

EXHAUSTED!

**Workers Confront Extreme Heat
and Wildfire Smoke in California**



TABLE OF CONTENTS

Introduction	4
Summary Of Recommendations	6
Protecting Indoor & Outdoor Workers	6
Specifically Protecting Outdoor Workers	7
Specifically Protecting Indoor Workers	7
Part 1: Working Conditions for Outdoor and Indoor Workers	8
Outdoor Workers	8
Working Conditions	9
Extreme Heat Impacts	12
Air Quality Impacts	13
Indoor Workers	14
Working Conditions	16
Ventilation	16
Indoor Air Pollution	17
Heat Stress	18
Safety Concerns	19
Thermal Discomfort	20
Part 2: Existing Outdoor Worker Regulations & Proposed Indoor Worker Regulations	22
Existing Outdoor Worker Laws and Regulations	22
State of California’s Heat Standard	22
Labor Contracting and Undocumented Immigration	26
Wildfire Smoke Standard	26
Emerging Legislation Related to Worker Protection	29
Heat Illness Prevention Standard for Indoor Workers	29
Part 3: Gaps in Extreme Heat and Air Pollution Policy for Outdoor and Indoor Workers	33
Part 4: Proposed Recommendations	34
Protecting Indoor & Outdoor Workers	34
Specifically Protecting Outdoor Workers	38
Specifically Protecting Indoor Workers	39
Acknowledgments	41
Appendix	42



Climate Resolve wishes to express our gratitude to the Conrad N. Hilton Foundation and Resilient Cities Catalyst for their funding and support.

Special thanks to Resilient Cities Catalyst’s Anna Friedman and Kristen Tadrous for their faithful guidance. Thanks, too, to Samuel Carter, Andrew Salkin and Corinne LeTourneau for their helpful and timely advice.

Exhausted! Workers Confront Extreme Heat and Wildfire Smoke in California was researched and written by Climate Resolve. Kristopher Eclarino and Natalie Delgado were the primary authors, with key contributions from Jonathan Parfrey, Enrique Huerta, Gabriel Varela, Woodrow Covington, Mariana Estrada, Robyn Wong, and Alex Moisa. Thanks, too, to Bryn Lindblad and Gina Palino for reviewing the report.

Headquartered in downtown Los Angeles, Climate Resolve is an organization of twenty staff members cheerfully working to achieve a just and resilient future. Our mission is to build collaborations that champion equitable climate solutions. We connect communities, organizations and policymakers to address a global problem with local action. We inclusively develop practical initiatives that reduce climate pollution and prepare for climate impacts. Using our collective power to tackle climate change, we are creating a thriving California and inspiring others to act. Our purpose is a just and resilient future.

For more information, visit climateresolve.org or write info@climateresolve.org or call (213) 634-3790 or visit 525 South Hewitt Street, Los Angeles, CA 90013



RESILIENT CITIES CATALYST

INTRODUCTION

From harvesting crops in close proximity to active wildfires to warehouse workers skipping water breaks during a heat wave to meet a daily quota, California workers have soldiered-on even at the expense of their own health. The nation relies on California workers. Over one-third of America's vegetables and two-thirds of the nation's fruits and nuts are harvested in California¹. America's supply chain relies on the successful operation of California ports and warehouses.

Has society reciprocated by ensuring the health of California's essential workers?



During the first year of the COVID-19 pandemic, the United States defined essential services in twelve industries. Food and agricultural industries comprise 20.6% of all essential workers, while transportation, warehouse, and delivery workers make up another 7.2%.²

In California, nearly 1 in 10 workers are undocumented.³ These undocumented laborers are disproportionately found in essential sectors, such as agriculture, construction and manufacturing.⁴

The COVID-19 pandemic brought home how certain jobs are absolutely crucial to society. Recent studies indicate that over one-quarter of California's essential workers will soon be operating under

1 California Department of Food and Agriculture. "California Agricultural Production Statistics." CDFA, accessed on January 12, 2022. <https://www.cdfa.ca.gov/Statistics/>.

2 McNicholas, Celine. "Who Are Essential Workers?: A Comprehensive Look at Their Wages, Demographics, and Unionization Rates." Economic Policy Institute, May 19, 2020.

<https://www.epi.org/blog/who-are-essential-workers-a-comprehensive-look-at-their-wages-demographics-and-unionization-rates/>.
3 Hayes, Joseph and Laura Hill. Undocumented Immigrants in California. Public Policy Institute of California, March 2017.

<https://www.ppic.org/publication/undocumented-immigrants-in-california/>.
4 Goss, Michael, et al. "Climate Change Is Increasing the Likelihood of Extreme Autumn Wildfire Conditions Across California." Environmental research letters 15, no. 9 (2020): 94016.

<https://iopscience.iop.org/article/10.1088/1748-9326/ab83a7>.

high temperatures, as well as affected by wildfires, with much greater frequency.⁵

These are not theoretical problems. Extreme heat and wildfire smoke in the workplace need to be addressed, and soon. If goods are going to get delivered and food placed on America's dining tables, it's imperative that workers have access to cool environments, access to clean air refuges, access to water to stay hydrated, and access to proper ventilation and other safety measures.

Climate Resolve's process for developing this study entailed interviewing over two dozen agency staff, academic experts, labor and environmental advocates, and workers themselves.⁶ The literature review included over sixty studies and reports used to inform this study. Writers of the report also attended lectures and webinars related to worker health and climate change. Report writers also scrutinized State of California and federal law, regulations, codes and standards.

This first section of *Exhausted! Workers Confront Extreme Heat and Wildfire Smoke in California* examines current research on the direct effects of extreme heat and wildfire smoke on worker health; first examining outdoor workers, then following-up with information about the experience of indoor workers.

The second section examines the State of California's suite of laws and regulations designed to protect workers. The section following identifies current gaps in protecting workers.

The report concludes by recommending specific actions that public and private actors may take to better protect workers. Climate Resolve hopes that this report serves as a small but certain step in improving working conditions in California.

The report identifies 18 policy actions. A summary of recommendations is offered below. A detailed accounting of recommendations is offered in the last chapter of this report.

If adopted, these measures will significantly help workers weather the effects of extreme heat and wildfire smoke. Curiously, the recommendations do not target the California Division of Occupational Safety and Health (Cal/OSHA) alone, but span multiple authorities and approaches. Effective action requires collaboration across many sectors. The recommendations concern State of California agencies as well as local municipalities, the federal government, employers, academia, advocates, philanthropy, communication experts and workers themselves.



⁵ Goss, Michael, et al. "Climate Change Is Increasing the Likelihood of Extreme Autumn Wildfire Conditions Across California."

⁶ See acknowledgements section for a list of interview participants.

SUMMARY OF RECOMMENDATIONS

PROTECTING INDOOR & OUTDOOR WORKERS

- 1. Create new insurance products for hazard pay and unworkable conditions**

The California Division of Workers' Compensation (DWC) should work with the California Department of Insurance (CDI) to develop new insurance products, such as Anticipatory Parametric Insurance Coverage, to provide a safety-net to offset workers' salaries during exceptional weather events. We recommend a tiered system with defined thresholds for: (1) hazard pay and exclusionary pay during extreme heat and poor air quality events; and (2) insurance coverage for workers who are unable to work due to temperatures exceeding thresholds where heat-related deaths begin and air quality index reaches unhealthy levels. In designing the insurance products, special attention should be paid to undocumented workers, who may be hesitant to participate in a state program.
- 2. Design and build large-scale cooling projects in the built environment**

Cities and counties should build neighborhood-wide, even city-wide, cooling projects. Examples of these projects include planting trees, installing shaded bus shelters, retrofitting hot roofs with cool roofs, applying reflective coatings to streets and parking lots and creating supportive community facilities in the form of resilience hubs. Large-scale heat-mitigation measures will allow workers to be less exposed to extreme heat conditions and to recover from heat stress away from the job site.
- 3. Make home a safe haven**

The burden of extreme heat is not limited to the workplace but may also affect the living conditions of workers. Workers may return to overly hot homes. The California Building Standards Commission (CBSC) and California Energy Commission (CEC) should, in an equitable way, expand current standards for home cooling, and target non-air-conditioned buildings to be cooled by heat-pumps. Nighttime recovery from extreme heat exposure is essential for human health.
- 4. State agencies must coordinate their approach on extreme heat**

The effects of extreme heat and wildfire smoke span across multiple sectors. While Cal/OSHA is responsible for conditions at the workplace, the agency is not responsible for worker health away from the workplace. Cal/OSHA does not promulgate building codes, nor plant trees, nor ensure medical care to protect workers. Coordination among state agencies and local governments is necessary for a holistic approach to looking after workers' health.
- 5. Cal/OSHA must be sufficiently resourced in both funds and technical support**

Cal/OSHA is insufficiently staffed and funded. The scant number of field inspectors results in workers being unprotected. The Governor and state legislature must fund Cal/OSHA to update standards and perform educational and enforcement activities to deter non-compliance and reduce the number of workplace injuries. Cal/OSHA staff should be familiar with environmental hazards and how heat and air quality can affect workers.
- 6. Improve communication on drinking-water**

Employers are mandated to provide workers with easy access to drinking water. Yet, the quota system aimed at maximizing productivity dissuades workers from taking water breaks. In fact, workers are financially penalized for taking breaks to drink water. Workers should be encouraged to stay hydrated. We recommend that Cal/OSHA create an educational/communications campaign about the importance of regularly drinking water and the laws that permit such breaks.
- 7. Expand independent monitoring**

Because Cal/OSHA is shorthanded, and cannot witness all violations, there is a need for third-party monitors. Third parties, funded privately or by philanthropy, can bring workplace violations to the attention of Cal/OSHA or the courts to deter harmful labor conditions.
- 8. Fix Cal/OSHA's communications problem**

Many workers don't know of Cal/OSHA's existence or that workers are protected by law. We suggest that Cal/OSHA create a communication campaign that informs workers of their rights, including access to shade and a mandatory cool-down rest, and cite the myriad ways that Cal/OSHA has improved the lives of workers. By helping workers understand that Cal/OSHA is here to help, workers can feel more empowered to cite violations and file complaints anonymously without fear of retaliation from their employers.
- 9. Environmental organizations must prioritize worker health and safety**

Mainline conservation and environmental organizations have been heretofore silent about the fate of agricultural and

supply chain workers as they face extreme weather conditions. Environmentalists should promote laws that protect human health with equal vigor as they advocate for the health of the natural world.

10. Develop a Cal/OSHA database on heat-related workplace incidents

Develop a centralized data system on heat-related workplace incidents linked to a statewide heat syndromic surveillance system, like the one being developed by the California Department of Public Health (CDPH). The data will provide critical feedback for researchers and policymakers.

11. Improve air quality monitoring at the workplace

The recently adopted Cal/OSHA standard to protect workers from wildfire smoke requires employers to monitor the air quality index (AQI) for particulate matter with a diameter of less than 2.5 micrometers (PM2.5). We recommend Cal/OSHA take the further step of mandating the implementation of low-cost network-enabled air quality sensors and thermometers to upload findings “live” to the web.

12. Fund organizations to assist workers

Communicating with workers about their rights and the dangers of heat is extremely important. California is blessed with nonprofit groups that support at-risk workers, such as 805 UndocuFund, Warehouse Workers Resource Center, IDEPSCA and California Rural Legal Assistance (CRLA). Communication campaigns (recommendations #6 and #8) and monitoring (recommendations #7 and #10) may be best performed by organizations that are already trusted by at-risk workers.

