UNDERSTANDING THE EFFECTS OF CLIMATE CHANGE ON INDOOR AIR QUALITY AND PUBLIC HEALTH

Background

The U.S. Environmental Protection Agency (EPA) announced funding to nine institutions on July 21, 2015, for innovative research projects to improve understanding of the effects of climate change on indoor air quality and the resulting health effects. This research will look into the health effects produced by the change in air quality through observation changes in building use and design.

Indoor air quality, climate change and human health are all linked in numerous other ways. The research provided by the funding granted to these universities will help the public, and state and local regulators, make more informed decisions on energy use, climate change, and health. A priority is the evaluation of existing guidelines for building system design or for weatherization to adapt buildings to a changing climate, against researched evidence of health effects related to ventilation. Another emphasis is on newer, more energy efficient designs that will also preserve indoor air quality.

This research will use weather, building models and measurements in order to accurately monitor the effect of climate change on human health and indoor air quality. The grants will fund the following research projects:

Harvard University
Project: *Assessing the Potential Impact of Global Warming on Indoor Air Quality and Human Health at Two US Cities: Boston, MA and Atlanta, GA*

This project will be testing the hypothesis that rising temperatures associated with climate change will impact future home air exchange rates, leading to decreased air exchange rates during the summer season and increased air exchange rates during the spring and fall seasons. These changed rates will alter the contributions of both indoor and outdoor particle sources to indoor air quality, which will effect human health. The data collected from this research will be used to create models that assess indoor air quality, climate forecasts and population health.

Rutgers, State University of New Jersey
Project Title: *Climate Change, Indoor Ozone and Vascular Function*

This project will look at how ozone, which has been affected by climate change, changes indoor air quality and chemistry. This research will also study how useful a portable air cleaner can be for those with respiratory issues, and how ozone pollution in indoor air affects cardiovascular health.

Florida State University
Project Title: *Indoor Environment and Emergency Response Health Outcomes*

This project will look at the relationship between indoor and outdoor temperature and humidity and the built environment, the link between indoor air temperature, humidity and extreme conditions of heat and cold. The data collected can help project future extreme heat disease burdens or influenza risk related to climatic and demographic changes. The study results aims to improve the health status of vulnerable populations and create adaptation strategies to these

projected changes.

Illinois Institute of Technology
Project Title: *Combining Measurements and Models to Predict the Impacts of Climate Change and Weatherization on Indoor Air Quality and Chronic Health Effects in U.S. Residences*

The research funded at this institution will look at indoor and outdoor air quality. The link between chronic health effects and several main pollutants will be examined in current buildings, buildings in 2050 and 2080 climate scenarios, but also with future policies that encouraged increased energy efficiency.

Missouri University of Science and Technology
Project Title*: Indoor Exposure to Pollutants Associated with Oxidative Chemistry: Field Studies and Window-Opening Behavior*

The research done at this institution will look at understanding indoor smog-induced chemistry, and the associated human exposures to chemical products as influenced by natural ventilation. This research will consider how natural ventilation is affecting resident exposure to ozone and other aerosols. The results will aid in models and predictions of personal exposure to pollutants that promote oxidative stress in lung tissues

University of Colorado at Boulder
Project Title: *Climate Change Mitigation in Low-Income Communities in Colorado: Home Weatherization Impacts on Respiratory Health and Indoor Air Quality during Wildfires*

This institution will study the effects of weatherization programs on low-income residents in a changing climate, specifically in terms of ventilation, air quality and respiratory health. This study focuses on learning how weatherization impacts health.

Portland State University
Project Title: *Determinants of Indoor and Outdoor Exposure to Ozone and Extreme Heat in a Warming Climate and the Health Risks for an Aging Population*

This project will look at developing a model that characterizes current and future health risks of an older population to urban ozone and extreme heat, indoors and outdoors. This research will also strive to improve the understanding of how emerging trends in building design and management practices affect indoor air quality and what can be done to reduce negative health effects during high ozone and extreme heat situations.

Washington State University
Project Title: *Integrated Measurements and Modeling Using US Smart Homes to Assess Climate Change Impacts on Indoor Air Quality*

The goal of this research project is to better understand the relationships between local climate change, air quality, energy consumption, ventilation rates, occupant behavior and indoor pollution. This research will make use of a Smart Home indoor air quality database and simulation results for a range of current and future conditions for a diverse set of buildings representing the US housing stock.

University of Oregon
Project Title: *Impacts of Weatherization on Microbial Ecology and Human Health*

This project will look at the quantitative change in indoor microorganisms before and after modification for better energy use. This project will also look at how the microbial composition of indoor air is affected by outside seasonal air, household building operation attitudes and behaviors before and after weatherization.

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Information about the grant recipients:
http://www2.epa.gov/air-research

Information about Climate Change and Indoor Air Quality:
http://www.epa.gov/climatechange/
http://www.epa.gov/iaq/

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