

To: Liane Randolph, Chair and CARB Members

From: Thomas Phillips, Healthy Building Research

Re: Draft Scoping Plan Comments: Prevent Overheating of Buildings, Health Impacts, and Grid Stress Due to Climate Change, Urban Heat, and Power Outages

Date: June 24, 2022

Thank you to the staff of CARB and other agencies for their hard work on updating the Scoping Plan, and including some additional health benefit estimates.

However, I am very disappointed in this draft Plan update. We have known about the health and grid reliability risks of overheated buildings due to climate change, urban heat, and power outages since at least 2005.<sup>1 2 3</sup> And we have known for several years how to reduce those risks while also reducing GHG emissions cost effectively.<sup>4 5</sup> In fact, several other countries and provinces have already adopted overheating standards using future weather files for designing climate ready buildings.<sup>6</sup>

I have worked on climate adaptation of buildings and communities to extreme heat for over 10 years, with state, local, and national groups. It is clear from a large and growing body of research shows that one of the biggest climate change risks to our health, productivity, and equity is overheating of the indoor environments where we live, learn, and work for the large majority of our lives. In addition, outdoor workers cannot recover from outdoor heat exposure when their home is too hot to sleep well.

I am writing to not only support much more aggressive action to reduce both operational and embedded carbon emissions by 2030 per IPCC recommendations, but also to support high efficiency, low carbon, "climate ready" building standards that capture major health and other social co-benefits. Climate ready (climate resilient) buildings are designed to perform efficiently and safely for the next 60-100 years under future climate conditions that are much hotter. They also perform better under power outages due to the emphasis on passive cooling measures.

Researchers are already testing climate ready urban trees and agricultural crops for California and other regions. Now we need prepare California's buildings for future climates and their extremes.

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<sup>1</sup> Hacker, JN, Belcher, SE & Connell, RK (2005). [Beating the Heat: keeping UK buildings cool in a warming climate](#). UKCIP Briefing Report. UKCIP, Oxford.

<sup>2</sup> Wilson, Alex (December 1, 2005). ["Passive Survivability"](#). Building Green.

<sup>3</sup> Institute of Medicine, 2011. [Climate Change, Indoor Environment and Health](#). National Academy of Science.

<sup>4</sup> Zhang, et al. 2021. Resilient cooling strategies – A critical review and qualitative assessment. <https://doi.org/10.1016/j.enbuild.2021.111312>.

<sup>5</sup> Phillips and Higbee, 2021. [Adjusting for New ABNORMALS: Adjusting for Extreme Heat and Outages](#). EEBA Hybrid Home Performance Summit, Sept. 14-16.

<sup>6</sup> Phillips, June 10, 2022. [Overheating and Passive Survivability Standards and Guidelines: A Brief History and A Look Ahead](#). Healthy Building Research, Davis, CA

Furthermore, the state is required to seriously consider health and other social co-benefits and social costs of climate actions, e.g., SB 32, AB 197, SB 350. If the state continues to ignore these known risks of overheating, it will be failing to meet its legal mandate to avoid the social, energy, and grid-related costs of overheated, maladapted buildings. It will also be locking in inefficient buildings.

We also know from the 2006 California heat wave, modeling studies, and the 2021 Pacific Northwest Heat Dome that most heat-related deaths occur at home, especially among vulnerable persons. In addition, a national study found that over half of heat-related excess deaths in 1997-2006 occurred when outdoor temperatures were moderate; California had some of the highest death rates.<sup>7</sup>

In order to capture the health and productivity benefits of climate ready buildings, I request that the CARB Scoping Plan include the following climate actions:

**1. Ramp up climate ready buildings:**

Take immediate action to adopt overheating standards under current and future climates, e.g., in the Cal Green and Title 24 building standards, in holistic weatherization programs, and in state and university buildings.

This action will reduce negative impacts of climate change and increasing urban heat on energy, carbon, cost, health, productivity, equity, and liability. Lock in of maladapted, inefficient buildings will be reduced. Health and safety risks during power outages and wildfires, which now are an ever-increasing risk, will be reduced. This action will also improve grid reliability and air pollutant emissions by reducing peak demand.

This action helps meet the mandates for addressing health and other social costs in California legislation and the recommended actions in the 2013 and 2021 Extreme Heat Plans.

**2. Monetize the costs and nonenergy benefits** of overheating mitigation in terms of reduced impacts of climate change on mortality, morbidity, and productivity.

Based on current science and best practices, substantial nonenergy benefits can be estimated. Analyses from Canada and the UK suggest that millions of dollars could be saved each year by preventing overheating in new and existing buildings. Modeling studies of new and existing multifamily buildings in British Columbia and New York have shown that indoor overheating under future climate conditions can be prevented cost effectively.

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<sup>7</sup> Weinberger, K., et al, 2020. Estimating the number of excess deaths attributable to heat in 297 United States counties. [doi: 10.1097/EE9.000000000000096](https://doi.org/10.1097/EE9.000000000000096).

3. **Monetize the grid benefits** from reducing peak cooling demand by improved energy efficiency under current and future climates. Improve the heat vulnerability criteria in the Disadvantaged Community criteria to include data on the thermal efficiency of homes. The current heat vulnerability criteria for DAC greatly underestimate the heat health risks in California's homes.<sup>8</sup>
4. **Create skilled jobs and assess the economic benefits:** fund the training of building professionals and trades to provide low carbon, healthy buildings that also prevent overheating.
5. **Walk the Talk:** Conduct demonstration projects for mitigating overheating risks while reducing carbon emissions new and existing State and university buildings.

In summary, the draft Plan does not reflect the best science, contrary to the online CARB FAQs, nor does it serve as a model for other nations, in terms of the building sector.

We dodged a very big bullet last year when the 2021 Pacific Northwest heat dome did not reach very far into California. Rather than wait for more and more heat catastrophes, power outages and wildfires, it is critical that we take aggressive action now to make our buildings climate ready. It is also much less expensive to design buildings and retrofits for future climates in the first place.

California can and must catch up quickly with other nations to provide climate ready buildings while reducing carbon emissions. We cannot provide enough cooling shelters, shade trees, emergency responders, and hospital facilities to cope with projected heat waves that will last three weeks on average and up to nine weeks in Fresno by late-century.<sup>9</sup> Meanwhile, the Arctic is warming up faster than expected, marine heat waves are increasing, the jet stream has become more chaotic, and 9,000 lightning strikes hit drought stricken southern California this week.

Thank you for CARB's efforts to protect our people and our ecosystems, and to set a good example for the rest of the world. I pray for all our sakes that California takes the bold actions needed immediately.

A concerned parent, citizen, and scientist,

Thomas J. Phillips  
Healthy Building Research, Davis, CA

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<sup>8</sup> Samuelson H, et al., 2020. Housing as a critical determinant of heat vulnerability and health. DOI: [10.1016/j.scitotenv.2020.137296](https://doi.org/10.1016/j.scitotenv.2020.137296).

<sup>9</sup> Cal Adapt, 2022. [Tools; Extreme Heat Days & Warm Nights](#). Duration, Fresno, RCP 8.5.