SPECIFICALLY PROTECTING OUTDOOR WORKERS

13. Provide clean air refuges during wildfire smoke events

Employers should provide clean air spaces to reduce smoke exposure to outdoor workers, especially during mandated breaks. These temporary shelters with air purifiers would allow employers to continue crucial work during harsh conditions.

14. Make growers liable

Some growers are currently exploiting loopholes, effectively ducking enforcement for labor violations, by hiding behind contracts with farm labor contractors, who act as brokers of labor. We recommend that Cal/OSHA formally close these loopholes.

SPECIFICALLY PROTECTING INDOOR WORKERS

15. Prioritize adoption of the Indoor Heat Illness Prevention Standard

Cal/OSHA should quickly finalize the Indoor Heat Illness Prevention Standard. Bureaucratic foot-dragging has impeded progress, even though a final draft exists. Also, once adopted, Cal/OSHA should perform robust outreach and education about the new regulation.

16. Update the California Building Code to protect warehouse workers

The California Building Standards Commission (CBSC) and the California Energy Commission (CEC) should update the Building Energy Efficiency Standards (Title 24) to address both energy efficiency as well as indoor air temperature. Should the Commissions fail to mandate these protections, local jurisdictions, via their own local building and safety departments, should develop their own protective building codes for warehouses, and then file for exemption from the state code.

17. Update international standards to include real-time indoor temperature and humidity monitoring

Real-time monitoring of indoor temperature and humidity can be incorporated in new building design via the international standards of ASHRAE/IES Energy Efficiency Standard 90.1 and the International Energy Conservation Code (IECC). Such monitoring is key to ensuring compliance with the hopefully soon-to-be enacted Indoor Heat Illness Prevention Standard. Monitoring technology also removes the responsibility of the worker to file a complaint against their employer and would reduce the fear of termination.

18. Prioritize research into worker productivity and absenteeism

Extreme heat has demonstrably affected worker productivity and absenteeism. The impacts are well-established. Yet, quantifying the specific economic losses associated with impacts are less well known. Businesses are likely losing money by not providing a cool working environment – but the case must be made. We recommend that the Fifth California Climate Change Assessment allocate funding for research to quantify economic losses due to heat and smoke exposure within various sectors in California.

OUTDOOR WORKERS

As climate change is expected to make extreme heat events more frequent and also increase the intensity and frequency of wildfires, the threat to outdoor workers, especially agricultural workers, is severe.



Outdoor workers in the United States have up to 35 times the risk of dying from heat exposure than does the general population.⁷

Outdoor workers in the United States have up to 35 times the risk of dying from heat exposure than does the general population. A recent investigation by KQED revealed that employees within the agriculture industry reported they “labored in heavy smoke” without any of the required safeguards granted to them by Cal/OSHA’s emergency Wildfire Smoke Standard (which is described in more detail later in this report).⁸ Studies have shown heat waves and outdoor pollution to be synergistically linked, which further increases risk to outdoor workers as California temperatures rise.⁹

The threat to outdoor workers of extreme heat exposure and poor air quality from wildfire smoke is already alarming and becoming more troubling still. As of 2021, approximately 4 million Californians work out-of-doors, accounting for roughly 21% of the state’s workforce.¹⁰

Over the last decade, California experienced its hottest decade on record, resulting in approximately 3,900 deaths attributed to heat exposure.¹¹ Injuries due to heat exposure, during the same period, are believed to be in the hundreds of thousands.¹²

California employs one-third of all farmworkers living in the United States, with somewhere between 471,000 and 626,000 farmworkers employed across the state.¹³ California’s agricultural industry production totals \$50 billion annually and is critical to the nation’s food supply.¹⁴

7 Gubernot, Diane M., G. Brooke Anderson, and Katherine L. Hunting. “Characterizing Occupational Heat-Related Mortality in the United States, 2000-2010: An Analysis Using the Census of Fatal Occupational Injuries Database.” *American Journal of Industrial Medicine* 58, no. 2 (February 15, 2015): 203–11. <https://doi.org/10.1002/ajim.22381>.

8 Romero, Farida. “California Failed to Protect Outdoor Workers from Wildfire Smoke Under Biden’s New OSHA Chief.” KQED, December 2, 2021. <https://www.kqed.org/news/11897789/california-largely-failed-to-enforce-worker-smoke-protections-under-bidens-new-osha-pick>.

9 Schwarz, Lara, et al. “Spatial Variation in the Joint Effect of Extreme Heat Events and Ozone on Respiratory Hospitalizations in California.” *Proceedings of the National Academy of Sciences - PNAS* 118, no. 22 (2021): 1. <https://www.pnas.org/doi/10.1073/pnas.2023078118>,

10 California Employment Development Department. “Current Industry Employment and Unemployment Rates for Counties.” EDD, accessed on December 26, 2021.

<https://www.labormarketinfo.edd.ca.gov/data/industry-employment-and-unemployment-rates-for-counties.html>.

11 Phillips, Anna. “Heat Waves Are Far Deadlier than We Think. How California Neglects This Climate Threat.” *Los Angeles Times*, October 7, 2021. <https://www.latimes.com/projects/california-extreme-heat-deaths-show-climate-change-risks/>.

12 Ibid.

Goss, Michael, et al. “Climate Change Is Increasing the Likelihood of Extreme Autumn Wildfire Conditions Across California.” *Environmental research letters* 15, no. 9 (2020): 94016.

<https://iopscience.iop.org/article/10.1088/1748-9326/ab83a7>.

14 California Department of Food and Agriculture. “California Agricultural Production Statistics.”

Working Conditions

When outdoor workers are increasingly exposed to extreme heat and poor air quality from wildfire smoke, health risks and significant challenges arise. Although California has enacted laws and promulgated regulations dedicated to protecting outdoor workers, worsening conditions have led advocates to call for stronger protections.

Extreme Heat Impacts

Outdoor workers are at risk of a number of heat-related illnesses such as heat stroke, heat cramps, heat exhaustion and dehydration. Heat can lead to premature death, and is the cause of more deaths nationwide than all other weather-related phenomena. When body temperature increases, correspondingly heart and respiratory rates also increase, potentially damaging the brain, heart, lungs, kidneys and liver.

Additionally, heat fatigue can cause people to make mistakes, which can be especially harmful when operating heavy machinery.



Hotter temperatures increase workplace accidents by 5-7% on days between 85°F and 90°F and by 10%-15% on days above 100°F.¹⁵

Hotter temperatures increase workplace accidents by 5-7% on days between 85°F and 90°F and by 10%-15% on days above 100°F. There is economic fallout from extreme heat. The average outdoor worker loses \$1,700 each year due to work stoppages when heat and humidity is greater than or equal to 100 degrees Fahrenheit.¹⁶ In the future, outdoor workers will face hotter days. A recent study suggests that by midcentury (2036-2065) the annual amount of extreme heat days (when temperatures exceed 100°F) would be triple that of the late 20th century baseline, putting at risk an estimated \$39.3 billion in lost income each year in the United States.¹⁷

In California, researchers estimate that 360,000 injuries were caused by extreme heat from 2001-2018.¹⁸ Lower-wage workers were found to be at greatest risk of working on days with temperatures above 85°F, with older men suffering from heat-related injuries more than other groups.¹⁹ These inequalities are exacerbated in part by the fact that low-income communities are located in hotter parts of the state and are likely burdened by preexisting health risks due to social, environmental and economic conditions.²⁰ Within California, the Central Valley supports more than 200,000 agricultural sector jobs per year. More than half of the population in the Central Valley lives in disadvantaged communities (as defined by CalEnviroScreen), and many rural disadvantaged communities lack access

¹⁵ Tanglis, Michael. Extreme Heat and Unprotected Workers. PDF file. Public Citizen. 2018. https://www.citizen.org/wp-content/uploads/extreme_heat_and_unprotected_workers.pdf.

¹⁶ Dahl, Kristina, Rachel Licker. "Too Hot to Work: Assessing the Threats Climate Change Poses to Outdoor Workers." Union of Concerned Scientists, 2020. <https://doi.org/10.47923/2021.14236>.

¹⁷ Licker, Rachel, et al. "Quantifying the impact of future extreme heat on the outdoor work sector in the United States." Earth and Space Science Open Archive, August 9, 2021. <https://www.essoar.org/doi/abs/10.1002/essoar.10507713.1>.

¹⁸ Park, Jisung, et al. "Temperature, Workplace Safety, and Labor Market Inequality." Discussion Paper Series, 2021, 1-2021. <https://doi.org/10.2139/ssrn.3892588>.

¹⁹ Ibid.

²⁰ Patnaik, Aneesh, et al. "Racial Disparities and Climate Change" Princeton University, August 15, 2020. <https://psci.princeton.edu/tips/2020/8/15/racial-disparities-and-climate-change>.

to basic services such as safe, reliable and affordable drinking water, sewage systems, and health care, making them some of the least resilient communities in California.²¹

Groups most at risk to heat illness were found among Latinx populations, and in particular within the agriculture and construction industries.²² Latinx people were 3.2 times more likely to die of work-related heat exposure than non-Latinx populations.²³ When compared to all industries as defined by the Bureau of Labor Statistics, agriculture workers had more than 35 times the risk of heat-related death, while construction workers had 13 times the risk.²⁴

Indigenous Agricultural Workers

Indigenous agricultural workers remain an invisible population within the agricultural industry. Findings from the National Agricultural Workers Survey (NAWS) 2017-18 reported that 6% of agricultural workers are indigenous, speaking such languages as Nahuatl, Maaya, Mixtec and Zapotec.²⁵ Though this may seem like a small population, they represent a segment that is even more susceptible to extreme heat and unequal working conditions. Due to social isolation and language barriers, indigenous workers may face greater challenges in reporting workplace safety violations or labor rights abuse.²⁶ This raises an area of concern in which workers may be unaware that Cal/OSHA exists to advocate for them and to get their employers to comply on extreme heat days.



Moreover, indigenous communities remain vulnerable in times of wildfires. For instance, during the 2017 Thomas Fire within Ventura and Santa Barbara Counties, government agencies broadcasted emergency response information in English and Spanish.²⁷ Outreach materials may be in English and Spanish, yet those languages differ enough from indigenous languages that indigenous people may not be able to understand the warnings. The lack of proper communication in their native language creates a communication shortcoming. The exclusion of indigenous languages makes it harder for this community to take the appropriate safety measures to take care of themselves during wildfire season.

When hazard and safety outreach is conducted by Cal/OSHA staff or labor advocates, their outreach materials, such as presentations or pamphlets, must be translated to eliminate the barrier of language. By having access to translated materials, indigenous agricultural workers can begin to understand how to respond to violations in the workplace and take care of themselves in the midst of extreme weather events.

21 Fernandez-Bou, Angel Santiago, et al. "Regional Report for the San Joaquin Valley Region on Impacts of Climate Change." California Natural Resources Agency, State of California Energy Commission, and Governor's Office of Planning and Research. Publication number: SUM-CCCA4-2021-003, 2021.

https://www.energy.ca.gov/sites/default/files/2022-01/CA4_CCA_SJ_Region_Eng_ada.pdf.

22 Park, Jisung, et al. "Temperature, Workplace Safety, and Labor Market Inequality." Discussion Paper Series, 2021, 1–2021.

