



Hearing 2022-2-3
Joint Legislative Committee on
Emergency Management

BACKGROUND

THE EXTREME HEAT EMERGENCY

Senator Henry Stern *Chair* Assemblymember Freddie Rodriguez *Vice Chair*

CONTACT: (916) 651-4027 | JLEMC@sen.ca.gov

The Extreme Heat Emergency Hearing

February 3, 2022

State Capitol

Senate Chamber

Sacramento, CA 95814

Introduction

According to the [World Health Organization](#), “given that people spend most of their time indoors and that, in the absence of air conditioning, they will be exposed to an increased risk of high indoor temperatures during periods of high outdoor temperature, protection against outdoor heat is a key characteristic of healthy housing.” People who are at the [highest risk](#) of illness due to extreme heat are older adults, the very young, people with mental illness and those with chronic diseases.

However, there is currently no definitive maximum temperature that human beings and animals may safely endure in an indoor setting. In a [systematic review](#) conducted by the WHO, it was concluded there has not yet been enough research to establish a definite temperature. Similarly, the Occupational Safety and Health Administration (OSHA) does not set a maximum

level for indoor workplace temperatures. Indoor air temperature safety depends on factors such as available ventilation, required safety gear or clothing, the amount of time spent indoors, etc. In OSHA's [Technical Manual](#), heat stroke is defined as a condition when the body's temperature has risen to 106 degrees Fahrenheit within 10-15 minutes. Heat exhaustion, a precursor to heat stroke, occurs when the core body temperature rises to 100.4-102.2 degrees Fahrenheit.

Governor's [Draft California Extreme Heat Action Plan](#)

Analyses

Extreme heat as a global emergency

DeShazo, J.R., et al. (Oct. 27, 2021) [Adapting to extreme heat in California](#). UCLA Luskin Center for Innovation. "A now well-established body of research demonstrates that heat exposure has diverse and damaging impacts.... California will increasingly need to regulate heat exposure to avoid mounting health, economic, and social damages." This report outlines planning efforts in select areas in California, focusing on some of the main indoor areas that will be most susceptible to extreme heat: prisons, senior living facilities, schools, child care facilities, homes and indoor workplaces.

Hsu, A., et al. (May 2021) [Disproportionate Exposure to Urban Heat Island Intensity across Major US Cities](#). Nature Communications.

Schwarz, L., et al. (June 2021) [Spatial Variation in the Joint Effect of Extreme Heat Events and Ozone on Respiratory Hospitalizations in California](#). Proceedings from the National Academy of Sciences. "As the world warms due to climate change, two studies released this week show that heat exposure and related health issues are already having an inordinate impact on people of color and low-income communities. One study ... found that in all but six of the largest 175 U.S. cities it examined, people of color had higher exposures to heat than White residents.... Another study, which appears in the Proceedings of the National Academy of Sciences (PNAS), analyzed hospitalization data in California during days when heat waves coincided with elevated pollution levels. The study found that the lower a ZIP code's median income, the higher the chance of hospitalization for unscheduled respiratory issues on those days.... The new studies reinforce other recent research highlighting environmental inequities in minority and low-income communities. And the authors, as well as outside experts, say they hope their work will bring greater attention to heat as a climate risk." ([The Washington Post](#), May 25, 2021).

Makido, Y., et al. (May 2019) [Nature Based Designs to Mitigate Urban Heat: The](#)

[Efficacy of Green Infrastructure Treatments in Portland, Oregon.](#) Atmosphere, vol. 10 no. 5. Urban heat, when coupled with climate change impacts, represents a growing concern in city planning. One potential response is to mitigate heat island effects by making alterations to the built environment. These changes can include designing increase vegetation and tree cover, the use of reflective materials, and green roofs. The study found that the effectiveness of each intervention varied across the specific land-use types. Instead of a single mitigation solution, planners will need to adopt multiple strategies that target specific climates and landscaped environments.

McCall, J. (Nov. 2018) [Climate Change and Health: Understanding how Global Warming Could Impact Public Health in California.](#) Senate Office of Research.

“Public health is strongly affected by environmental conditions. Therefore, the environmental changes resulting from global climate change have important implications for public health, as do the strategies used to mitigate harmful impacts of climate change.... The first part of the report describes the state of climate change in California and possible effects on human health. The second part is a detailed summary of research showing how California’s population already is affected by extreme heat and other suboptimal environmental conditions that could worsen with climate change.”

Turner, V. Kelly, et al. (Jan. 3, 2022) [More than surface temperature: mitigating thermal exposure in hyper-local land system.](#) Journal of Land Use Science. “A new study finds that designing cooler cities will require a different type of temperature data than what most cities have at their disposal.... The study authors call for more holistic heat measurement in cities, asserting that more comprehensive data is necessary to understand the best strategies for managing urban heat.” ([Press release](#))

World Health Organization. [WHO Housing and Health Guidelines, Ch. 5: High Indoor Temperatures.](#) “Air conditioning, insulation, certain building materials, wall thickness, shading from direct sunlight, natural ventilation (especially during night time), and increased air motion (fans) to cool indoor temperatures can help protect people against heat and heat-related illness. However, large numbers of people in developing countries, as well as low-income groups in developed countries, do not have access to such housing facilities. As a consequence, low socioeconomic groups are at higher risk of heat-related mortality. Research carried out in São Paulo, Brazil, for example, showed that those with less education were more susceptible to heat-related mortality.”

Building Decarbonization

[Building decarbonization](#) is generally defined as reducing the emission of greenhouse gas in new and retrofit buildings by:

1. Improving energy efficiency. Continued improvements in lighting, building insulation and exteriors, and heating and cooling systems;
2. Electrification of end-uses. Changing appliances, heating and hot water appliances from coal, oil, and natural gas to electric.

A [White House report](#) on limiting climate change through decarbonization states that “[s]pace heating and cooling, together with lighting, water heating and refrigeration consume the most energy of U.S. building end users, and account for over half of building emissions.” (p.59) The report focuses on ways to reduce the carbon footprint of both new and existing buildings with heating and cooling systems that use less energy, or use energy that is produced through carbon-heavy means. One example would be augmenting older, less energy-efficient air conditioning systems with high-efficiency heat pumps that channel heat out of indoor spaces in summer, and channel that heat waste toward water heaters. (p.61) Improved cooling technology would provide relief from extreme heat in indoor settings.

On August 5, 2021, the White House [announced](#) its Council on Environmental Quality intends to address “building-based solutions to address urban heat.” Urban heat intersects with environmental justice, as it impacts those in inner cities, particularly communities of color and low-income communities. And on January 21, 2022, the Biden Administration [announced](#) that it will team up with states, cities, labor, and industry to launch the [Building Performance Standards Coalition](#), dedicated to cutting emissions from new and retrofit buildings, not only to make these buildings more energy efficient, but to protect people from the effects of climate change and extreme heat.

California Research Bureau | Page 3

Further reading

New Buildings Institute (Jan. 12, 2021) Building Electrification Technology Roadmap. 107 p.

<https://newbuildings.org/resource/building-electrification-technology-roadmap/> (free registration) Summary, 32 p.

<https://newbuildings.org/wp-content/uploads/2021/01/BETRSummary.pdf>

Edison International (Nov. 2019) Carbon Neutrality by 2045.

https://www.edison.com/home/our_perspective/pathway-2045.html