations he and other modelers have performed on the effects of climate change on air quality have produced widely varying results.

Greater consistency and confidence in results will emerge, he said, as more researchers develop models, refine them and compare results. It's a years-long process.

"Eventually you'll get enough of these models on the effects of climate change on air pollution so you'll have a range that will be useful," Jacob said.

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