<https://doi.org/10.2139/ssrn.3892588>.

23 Ibid.

24 Ibid.

25 U.S. Department of Labor, Employment and Training Administration. Findings from the National Agricultural Workers Survey 2017–2018: A Demographic and Employment Profile of United States Farmworkers, by Izaac Ornelas, Wenson Fung, Susan Gabbard, and Daniel Carroll. Report No. 14, Washington, D.C, NC: 2021. PDF.

<https://www.dol.gov/sites/dolgov/files/ETA/naws/pdfs/NAWS%20Research%20Report%202014.pdf> (accessed on January 22, 2022).

26 National Center for Farmworker Health. "Indigenous Agricultural Workers." NCFH, accessed on December 11, 2021.

http://www.ncfh.org/indigenous-agricultural-workers.html#_ftn1.

27 Ibid.

When looking at community level rates of heat related mortality and morbidity for outdoor work there was a strong relationship between increases in temperature and higher rates of illness and death. The study looked at all 276 zip codes in LA County and used the zip codes as proxies for communities. This research is unique because rather than focusing on individual outdoor worker health events, it focused on the events at the community scale. Analyses at the community level of summer heat events between 2005 - 2010 revealed:

- Each percentage increase in residents working in construction within a zip code resulted in an 8.1 percent increase in heat-related emergency department visits and a 7.9 percent increase in heat-related hospitalizations;
- Each percentage increase in residents working in agriculture and related sectors within a zip code resulted in a 10.9 percent increase in emergency department visits;
- Emergency department visits for All Internal Causes²⁸ were higher in communities with more residents working in construction and agriculture.

In 2005, given the state of injury from outdoor labor, California became the first state to implement a mandatory Heat Illness Prevention Standard for outdoor workers.²⁹ Since the heat standard was adopted, Cal/OSHA has cited hundreds of workplaces each year for not providing adequate shade structures, access to water, or rest breaks on extremely hot days. Researchers speculate that compliance with California heat regulations had a positive impact of “helping to prevent the most extreme consequences of heat exposure on outdoor workers—i.e., heat-related death.”³⁰ However, the high rate of hospitalization during heat events makes it clear that the law has not wholly eliminated heat illness in the workplace.



Extreme heat contributes to workplace errors and work-related injuries. Research shows that extreme heat increases the amount of labor needed to take care of certain crops, lengthening worker’s exposure time and leading to the hiring of more workers.³¹ Workers are aware of heat impacting the pace of work, which results in tasks taking longer.³² Extreme heat’s impact on work performance and injuries are just beginning to be understood. Additional research and monitoring will be necessary to get a full picture of extreme heat impacts outside of reportable injuries.

As climate change is expected to make days of extreme heat more frequent and more intense, amplifying health risks, statewide preventative measures must be enforced and get ramped up to reduce worker heat exposure.

28 Ibid. Note: All Internal Causes of death and hospitalization: Includes heat-related and any underlying cause including cardiovascular, respiratory, kidney issues, fluid/electrolyte/acid imbalances, dehydration, diabetes, etc.

29 See Appendix: Table 1 : Laws and Regulations.

30 Ibid.

31 Castillo, Federico, et al. “Chapter 2: The Impact of Heat Waves on Agricultural Labor Productivity and Output,” in *Extreme Events and Climate Change: A Multidisciplinary Approach*, ed. F. Castillo, et al. April 2021, 11–20. <https://doi.org/10.1002/9781119413738.ch2>.

32 Sudhvir Singh, Elizabeth G. Hanna, Tord Kjellstrom, *Working in Australia’s heat: health promotion concerns for health and productivity*, Health Promotion International, Volume 30, Issue 2, June 2015, Pages 239–250, <https://doi.org/10.1093/heapro/dat027>.

Namesake Origins: Cal/OSHA's Maria Isabel Vasquez Jimenez Heat Illness Prevention Standard

Passed as an emergency regulation in 2005 and made a law in 2006, the Heat Illness Prevention Standard was made permanent in response to the increase of heat-related worker deaths. The first of its kind, the law includes requirements for employers in outdoor labor occupations, during extreme heat days, to provide access to water, shade and provide rest breaks to employees. Then in 2008, this law was renamed to the Maria Isabel Vasquez Jimenez Heat Illness Standard, after a 17-year-old pregnant farmworker, Maria Jimenez, who died from heat exposure while pruning grapes.



Air Quality Impacts

Outdoor workers are continually exposed to outdoor air conditions, making air pollution a major risk factor. Air pollution goes beyond being an irritant; air contaminants can cause premature mortality, increased hospital admissions for heart or lung causes, acute and chronic bronchitis, asthma attacks, emergency room visits, respiratory symptoms, and restricted activity days.³³ Additionally, PM2.5 and PM10 are registered carcinogens.³⁴

There is growing concern about the effect of wildfire smoke on respiratory health. In recent years, wildfire smoke has contributed as much as 70% of northern California's PM2.5 content on days exceeding regulatory PM2.5 standards.³⁵ Researchers project that wildfire smoke will overtake other sources of fine particulate pollution to become the primary source of air pollution statewide, as the frequency and severity of wildfires increases, and emissions from vehicles and power plants continue to reduce.³⁶

Wildfire smoke includes ash and tiny particles that can travel long distances. These particles are made up of whatever is being burned – not only

plants and vegetation, but also remnants of residential or commercial structures, vehicles, industrial or household chemicals, radionuclides and other unknown materials.³⁷ When exposed to wildfire smoke containing PM2.5, individuals can experience symptoms that include irritation of the eyes, nose, and throat, difficulty breathing, asthma attacks, chest pain, and persistent cough, phlegm, and wheezing.³⁸

33 California Air Resources Board. "Inhalable Particulate Matter and Health (PM2.5 and PM10)." State of California Government . California Air Resources Board, 2022. <https://ww2.arb.ca.gov/resources/inhalable-particulate-matter-and-health>.

34 Harrison, R M, et al. "What Is Responsible for the Carcinogenicity of PM2.5?" Occupational and environmental medicine (London, England) 61, no. 10 (2004): 799–805. <https://www.jstor.org/stable/27732358>.

35 Liu, Jia Coco, et al. "Particulate Air Pollution from Wildfires in the Western US Under Climate Change." Climatic change 138, no. 3-4 (2016): 655–666. <https://doi.org/10.1007/s10584-016-1762-6>.

36 O'Dell, Katelyn, Kelsey Bilsback, Bonne Ford, Sheena E. Martenies, Sheryl Magzamen, Emily V. Fischer, and Jeffrey R. Pierce. "Estimated Mortality and Morbidity Attributable to Smoke Plumes in the United States: Not Just a Western US Problem." GeoHealth 5, no. 9. August 21, 2021. <https://doi.org/10.1029/2021gh000457>.

37 UCLA Labor Occupational Safety & Health Program. Worker Protection From Wildfire Smoke, Emergency Cal/OSHA Standard 2019. PDF File. 2019. <https://losh.ucla.edu/wp-content/uploads/sites/37/2019/10/new-english-standard-RGB.pdf>.

38 Environmental Protection Agency. "How Smoke from Fires Can Affect Your Health." EPA, accessed on November 16, 2021. <https://www.epa.gov/pm-pollution/how-smoke-fires-can-affect-your-health>.

The most vulnerable outdoor worker group to the impact of wildfire smoke are adults over 65 years of age and individuals with pre-existing health conditions.³⁹

Smoke-borne PM_{2.5} is a health threat due to particles penetrating deep into lung tissue and entering the bloodstream.⁴⁰ Due to the rising impacts of climate fueled wildfires, research on smoke-sourced PM_{2.5} and its impact on human health is currently less understood than mechanically produced PM_{2.5}. The effects of ultra-fine particulates is an enduring topic of interest among environmental justice communities.⁴¹

Due to California's legacy of military production facilities, worker exposure to radionuclides is also a concern.⁴² In a study conducted by the Worcester Polytechnic Institute, radioactive microparticles were released after the Santa Susana Field Laboratory, a former nuclear research facility, was partially-burned in the Woolsey Fire.⁴³

There is a feedback loop between extreme heat and air pollution. Heat accelerates chemical reactions that form PM_{2.5} and ground-level ozone; in turn, these toxicants trap heat.⁴⁴ Heat waves and air pollution share common underlying meteorological drivers and often coincide.⁴⁵

In 2019, Cal/OSHA issued an emergency standard on wildfire smoke. The new standard applies to workplaces where the U.S. Environmental Protection Agency (EPA) Air Quality Index (AQI) for PM_{2.5} is 151 or greater (which is considered unhealthy for all people), regardless of AQI for other contaminants;⁴⁶ and the employer should reasonably anticipate employees may be exposed to wildfire smoke. In 2020, during a record-breaking wildfire season, several hundred farmworkers were not given N95 masks due to supply issues related to COVID-19.⁴⁷



Farmworkers reported not being able to breathe and having sore throats from the intense smoke and ash, but felt that they had to continue working or they were at risk of being fired.

Farmworkers reported not being able to breathe and having sore throats from the intense smoke and ash, but felt that they had to continue working or they were at risk of being fired.

39 Environmental Protection Agency. "Which Populations Experience Greater Risks of Adverse Health Effects Resulting from Wildfire Smoke Exposure?" EPA, accessed on November 9, 2021.

<https://www.epa.gov/wildfire-smoke-course/which-populations-experience-greater-risks-adverse-health-effects-resulting>.

40 Hua Xu, Min-Hua Shi, and Yi-Xin Lian. "The Impact of PM_{2.5} on the Human Respiratory System." *Journal of thoracic disease* 8, no. 1 (2016): E69–E74. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4740125/>

41 Ibid.

42 Grigoryants, Olga. "Study: Radioactive Elements Reached Neighborhoods near Santa Susana Field Lab during Woolsey Fire." *Daily News*, October 22, 2021.

<https://www.dailynews.com/2021/10/21/study-radioactive-elements-reached-neighborhoods-near-santa-susana-field-lab-during-woolsey-fire/>.

43 Kaltofen, M.; Gundersen, M.; Gundersen, A. Radioactive microparticles related to the Woolsey Fire in Simi Valley, CA. *Journal of Environmental. Radioactivity*. Vol 240, December 2021, 240.

<https://www.sciencedirect.com/science/article/abs/pii/S0265931X21002277?via%3Dihub>.

44 Schnell, Jordan L, and Michael J Prather. "Co-Occurrence of Extremes in Surface Ozone, Articulate Matter, and Temperature over Eastern North America." *Proceedings of the National Academy of Sciences - PNAS* 114, no. 11 (2017): 2854–2859.

<https://www.jstor.org/stable/26480259>.

45 Ibid.

46 To better understand the Air Quality Index (AQI), consult this US EPA website: <https://www.airnow.gov/aqi/aqi-basics/>.

47 Molinari, Laura. "Hazardous Air Quality Threatens California Farmworkers after Devastating Wildfires." *CBS News*. CBS Interactive, September 9, 2020.

Is it Outdoor Work or Indoor Work?

At times, the distinction between indoor work and outdoor work is not clear. Cleaning produce in an open-air but roofed shed – is that indoor or outdoor work? Working at a parking lot kiosk? Indoor or outdoor? Unloading trucks on a loading dock? Which is sometimes indoor and sometimes outdoor. Working in a food truck? It's also important to note that cargo containers parked outside of a warehouse in Southern California routinely exceed 135°F.

As separate standards are being created for indoor and outdoor work, policymakers need to ensure that all relevant occupations are addressed.

INDOOR WORKERS

Indoor workers represent a significant population affected by extreme heat. Even though work takes place in shade, or within a building, heat nonetheless remains an issue. Heat is especially an issue for those who labor in warehouses, restaurants, indoor construction, laundries, garages, port terminals, and factories – those who do not have the benefit of air-conditioning. These workers often work in unventilated settings, even in summer. The days of “sweatshops” are not over.



Additionally, as frequent and intense wildfires are likely to become the new normal, employers must take the necessary steps to mitigate exposure smoke-borne PM2.5 in indoor workplaces. Smoke-borne PM2.5 can enter indoor workplaces in the form of natural ventilation and infiltration, and also through poorly sealed, unmaintained HVAC units.

The experiences of warehouse and transportation workers are the focus of this report section. These sectors have grown tremendously as a significant portion of the retail sector has moved from brick-and-mortar stores to online distribution. In 2021, the U.S. Department of Commerce reported that e-commerce sales constituted \$870.8 billion – a 14.2% increase over the previous year.⁴⁸

In California, the shift in retail distribution has seen a corresponding surge in transportation and warehousing activity in Southern California.⁴⁹ According to the Center for Economic Forecasting and Development at the University of California, Riverside, the number of logistics workers in the Inland Empire region rose from 36,500 to 192,100 people between February 2020 and October 2021.⁵⁰ There is

48 U.S. Department of Commerce Economic Indicators Division. Rep. Quarterly Retail E-Commerce Sales: 4th Quarter 2021 . Washington D.C., NC: U.S. Census Bureau News, 2021. https://www.census.gov/retail/ecommerce/historic_releases.html.

49 Ibid.

50 Berger, Paul. “Logistics Hiring Surge in California’s Inland Empire Can’t Satisfy Demand.” The Wall Street Journal. Dow Jones & Company, December 22, 2021.

<https://www.wsj.com/articles/logistics-hiring-surge-in-californias-inland-empire-cant-satisfy-demand-11640205600>.

so much demand that job vacancies recently tripled to 5,600 unfilled positions.⁵¹

Despite the recent shift in American retail to warehouse delivered goods, the effect of extreme heat on tens of thousands of Californians laboring in un-airconditioned fulfillment centers has not been sufficiently studied nor addressed by California policymakers.



Despite the recent shift in American retail to warehouse delivered goods, the effect of extreme heat on tens of thousands of Californians laboring in un-airconditioned fulfillment centers has not been sufficiently studied nor addressed by California policymakers. We suspect two reasons. When work takes place in an indoor setting, there's an assumption that because workers are shielded from direct sunlight, heat does not affect them.⁵² (This is a false assumption.) Second, the variety of indoor occupations are so multifarious that it's hard to create a single regulation that would apply universally. For example, should restaurant workers, like cooks, standing over a hot stove, have a temperature standard that is the same as warehouse workers?

In 2017, the Division of Occupational Safety and Health held an advisory meeting to draft a regulation focused on reducing heat-related illness within places of indoor employment.⁵³ The most recent draft of the standard, updated approximately two years ago in 2019, would apply to all indoor worker areas where the temperature equals or surpasses 82°F. In order to comply with this standard, employers must implement administrative controls such as adjusting work procedures or schedules to minimize heat illness.⁵⁴ Some businesses are actively opposed to the proposed Indoor Heat Illness Prevention Standard. They argue that regulations should be targeted to specific industries and that a single temperature standard should not be applied universally. They also contend that compliance will be expensive. Owners will need to renovate existing buildings, buy new air-cooling equipment and pay higher utility bills.⁵⁵ This raises the question as to whether a standard should be implemented across all indoor industries or whether only certain industries should be called-out. Speaking for labor, Veronica Alvarado, Deputy Director of the Warehouse Worker Resource Center (WWRC), believes all workers should receive protection for the work they perform even if their responsibilities vary.

51 Berger, Paul. "Logistics Hiring Surge in California's Inland Empire Can't Satisfy Demand."

52 Ibid.

53 Division of Occupational Safety and Health, Cal/OSHA. "Heat Illness Prevention in Indoor Places of Employment." Heat Illness Prevention Indoors - Advisory Meetings. California Department of Industrial Relations, February 28, 2017. <https://www.dir.ca.gov/dosh/doshreg/heat-illness-prevention-indoors/>.

54 Ibid.

55 Peterson, Molly. "Rising Heat Is Making Workers Sick, Even Indoors." KQED, December 4, 2018. <https://www.kqed.org/science/1934110/rising-heat-is-making-workers-sick>.

Working Conditions

Heat and smoke-borne PM2.5 affects indoor workers in a variety of ways, which requires multiple remedies to reduce risk and harm.

Ventilation

Lack of ventilation can lead to injury and can further exacerbate existing conditions, leading to hospitalization. According to a 2011 survey from Warehouse Workers United (WWU) and the University of California Los Angeles Labor Occupational Safety and Health Program (UCLA-LOSH), of warehouse workers in Inland Southern California, 70% of employees said their ventilation was inadequate.⁵⁶ Survey respondents reported that their co-workers fainted due to lack of ventilation.



Supplying adequate ventilation – maximizing air flow by either bringing-in outdoor air or recirculating indoor air⁵⁷ – is highly dependent on the size of rooms as well as the rooms’ particular dimensions. Solutions need to be tailored to each location. However, ventilation is typically left to the discretion of the building or business owner, which can be a problem as owners may try to save money by not paying for adequate ventilation.⁵⁸



56 Struna, Jason, et al. “Unsafe and Unfair: Labor Conditions in the Warehouse Industry.” Edited by Mindy Marks and Karthick Ramakrishnan. *Policy Matters* 5, Issue 2 (2012): 1–12.

<https://policymatters.ucr.edu/vol5-2-warehouse/#:~:text=Policy%20Matters%20is%20a%20quarterly,%2C%20state%2C%20and%20national%20levels>.

57 Humphries, Courtney. “The Future of Work: The Uneven Rise of the Healthy Workplace.” *The Boston Globe*. April 2019. <https://apps.bostonglobe.com/ideas/graphics/2021/04/the-future-of-work/articles/the-uneven-rise-healthy-workplace/>.

58 Humphries, Courtney. “The Future of Work: The Uneven Rise of the Healthy Workplace.”

Undocumented Workers in Indoor and Outdoor Occupations

Undocumented workers are a significant portion of the labor force in essential industries. In a report released by the Center for American Progress in 2021, researchers found that there are 7 million undocumented immigrants working in the United States, with California as one of the top two states with the highest concentration of undocumented immigrants in their workforce at 1.4 million.⁵⁹ The following industries hire the most undocumented workers in California:

- In the agriculture industry, 38% of the workforce are undocumented
- In accommodation and food, 25% are undocumented
- In construction, 21% are undocumented
- In manufacturing, 14% are undocumented
- In goods movement and wholesale, 14% are undocumented.⁶⁰

Undocumented workers who are less skilled tend to accept work that is more labor intensive such as sewing machine operators, dishwashers, and landscapers.⁶¹ Their undocumented status makes them particularly vulnerable in accessing healthcare and other government services, reporting work violations, and enduring extreme heat conditions.



Indoor Air Pollution

Indoor air pollution depends on a number of factors. Chemicals off-gas from paint, building materials, machines and even from furniture.⁶² Additionally, indoor workplaces that are poorly sealed, have unmaintained HVAC units with air filters less than MERV 13 can draw in wildfire smoke borne PM2.5. Allergens such as dust, pollen and mold may also be present indoors. These chemicals may combine with outdoor air pollution that intrudes into the building.

Poor ventilation may amplify worker exposure to toxicants and can cause severe pulmonary, respiratory, and cardiovascular effects at high levels of exposure. In addition, high levels of carbon dioxide build-up in poorly ventilated rooms, with consequent health effects of diminished cognition and alertness.⁶³

59 Cusick, Julia, Sam Hananel, and Claudia Montecinos. "Protecting Undocumented Workers on the Pandemic's Front Lines." Center for American Progress, November 7, 2021.

<https://www.americanprogress.org/article/protecting-undocumented-workers-pandemics-front-lines-2/>.

60 New American Economy. The Contributions of New Americans in California. August 2016.

<https://research.newamericaneconomy.org/report/the-contributions-of-new-americans-in-california/>.

61 New American Economy. "The Contributions of New Americans in California."

62 Humphries, Courtney. "The Future of Work: The Uneven Rise of the Healthy Workplace."

63 Ibid.

Within warehouses, exhaust from diesel trucks routinely flows into warehouses – which strengthens the argument for speeding the transition from diesel to electric or hydrogen powered trucks.

Indoor Workers during the COVID-19 Pandemic

According to the CDC, the main pathway people got infected with the SARS-CoV-2 virus was through the inhalation of very fine respiratory droplets and aerosol particles. No matter the location, whether it was at a meat-packing plant or at a convalescent hospital, poor ventilation helped spread the virus. Adequate air-flow not only helps workers stay healthier by reducing body temperature and exposure to pollutants—but can also help stem the spread of contagion.

Heat Stress

Heat stress makes indoor workers vulnerable to more severe heat-related illnesses. The National Agricultural Safety Database (NASD) defines heat stress as the buildup of body heat due to muscle use or the environment. As the body struggles to regulate its temperature, it leads to heat exhaustion and heat stroke.⁶⁴ Many indoor working environments lack systems to help workers control heat stress.

In 2018, KQED investigated the experiences of 16 workers in seven workplaces in Los Angeles, Riverside, San Bernardino and Sacramento Counties from July to September by utilizing a temperature and humidity monitoring system.⁶⁵ These included workers from warehouses, port terminals, garment factories, and other indoor settings. The KQED study found people were working in temperatures above 90°F for an average of 47% of the work day. The most drastic case saw a worker operating in temperatures above 90°F for 82% of their work day.⁶⁶

Compounding the risk to workers, fulfillment centers often pay by using a quota system, which results in workers eschewing water breaks. Workers can become dehydrated, which can lead to heat exhaustion and other injuries. Potable water may be hard to access. The KQED study described cannery workers running up and down stairs to reach the water cooler. The threat of terminating employment convinced workers to skip rest and water breaks.⁶⁷ Another worker described unloading goods from a 40-foot long metal container. In this space, temperatures reach upwards of 98°F, while the heat index (defined as what the temperature feels like to the human body when relative humidity factored in with the actual air temperature) reached 115°F.⁶⁸ When the human body reaches that temperature, the mind loses focus. In this instance, the warehouse worker lost count of the shipment and began the count over.

When workers fall ill from heat, many employers do not know what to do. This study uncovered an account of a worker fainting, only to be covered with cardboard rather than receiving medical treatment.⁶⁹ When workplaces don't provide sufficient cooling, it affects the body's ability to regulate temperature. When the body's temperature exceeds 98.6°F, the body sweats, using evaporative cooling to reduce the body's temperature.⁷⁰ Unable to cool down, the body then overheats—which can lead to heat exhaustion, which entails nausea, headaches, confusion, incidence of kidney stones, and muscle cramps.⁷¹

64 National Agricultural Safety Database. "Heat Stress." NASD, accessed on November 27, 2022. <https://nasdonline.org/137/d001702/heat-stress.html>.

65 Peterson, Molly. "Rising Heat Is Making Workers Sick, Even Indoors."

66 Ibid.

67 Ibid.

68 Ibid.

69 Ibid.

70 Hanna, Elizabeth G, et al. "Climate Change and Rising Heat: Population Health Implications for Working People in Australia." *Asia Pacific Journal of Public Health* 23, (December 10, 2010): 14S-26S. <https://doi.org/10.1177/1010539510391457>.

71 Peterson, Molly. "Rising Heat Is Making Workers Sick, Even Indoors."

Heat stress entails economic penalties. Unlike outdoor workers, where the correlation between labor productivity and economic cost has been quantified, there is relatively scant research on how indoor heat affects economics and a company's bottom line.

Extreme Heat and Mental Health

The impact of extreme heat on worker health is not always visible to the naked eye. Extreme heat places stress on workers' psyche as well. According to studies, extreme heat is correlated with negative impacts to mood, memory, attention, and sleep.⁷²

Our interviews backup the connection between mental health and heat. The Warehouse Workers Center told us how warehouse workers become highly-stressed as they are pressured by employers to meet large quotas. It is a common practice for warehouse workers to consume energy drinks to keep up with their workloads. Warehouse workers live in an on-again off-again economy of supply and demand, an anxious state to live in on a daily basis. Dealing with extreme heat exacerbates already high levels of stress.⁷³ Warehouse workers may work 10-hour shifts for three to four days in a row with not enough time to rest their mind or their body. Many warehouse employers schedule their employees for sequential closing and opening shifts, without providing adequate time for a full night of necessary rest to bounce back from heat and exhaustion.

The body has a natural response mechanism to handle stress, but only in small quantities. When stress builds and becomes long-term, it can have serious health consequences.⁷⁴



Safety Concerns

Higher temperatures increase workplace accidents. As referenced in the previous section on outdoor workers,

A recent study found a 5-7% increase in accidents on days between 85 and 90 degrees and a 10-15% increase on days above 100 degrees from 2001 to 2018.⁷⁵

A recent study found a 5-7% increase in accidents on days between 85 and 90 degrees and a 10-15% increase on days above 100 degrees from 2001 to 2018. In total, these researchers found that heat was associated with an additional 360,000 work injuries in California.⁷⁶ However, reporting is not comprehensive: many indoor injuries and accidents are not attributed to heat exposure, though researchers have connected them back to heat. These heat induced accidents may entail falling from

72 Connors, Erin. "Extreme Heat Contributes to Worsening Mental Health, Especially among Vulnerable Populations." American Psychiatric Association, June 30, 2021.

<https://www.psychiatry.org/newsroom/news-releases/extreme-heat-contributes-to-worsening-mental-health-especially-among-vulnerable-populations#:~:text=Extreme%20heat%20has%20been%20associated,with%20an%20increase%20in%20suicide>.

73 Ibid.

74 American Psychological Association. "Stress Effects on the Body." American Psychological Association, November 1, 2018.

<https://www.apa.org/topics/stress/body>.

75 Park, R. Jisung, et al. "Temperature, Workplace Safety, and Labor Market Inequality." IZA Labor Institute of Economics Discussion Paper Series, no. 14560 (July 2021) :1-62. <https://www.iza.org/publications/dp/14560/temperature-workplace-safety-and-labor-market-inequality>.

76 Ibid.

heights, being struck by a vehicle or mishandling dangerous machinery.⁷⁷



Thermal Discomfort

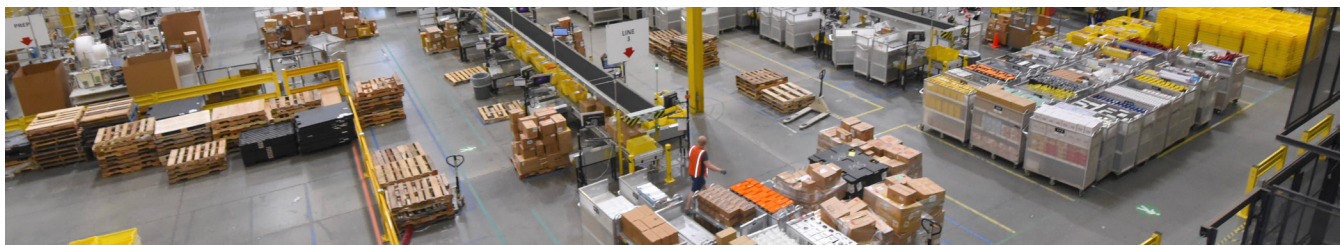
Though not an illness, thermal discomfort can affect productivity and well-being. “Thermal comfort” is when a person feels comfortable with the temperature.⁷⁸ When workers experience thermal comfort, they feel neither too cold nor too hot. According to the California Energy Commission (CEC), a state agency responsible for setting guidelines on indoor thermal comfort, “Humans are comfortable within a relatively small range of temperature and humidity conditions, roughly between 68-80°F (20-26.7°C)

and 20-80% relative humidity (RH).” Achieving and maintaining these heat-conscious design decisions is spelled out for employers and Cal/OSHA in a guide document called the Pacific Energy Center’s Guide to: California Climate Zones and Bioclimatic Design. Thermal comfort has recently received more attention due to its effect on the quality of life and well-being of individuals within buildings.⁷⁹

Within the United States and international context respectively, ASHRAE/IES Energy Efficiency Standard 90.1 and the International Energy Conservation Code (IECC) offer model codes for buildings.⁸⁰ Among the many codes, IECC suggests standards for energy efficiency. Researchers recently examined comfort analysis, productivity, and heat index for various versions of ASHRAE/IES Energy Efficiency Standard 90.1 and the IECC. Their results found that among six climate zones, 40% of employees still have 40% of occupied hours outside the comfort zone despite the implementation of local energy efficiency standards equivalent to Standard 90.1.⁸¹ Despite energy efficiency codes, such as requirements for wall and roof insulation, indoor workers continue to work in environments that are thermally uncomfortable. In order to adjust to their uncomfortable environments, workers must modify what they wear. For example,

A former worker at an Amazon fulfillment center stated she had to work in gym clothes to maintain comfort given the lack of air-conditioning within the building.

A former worker at an Amazon fulfillment center stated she had to work in gym clothes to maintain comfort given the lack of air-conditioning within the building.



77 Abdalla S, Apramian SS, et al. “Chapter 6: Occupation and Risk for Injuries” in *Injury Prevention and Environmental Health*, edited by Mock CN, et al. (Washington, District of Columbia: World Bank Group, 2017). <https://www.ncbi.nlm.nih.gov/books/NBK525209/>.

78 Taber, Christian, and Donald Colliver. “Thermal Comfort in Heated-And-Ventilated-Only Warehouses.” *ASHRAE Journal* 60, no. 12 (2018): 12–18. https://uknowledge.uky.edu/bae_facpub/229.

79 79 Aram, Farshid, et al. “Urban Heat Resilience at the Time of Global Warming: Evaluating the Impact of the Urban Parks on Outdoor Thermal Comfort.” *Environmental Sciences Europe* 32, no. 1 (2020). <https://enveurope.springeropen.com/articles/10.1186/s12302-020-00393-8>.

80 Taber, Christian, and Donald Colliver. “Thermal Comfort in Heated-And-Ventilated-Only Warehouses.”

81 Ibid.



Risk in Other Industries

In this report, we primarily focus on farmworkers and warehouse workers. However, they represent only a portion of occupations that are being impacted by extreme weather. Numerous other types of outdoor and indoor workers are also at risk of heat stress, illness, and injury.

Construction workers often work in the sun and high temperatures while performing physically difficult tasks. Their duties require concentration and focus. From 2003-2008, the U.S. Census of Fatal Occupational Injuries reported 196 heat-related mortalities.⁸² Within that number, construction workers constituted 36% of all heat-related deaths.

Firefighters are another sector at the frontline of climate change. When fighting fire, they must wear protective clothing and self-contained breathing apparatus.⁸⁵ While this clothing serves as a shield, the gear reduces the body's ability to stay cool via perspiration.

Indoor work varies. Workers at manufacturing plants are particularly vulnerable to the effects of heat stress. They may be exposed to heat from machine operations, furnaces, ovens, or molten metal.⁸⁴ One case study assessed conditions of an automobile parts manufacturing plant found that, of 400 workers, 96% reported unsuitable temperature conditions and 56% reported headaches.⁸⁵

Garment workers work long hours and operate equipment that can slice and burn. A report published by the Garment Worker Center, UCLA Labor Center, and UCLA Labor Occupational Safety and Health (LOSH) highlighted the experiences of garment workers in Los Angeles; during the spring and summer seasons when temperatures increased dramatically, 59.5% of these workers reported that their workplaces were inadequately ventilated.^{86,87}



82 Xiang, Jianjun, et al. "Health Impacts of Workplace Heat Exposure: An Epidemiological Review." *Industrial Health* 52, no. 2 (March 2014): 91–101. <https://doi.org/10.2486/indhealth.2012-0145>.

83 Prezant, David J., et al. "Impact of a Design Modification in Modern Firefighting Uniforms on Burn Prevention Outcomes in New York City Firefighters." *Journal of Occupational and Environmental Medicine* 42, no. 8 (August 2000): 827–34. <https://doi.org/10.1097/00043764-200008000-00013>.

84 Xiang et al. "Health Impacts of Workplace Heat Exposure."

85 Pogačar, Tjaša, et al. "The Effect of Hot Days on Occupational Heat Stress in the Manufacturing Industry: Implications for Workers' Well-Being and Productivity." *International Journal of Biometeorology* 62, no. 7 (2018): 1251–64. <https://doi.org/10.1007/s00484-018-1530-6>.

86 Shadduck-Hernández, et al. "Dirty Threads, Dangerous Factories." The Garment Worker Center. UCLA Labor Center, Garment Worker Center, UCLA Labor and Occupational Health, December 2016. <https://garmentworkercenter.org/dirty-threads-dangerous-factories/>.

87 We wish to acknowledge the Garment Worker Center, Instituto de Educación Popular del Sur de California, and others who advocate for workers under the stress of heat.

EXISTING OUTDOOR WORKER LAWS AND REGULATIONS



State of California's Heat Standard

Passed as an emergency regulation in 2005, the Heat Illness Prevention Standard was made permanent in response to the increase of heat-related worker deaths that year.⁸⁸ The emergency regulation required water and shade for outdoor workers and mandated employers to provide water and shade for outdoor workers. It borrowed elements from Assemblymember Judy Chu's sponsored Heat Illness Prevention bill introduced earlier that year.⁸⁹ In 2006, the State codified the heat standard into law and under California Code of Regulations §3395: Heat Illness Prevention in Outdoor Places of Employment. The Heat Standard applies to many outdoor occupational fields including: agriculture; construction; landscaping; oil and gas extraction; and transportation or delivery of agricultural products, construction materials, or other heavy materials (excludes air conditioned vehicles that do not load/unload).



⁸⁸ See Appendix: Table 1: Laws and Regulations.

⁸⁹ Sallady, Robert and Nancy Vogel. "Gov Orders Shade, Water for Workers Sickened by Heat" Los Angeles Times, August 3 2005. <https://www.latimes.com/archives/la-xpm-2005-aug-03-me-farmworkers3-story.html>.

California Code of Regulations §3395: Heat Illness Prevention in Outdoor Places of Employment

Key Provisions:

- Access to potable, cool drinking water free of charge and as close as possible to where the employees are working
- Access to shade. Shade must be present when temperatures exceed 80°F and available upon request when temperatures are lower
- High heat procedures when temperature equals or exceeds 95°F
- Acclimatization: observe all employees during heat waves and newly assigned employees for the first two weeks of employment
- Employee training on the policies and procedures related to heat illness prevention
- Employer must establish, implement, and maintain a heat illness prevention plan.



California's Heat Illness Prevention Standard, although currently limited to outdoor workers, is the most comprehensive standard in the nation. From 2011 through 2017, California issued more than \$13 million in penalties against companies found in violation of its heat stress standard.⁹⁰ California targets its inspections at what have traditionally been the highest-risk industries for outdoor heat-related injuries, the agriculture and construction sectors.

However, activists (and researchers as well) have critiqued Cal/OSHA's ability to enforce the law. Observers have noted that Cal/OSHA's rate of initiating an inspection for complaints is inadequate in large part due to the insufficient number of Cal/OSHA inspectors. Recent estimates show that the agency has fewer than 200 inspectors, with only 35 employees working in enforcement who speak Spanish.⁹¹

Additionally, in our interviews the Natural Resources Defense Council (NRDC) noted that Cal/OSHA is currently limited in its ability to levy fines. (We also heard from Cal/OSHA that one-third of their inspector positions are currently unfilled.) The Occupational Safety and Health Act sets the minimum fine for a repeat or willful violation at \$5,000 and a maximum fine for a repeat or willful violation at \$70,000. There are simply not the right tools or number of inspectors to ensure the heat prevention standard is being met.

In 2015, the United Farm Workers (UFW) union sued Cal/OSHA for not enforcing the Heat Illness Prevention Standard as farmworkers continued to die and get sick from heat-related illnesses.⁹² UFW

90 Tanglis, Michael. Extreme Heat and Unprotected Workers.

91 Romero, Farida. "California Failed to Protect Outdoor Workers from Wildfire Smoke Under Biden's New OSHA Chief." KQED, December 2, 2021.

<https://www.kqed.org/news/11897789/california-largely-failed-to-enforce-worker-smoke-protections-under-bidens-new-osha-pick#:~:text=Failed%20to%20save%20article&text=President%20Joe%20Biden's%20pick%20to,KQED%20and%20The%20California%20Newsroom.>

92 Mohan, Geoffrey. "Cal-OSHA Settles Farmworker Suits over Heat-Related Deaths." Daily Press, June 12, 2015. <https://www.dailypress.com/la-fi-cal-osha-farm-workers-20150612-story.html>.

alleged that in 2011 alone, the agency failed to conduct on-site inspections related to 55 of the 78 complaints the union filed or helped to file. Nor have violations been referred to law enforcement for criminal prosecution. It is hard to believe that in the 14 years of the program that not one incident has warranted criminal investigation.

Heat Standard Enforcement during COVID-19

Stakeholder interviews suggested that Cal/OSHA enforcement of the Heat Illness Prevention Standard regulation was hampered by the COVID-19 pandemic. For evidence, we turned to state documents, namely Cal/OSHA Citations for Workplace Heat Standard across Agricultural industries from 2019 - 2021.⁹³

From January 2019 to December 2021, there have been 355 investigations at agricultural industry workplaces (North American Industry Classification System, often referred to as NAICS) that in total include 499 citations on violations related to the California Heat Illness Prevention Standard §3395.⁹⁴ They were issued by date:



- In 2019, before COVID, Cal/OSHA issued 233 citations
- In 2020, 174 citations were issued
- In 2021, despite record temperatures, only 92 were issued.

Cal/OSHA investigations are identified as either:

- Complaint - filed by an employee or on behalf of an employee;
- Accident - employer reports a fatality, serious injury, or serious illness; or
- Referrals - a report of hazards or alleged violations originating from either: 1) Cal/OSHA safety or health compliance officer or 2) media reports

From 2019 - 2021, Cal/OSHA's investigations have become more reliant on third party reports. In 2019, Complaint and Accident investigations made up a majority of the type of cases related to Heat Illness Prevention Standard violations across agricultural industries. In 2020 and 2021, Referrals made up the majority of Cal/OSHA investigations.

The most common violation was related to §3395(I) requiring workplaces to have in place a Heat Illness Prevention Plan. The second most common violation was §3395(C) requiring employers to provide employees with access to potable drinking water. The third most common violation was §3395(D) requiring employees suffering from heat illness to be provided access to an area with shade for a period of no less than five minutes.

The average fine amount for workplaces in violation of §3395(I) was \$300. The average fine amount for workplaces in violation of §3395(C) and §3395(D) was \$4,000 and \$4,500, respectively.

⁹³ Climate Resolve (2021). Cal/OSHA - Citations - Tracking Spreadsheet. December 12, 2021.

<https://docs.google.com/spreadsheets/d/1PBeoZp9KEt0B0qItP92ybbXHPPhA1rwxzUAtuwQt4aq0/edit#gid=1292774396>.

⁹⁴ U.S. Department of Commerce. "North American Industry Classification System - NAICS." United States Census Bureau, accessed on April 1, 2022. <https://www.census.gov/naics/>.



Workers' understanding of heat safety safeguards is low. A 2012 study of farmworkers in the Central Valley found that while most workers (91%) received training on heat-related illness, their knowledge and personal implementation of heat-abatement measures were moderate to low.⁹⁵ 44% of respondents severely underestimated the time required for acclimatization, and most drank less water per day than they should given their work.⁹⁶ The study also found gender differences. Women on average were more concerned about heat illness than men; however, women were less comfortable taking water breaks as their employment was more irregular than their male counterparts.⁹⁷

In an interview with California Rural Legal Assistance (CRLA), we learned that farm labor contractors, rather than the agricultural company or property owner, were held responsible for heat violations. From 2019-2021, Farm Labor Contractors and Crew Leaders (NAICS 115115) were found to be the most common type of agricultural establishment to be cited under the Heat Illness Prevention Standard, making up almost a quarter of all investigations (out of a total of 32 types of agricultural establishment).^{98,99} UFW shared that hiring farm labor contractors, which act as middlemen, is one way growers evade responsibility, as these contractors frequently change their legal business identities.

California Senate Bill 606 - Cal/OSHA Enforcement Expands

SB 606, which was co-authored by Senator Lena Gonzalez and Assemblywoman Lorena Gonzalez, was signed by Governor Newsom on September 27, 2021. SB 606 grants Cal/OSHA the ability to stack penalties in cases where an employer has willfully and negligently refused to keep up safety standards.

SB 606 creates two new categories of Cal/OSHA violations: "enterprise-wide" and "egregious". These violations would be considered as separate for purposes of issuing fines and penalties, and is one way for Cal/OSHA to issue heftier fines when warranted.

95 Stoecklin-Marois, Maria, et al. "Heat-Related Illness Knowledge and Practices among California Hired Farm Workers in the MICASA Study." *Industrial Health* 51, no. 1 (2013): 47-55. <https://doi.org/10.2486/indhealth.2012-0128>.

96 Ibid.

97 Ibid.

98 Climate Resolve. Cal/OSHA - Citations - Tracking Spreadsheet. December 12, 2021.

<https://docs.google.com/spreadsheets/d/1PBeoZp9KEt0B0qItP92ybbXHPA1rwxzUAtuwQt4aq0/edit#gid=1292774396>.

99 North American Industry Classification System (NAICS). "NAICS Code: 115115 Farm Labor Contractors and Crew Leaders." NAICS Association, accessed on December 17, 2021. <https://www.naics.com/naics-code-description/?code=115115>.

Labor Contracting and Undocumented Immigration

Agricultural labor is often recruited by farm labor contractors (FLCs). These contractors serve as intermediaries by helping employers obtain quick employment for key tasks such as harvesting.¹⁰⁰ FLCs serve as a “go between,” connecting employers with workers. FLCs can be helpful in overcoming language barriers between workers and farmers. FLCs can also help transport workers or supervise them in the fields.¹⁰¹ It also falls to FLCs to comply with labor statutes, such as providing shade, potable water, handwashing facilities and bathrooms.¹⁰²

According to Dr. Edward Flores, many of the 5,791 farm labor contractors in California are unaware of the Heat Illness Prevention Standard.¹⁰³

Accordingly, on hot days, farmworkers are left with little to no support on how to identify the symptoms of heat illness, and their employers are not living up to their obligations to supply relief. It is important to note that FLCs routinely change their legal status and name to escape responsibility and liability.

The undocumented status of workers places them at risk in advocating for worker rights, including protection from extreme heat. According to the U.S. Department of Agriculture, almost half of farmworkers lack legal immigration status.¹⁰⁴ In 2019, the New American Economy Research Fund reported that 40.9% of agricultural workers in California are undocumented.¹⁰⁵ Undocumented workers may hesitate to report heat violations for fear of being deported. Most undocumented workers do not want to lose the opportunity to send money home to their families. Their status places them in a compromising situation where they have to choose between their health or providing for their families. Undocumented workers are not eligible for federal programs such as unemployment assistance and may lack a local safety net.¹⁰⁶ The lack of protection for farmworkers makes them vulnerable to exploitation.



A few organizations have stepped in to advocate for workers, among them CRLA, UFW, and 805 UndocuFund, who are helping farmworkers report violations and informing them of their rights. Some researchers argue for an end to FLCs, in order to enhance direct employer-worker relations, as well as spur more faithful compliance with labor regulations.¹⁰⁷

Wildfire Smoke Standard

The groups Worksafe, California Labor Federation and California Rural Legal Assistance (CRLA) filed a petition to Cal/OSHA seeking wildfire smoke regulations in December 2018.

As a response to the increased frequency of wildfires across the State, the Cal/OSHA Standards Board

100 Anita, Alves Pena. “Undocumented Immigration and the Business of Farm Labor Contracting in the USA.” *American Journal of Business* 27, no. 1 (2012): 10-26. doi:<http://dx.doi.org/10.1108/19355181211217616>.

101 Farm Worker Justice. “Subcontracted workers.” Farmworker Justice, accessed on January 12, 2022. https://www.farmworkerjustice.org/advocacy_program/sub-contracted-workers/.

102 Representative from California Rural Legal Assistance (CRLA). Interview by Climate Resolve. October 22, 2021.

103 Orozco Flores, Edward. “Farm Workers and Heat.” Extreme Heat Webinar. Lecture presented at the Extreme Heat Webinar, November 18, 2021.

104 U.S. Department of Agriculture. “Farm Labor.” USDA ERS - Farm Labor, accessed on January 12, 2022. <https://www.ers.usda.gov/topics/farm-economy/farm-labor/>.

105 New American Economy Research Fund. “Immigration and Agriculture.” New American Economy Research Fund, August 16, 2021. <https://research.newamericaneconomy.org/report/immigration-and-agriculture/>.

106 Orozco Flores, Edward. “Farm Workers and Heat.”

107 Alves Pena, Anita. “Undocumented Immigration and the Business of Farm Labor Contracting in the USA.”



voted to adopt an emergency temporary standard to avoid serious harm to workers following the fires in 2018 and to protect workers from exposure to wildfire smoke.

On February 1, 2021, the emergency regulation was adopted and approved by the Office of Administrative Law as California Code of Regulations §5141.1: Protection from Wildfire Smoke.¹⁰⁸ The Standard applies to both outdoor and indoor workers who may be exposed to wildfire smoke for more than one hour per day, even if they are not directly impacted by fires. The Standard is triggered once the AQI for PM2.5

is 151 or greater, or when employers should reasonably anticipate employees could be exposed to wildfire smoke. The Standard does not apply to wildland firefighters or workers in enclosed buildings, structures, or vehicles with filtered air systems.

According to this Wildfire Smoke Standard, employers must:

- Determine employee PM2.5 exposure from wildfire smoke
- Have a system to communicate wildfire smoke hazards to employees
- Provide training on the new regulation, the health effects of wildfire smoke, and the safe use and maintenance of respirators
- When an exposure of AQI of 151 is reached, relocate employees indoors or outdoors to reduce exposure. If that does not work, employees must receive PPE (respirators) on a voluntary or mandatory basis (151-500: voluntary; 500+: mandatory).

Similar to our findings on non-enforcement of the Heat Illness Prevention Standard by Cal/OSHA especially since COVID-19, several interviewees also shared anecdotal evidence of non-enforcement by Cal/OSHA on issuing citations to employers for violations related to the Wildfire Smoke Standard. An investigation conducted by KQED and the California Newsroom analyzed data related to enforcement of the Wildfire Smoke Standard and found that it was rarely enforced, based on a comparison of the number of citations to the number of days when workers were exposed to unhealthy air during peak wildfire season from July 2019 to October 2021.¹⁰⁹

In interviews, the United Farm Workers noted that COVID-19 drastically impacted Cal/OSHA enforcement of the Wildfire Smoke Standard. Many employers were not providing KN95 (or equivalent) facemasks that are required once AQI for PM2.5 reaches 151. They noted that they heard stories of farmworkers being charged for a face mask during the early months of COVID-19.

In interviews, the United Farm Workers noted that COVID-19 drastically impacted Cal/OSHA enforcement of the Wildfire Smoke Standard. Many employers were not providing KN95 (or equivalent) facemasks that are required once AQI for PM2.5 reaches 151. They noted that they heard stories of farmworkers being charged for a face mask during the early months of COVID-19.

¹⁰⁸ See Appendix: Table 1 : Laws and Regulation.

¹⁰⁹ Romero, Farida. "California Failed to Protect Outdoor Workers from Wildfire Smoke Under Biden's New OSHA Chief."



Progress In Action: Extreme Heat Action Plan

In January 2022, the California Natural Resources Agency and Governor’s Office of Planning & Research released a draft Extreme Heat Plan to protect communities across the state from heat.¹¹⁰ Within the draft plan, there are several recommended actions that address the need for employers to protect worker health from extreme heat. These include:

- Protect workers from occupational exposure to excessive heat and provide information on occupational protections and available resources
- Identify education opportunities and strategic enforcement strategies to protect workers impacted by extreme heat from heat illness and other health & safety and labor law issues
- Conduct targeted enforcement of outdoor workplaces during periods of high heat to ensure compliance with established outdoor worker heat illness prevention regulations
- Following passage of an occupational heat illness prevention standard for indoor work environments, conduct targeted enforcement and education campaigns
- Build resilience through training partnerships and apprenticeships in jobs and careers that address extreme heat
- The Delta Stewardship Council will work with agricultural networks, farmers, and farmworkers in the Delta to understand what the agricultural community needs to address extreme heat.

110 California Natural Resources Agency and Governor’s Office of Planning and Research. Draft: Protecting Californians Amidst Extreme Heat: A State Action Plan to Build Community Resilience. Sacramento, CA: State of California, 2022. PDF. <https://resources.ca.gov/-/media/CNRA-Website/Files/Initiatives/Climate-Resilience/Draft-Extreme-Heat-Action-Plan-ADA.pdf> (accessed April 15 2022).

EMERGING LEGISLATION RELATED TO WORKER PROTECTION



Studies and anecdotal evidence strongly suggest that indoor workers routinely experience extreme heat at work, and would benefit from protection through Cal/OSHA.

To date, the Cal/OSHA Board has not implemented a final standard as stipulated in SB 1167 (2016) to “create a heat illness and injury prevention standard applicable to workers working in indoor places of employment” and to “review and adopt a standard that minimizes heat-related illness and injury among workers working in indoor places of employment.”¹¹¹

Heat Illness Prevention Standard for Indoor Workers

The establishment of a Heat Illness Prevention Standard for indoor workers from Cal/OSHA will hold employees accountable for reducing the risk of heat-related illness and prioritizing the health of their laborers in the workplace.¹¹² Under the draft standard employers would be required to comply when the heat index is above 87°F, or above 82°F when employees work in the presence of radiant heat or wear clothing that restricts heat removal.¹¹³ These clothing items would include those with the following characteristics: waterproof, designed to protect the wearer from a biological, chemical, fire, or radiological hazard, or designated to protect the wearer or work process from contamination.¹¹⁴



In addition, the proposed legislation would also include:

- Establishing, implementing, and maintaining a heat illness prevention plan
- Implementing emergency response procedures for signs and symptoms of heat illness and contacting emergency medical services

111 Mendoza, Tony. “SB-1167 Employment Safety: Indoor Workers: Heat Regulations.” California Legislative Information, accessed on February 18, 2022. https://leginfo.ca.gov/faces/billNavClient.xhtml?bill_id=201520160SB1167.

112 See Appendix: Table 1 : Laws and Regulations.

113 Ibid.

114 Ibid.

- Providing water and access to cool-down areas maintained below 82° F
- Taking temperature or heat index measurement during work shifts and maintaining records of measurements to assess the effectiveness of the employer’s control measures
- Closely monitoring new or newly assigned employees while they acclimate to hot conditions
- Training workers and supervisors in identifying the risk and signs of heat illness
- Using administrative controls of providing heat-protective equipment if engineering controls cannot reduce the temperature and heat index below the standard’s limits

Domingo Blancas Case - A Turning Point

In August 2011, Domingo Blancas had worked several days at a warehouse that was consistently over 100°F.¹¹⁵ When he began to feel ill, he reported it to his employer and then was hospitalized. Following this event, he filed a complaint which prompted a Cal/OSHA investigation. Under state and federal law, employers have a responsibility to protect workers against illness and injury at work. The ruling from the Blancas case expanded this responsibility to include heat, both outdoors and indoors. As a result, his employers, the warehouse and the staffing agency, each paid an \$18,000 penalty for failing to reduce heat risk. Eleven years have passed since that ruling, however, still no official indoor heat regulation has been passed to protect indoor workers from extreme heat.



Since the final draft version of the standard was released on April 22, 2019, the standard moved forward to the Administrative Procedures Act (APA) process, where any new standards that are estimated to have an economic impact exceeding \$50 million must undergo a standardized regulatory impact analysis (SRIA) to calculate the total amount of fiscal impacts associated with a proposed regulation. This process has undoubtedly slowed progress, as it adds an additional one to two years to the timeline of adopting a final standard.

In 2021, SB 410 was introduced by Senator Leyva, which would have exempted new Cal/OSHA regulations such as the Heat Illness Prevention Standard from the SRIA process; unfortunately, the bill failed to get sufficient votes to pass out of committee. Since the draft standard has moved forward to the APA process in 2019, at least 60 indoor heat-related complaints have been filed with Cal/OSHA while Cal/OSHA inspectors remain without a standard to enforce.¹¹⁶

115 Peterson, Molly. “Rising Heat is Making Workers Sick, Even Indoors.”

116 Worksafe. Dying at Work in California: Workers Memorial Day. April 28, 2020. https://worksafe.org/file_download/inline/d97f3ff0-ab3b-4242-8328-b6e5077f2567.



Emerging Legislation: First in the Nation California to Rank of Heatwaves

Recent state policy on extreme heat has a champion in Assemblymember Luz Rivas (Arleta). Her efforts, along with the organization Climate Resolve, have spurred new studies, news articles and legislation in California. Rivas' AB 2076 (2022), sponsored by Climate Resolve, aims to coordinate state government efforts on heat and help local jurisdictions adapt to this growing threat.

A companion bill, AB 2238 (2022), sponsored by California Insurance Commissioner Ricardo Lara, with support from Rivas, Garcia (Imperial) and Stern (Woodland Hills), seeks to rank heatwaves, similar to hurricane warning systems which rank powerful storms.¹¹⁷

This forecasting system can provide life-saving information to California workers and employers, which could help minimize exposure to heat. The bill recognizes that prevention can save life and aims to prevent injury by warning people ahead of heat events.

117 Rivas, Luz. "Bill Text - AB-2238 Extreme Heat: Statewide Extreme Heat Ranking System." California Legislative Information, accessed on February 18, 2022. https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=202120220AB2238.



Interagency Working Group on Extreme Heat

At the federal level, there is now more focus on developing extreme heat regulations. In July 2021, the White House Climate Policy Office formed the Interagency Working Group on Extreme Heat.¹¹⁸ Within this group, the National Oceanic and Atmospheric Administration (NOAA), Health and Human Services (HHS), and the Environmental Protection Agency (EPA) will unite in communication and coordination to improve how the government responds to heat.¹¹⁹

With an emphasis on vulnerable communities, these agencies will have access to federal data that will encourage heat-related planning and decision-making.

This is especially important for those who work indoors. Indoor workers are consistently made to work with materials such as metals that conduct heat, increasing the temperature of the interior workspace. Using data to inform planning, there will be more insight on how to create environments that minimize the effects of extreme heat.

Additionally, in coordination with the Biden administration effort, the U.S. Department of Labor's Occupational Safety and Health Administration published an Advance Notice of Proposed Rulemaking (NPR) for Heat Injury and Illness Prevention in Outdoor and Indoor Work Settings on October 27, 2021.¹²⁰

At the federal level, OSHA does not have a specific standard for hazardous heat conditions and this NPR begins the process to consider a heat-specific workplace rule. The NPR reviewed state standards, including California standards, on preventing heat illness and death, and sought input as to whether the agency should incorporate some of these standards into a final federal rule.¹²¹

Although there is movement at the federal level, adopting Cal/OSHA's indoor heat standard should still be a top priority for Cal/OSHA as the agency has the ability to adopt protection standards that are more tailored to the needs of California's workers and conditions than federal OSHA standards.

118 "The United States Government. "Fact Sheet: Biden Administration Mobilizes to Protect Workers and Communities from Extreme Heat." The White House, September 19, 2021.

<https://www.whitehouse.gov/briefing-room/statements-releases/2021/09/20/fact-sheet-biden-administration-mobilizes-to-protect-workers-and-communities-from-extreme-heat/>.

119 Ibid.

120 U.S. Department of Labor. "News Release: Us Department Of Labor Initiates Rulemaking To Protect Workers, Outdoors And Indoors, From Heat Hazards Amid Rising Temperatures." U.S. Department of Labor: Occupational Safety & Health Administration, October 26, 2021.

<https://www.dol.gov/newsroom/releases/osha/osha20211026>.

121 Ibid.



A comprehensive review of heat and wildfire smoke policies and the working conditions of outdoor and indoor workers reveal several gaps in worker protection.

During each and every extreme heat event, one can reliably predict that many thousands of Californians will seek care in community clinics and hospital emergency rooms. Many of these injuries can be prevented, in particular, at the workplace through state level policies and employer actions.

First, Cal/OSHA's enforcement branch is understaffed. As noted earlier, one-third of job openings at Cal/OSHA are unfilled, and the COVID-19 pandemic shifted focus elsewhere. According to a Feb. 25, 2021 state Senate subcommittee hearing, enforcement of state health-and-safety regulations has been "minimal to non-existent."¹²² Recent data shows there are approximately 190 inspectors to look after 1 million employers, who are responsible for 18 million workers.¹²³ This means that each inspector would be responsible for roughly 5,200 companies.

Second, bureaucratic foot-dragging has postponed the promulgation of new protective standards. The law that tasked Cal/OSHA to develop an Indoor Heat Standard, SB 1167, stipulated an implementation date of January 1, 2019, over three years ago. The need is too urgent and getting worse, workers cannot wait this long.

On the employer side, we found that some employers seek to evade responsibility by hiding behind labor contractors.¹²⁴ When Farm Labor Contractors are issued citations they too often duck responsibility by changing their legal title, obtaining a new license, skirting insurance premiums and other costs and fines.

People typically spend forty hours per week at their workplace. If so, then they spend approximately 128 hours per week at home or in their neighborhood. A holistic view of worker health points to augmenting workplace cooling projects with those at home as well. A de-siloed holistic approach by state agencies on heat would also go a long way in protecting workers, and, in fact, all Californians. As demonstrated by the draft Extreme Heat Action Plan, the State of California's current scattershot, uncoordinated approach needlessly places lives at risk.¹²⁵

Last, we found that employers oftentimes fail to educate their workers on heat prevention strategies at the workplace. Reinforcement or evaluation of workers' understanding, and monitoring of subsequent behavior change, was rarely carried out (and not required in the regulations). Moreover, most workers lack the knowledge on how to file a complaint through Cal/OSHA.

122 State of California Senate Budget and Fiscal Review Committee. Subcommittee No.5 Agenda, by Maria Elena Durazo, Shannon Grove, Dave Cortese, and Josh Newman. Sacramento, CA: 2021. Web. https://s3.documentcloud.org/documents/20792875/02252021_sub-5-agenda-final.pdf (accessed April 15 2022).

123 Brown, Garrett. "Inside Cal/OSHA: Where the Documents Speak for Themselves..." Inside CalOSHA, accessed February 11, 2022. <https://insidecalosha.org/>.

124 Farm Worker Justice. "Subcontracted workers."

125 California Natural Resources Agency Newsroom. "California Releases Draft Extreme Heat Action Plan to Protect Communities Across the State." CNRA Newsroom, January 10, 2022. <https://resources.ca.gov/Newsroom/Page-Content/News-List/California-Releases-Draft-Extreme-Heat-Action-Plan-to-Protect-Communities-Across-the-State>.

PROTECTING INDOOR & OUTDOOR WORKERS



1. Create new insurance products for hazard pay and unworkable conditions

Working in environments of extreme heat and smoke-occluded skies takes a toll on the physical and mental health of outdoor and indoor laborers. We recommend engaging the California Department of Insurance and Workers Compensation to develop Anticipatory Parametric Insurance Coverage to offset costly impacts to workers and employers.

Parametric Insurance Coverage involves the standard premium and payout structure of traditional insurance, but bases payouts on the occurrence of pre-determined “trigger” events rather than the incurrence of a loss and submission of a claim. The existence of established indices, such as the National Weather Service’s Heat Index, Air Quality Index (AQI) and CalEPA’s Urban Heat Island Index, along with the availability of high resolution land surface temperature data captured by NASA’s ECOSTRESS satellite, supports the potential feasibility of parametric instruments for determining heat and wildfire smoke impacts on workers.

We recommend a tiered system with defined thresholds for hazard pay and exclusionary pay with employers maintaining an employee’s earnings, wages, seniority, and all other employee rights and benefits and insurance coverage for workers who are unable to work due to temperatures exceeding the threshold where heat-related deaths begin and air quality index reaches unhealthy levels of concern. In designing the insurance products, special attention should be paid to undocumented workers, who may be hesitant to participate in a state program.

2. Design and build large-scale cooling projects in the built environment

Less than 25% of a worker’s week is spent on the job site. To protect worker health, we need a holistic approach where the full lives of workers are taken into consideration. Accordingly, we recommend that cities and counties invest in the planning and implementation of cooling measures such as planting more trees, building more shaded bus stops, and creating community-serving facilities in the form of resilience hubs.

Neighborhoods that promote cooling in public spaces can offer workers a safe haven after work with access to shade and water that will provide them with the necessary measures to cool down

and breathe clean air. Secondary benefits to cool homes and communities could result in better health for family members as a whole as many workers live in crowded older buildings that lack ventilation.

3. Make the home a safe haven

The burden of extreme heat and poor quality is not limited to the workplace, but expands into the living conditions of workers. Workers often return to overheated homes that lack access to cooling solutions and place their bodies in a constant state of heat stress. The human body requires adequate time to recover from the effects of heat stress. With the rising frequency of wildfires throughout California, ash and particles from plants, vegetation, and buildings travel far distances and cause respiratory issues for workers, whether it is from pollutant exposure at work or home.¹²⁶ The prioritization of health must not just be relegated to the workspace, but to the home of the worker as well.

We recommend that the California Building Standards Commission (CBSC) and California Energy Commission (CEC) adopt minimum standards for home cooling that take into account the changing climate. Additionally, the CEC should offer a new program to retrofit non-air-conditioned low-income residential buildings to receive grants to install equipment such as heat-pumps. We also recommend that the California Air Resources Board (CARB) collaborate with employers to ensure that workers receive home air purifiers to reduce their exposure to poor air quality during wildfire season. Providing holistic care in the home and workplace can give workers some of the necessary conditions they need to thrive.

4. State agencies must coordinate their approach on extreme heat

There are an assortment of regulations in California to protect indoor and outdoor workers, yet the detrimental impact to worker health remains high. Despite over a dozen state agencies that interface with extreme heat in one way or another, extreme heat remains largely unrecognized as the deadliest climate change-induced threat to California. What makes extreme heat so pernicious are the cascading effects on infrastructure whereby a power outage results in the failure of air conditioners, fans and refrigeration. Unforeseen interruptions at home due to extreme heat can lead to absenteeism and limited productivity. It is imperative that Cal/OSHA, the agency who is primarily responsible for worker safety, collaborate with other agencies in order to systematically address worker safety in and out of the workplace.

5. Cal/OSHA must be sufficiently resourced in both funds and technical support

Funding and staffing is essential for Cal/OSHA to adequately enforce worker protection standards. Chronic understaffing has led to inspectors handling a significant backlog of cases, which keeps them inside an office and limits them from going out in the field to conduct inspections.

We recommend allocating funding to Cal/OSHA specifically for education and enforcement to deter non-compliance, and to reduce the number of workplace accidents attributed to over exposure to heat and poor air quality. New research is released weekly on how the climate is impacting human health. Some of these emerging studies could help protect California workers. Cal/OSHA staff should be familiar with environmental hazards and how heat and air quality can affect workers.

We also recommend allocating additional funding for Cal/OSHA to appoint an environmental

126 O'Dell, Katelyn, Kelsey Bilsback, Bonne Ford, Sheena E Martenies, Sheryl Magzamen, Emily V Fischer, and Jeffrey R Pierce. "Estimated Mortality and Morbidity Attributable to Smoke Plumes in the United States: Not Just a Western US Problem." *Geohealth* 5, no. 9 (2021): e2021GH000457–n/a. <https://doi.org/10.1029/2021GH000457>.

scientist to its Occupational Safety & Health Standards Board to contribute their knowledge and up to date research to better develop protections in the future.

6. Improve communication on drinking water

Heat stress is made exponentially worse when people fail to drink water. While water may be present in the workplace, we found that workers are hesitant to drink for fear of “wasting time” and failing to meet a productivity quota. Additionally, drinking water can be placed in inaccessible areas, across a field or up a set of stairs. Due to these obstacles, workers face health issues from chronic dehydration.¹²⁷

To remedy the dehydration threat, Cal/OSHA should develop an educational campaign that highlights the importance of water breaks. This would improve both worker and employer understanding of the need and impact of inadequate drinking water. In addition, on extreme heat days workers should be provided with regularly scheduled water breaks and closer access to water stations.

7. Expand independent monitoring

As highlighted throughout the report – especially the cases of Domingo Blancas and Maria Jimenez – there is a lack of a national heat standard and a widespread failure of employers to regulate their extreme heat conditions in the workplace. Laborers are not only inadequately protected by the current suite of regulations, Cal/OSHA is shorthanded, and cannot possibly witness all violations. Therefore, third party nonprofit organizations, funded by private or public means, will bring violations to the attention of Cal/OSHA or court to deter harmful labor conditions.

8. Fix Cal/OSHA's communications problem

Marginalized populations are often distrustful of authority. Accordingly, outdoor and indoor workers may be hesitant to confide in a state agency such as Cal/OSHA. Workers may also fear retaliation, including loss of employment, or even loss of residency in the United States, if an employer discovers that a worker filed a grievance. Moreover, the lack of enforcement of protections and regulations by state agencies frequently places laborers in vulnerable positions.

It is important for Cal/OSHA to build trust between the agency and workers across the state. Climate Resolve recommends that Cal/OSHA launch a communications campaign that creatively informs workers about the purpose of Cal/OSHA, their rights as workers, and the standards employers must meet in the face of extreme heat. Perhaps the campaign can be developed and delivered in partnership with trusted organizations such as California Rural Legal Assistance (CRLA), the United Farm Workers, and the Warehouse Workers Resource Center. Through the distribution of this information by trusted partners, we can promote an environment where workers look out for their health and safety without being penalized.

9. Environmental organizations must prioritize worker health and safety

Many mainline conservation organizations have done a superb job of examining the shifting impacts of climate change on wildlife and habitats. We urge them to take a closer look at how climate change impacts human communities, in addition to plant communities. Working people, who harvest our crops and ensure the prompt delivery of goods and services, are today bearing the brunt of hotter days and poor air quality. These workers are on the frontline of climate impacts

127 Nerbass, Fabiana B, et al.. “Occupational Heat Stress and Kidney Health: From Farms to Factories.” *Kidney international reports* 2, no. 6 (2017): 998–1008. <https://pubmed.ncbi.nlm.nih.gov/29270511/>.

and need the support of environmental advocates.

Moreover, after workers leave the workplace, they return to communities that often lack resources and do not have the means to adapt to extreme heat. As environmentalists develop and promote laws and regulations, it is paramount that they consider the intersection of climate change, labor, and the built environment. Environmentalists should be proactive and advocate for policies through convenings, create resources for online clearinghouses, and conduct new research on ways to better protect workers.

10. Develop a Cal/OSHA database on heat-related workplace incidents

Under state and federal law, employers have a responsibility to protect workers against illness and injury at work. Historically, these laws have gone a long way to establish protection through anticipatory thresholds and mitigation against workplace injuries and illness. Missing from these efforts is an evaluation component to show the efficacy of these evolving efforts, and to create transparency. Developing a centralized data system that is linked to a statewide heat syndromic surveillance system, like the one being developed by the California Department of Public Health (CDPH), could provide critical feedback for researchers and policymakers.

11. Improve air quality monitoring at the workplace

The Protection from Wildfire Smoke Standard mandates that employers must monitor the air quality index (AQI) for PM_{2.5} if wildfire smoke is expected to affect a worksite.¹²⁸ There are real concerns of limitations and accuracy of the current way Cal/OSHA allows worksites to monitor AQI by using websites such as the U.S. EPA AirNow website and the U.S. Forest Service Wildland Air Quality Response Program website.^{129,130}

To better protect workers, we recommend Cal/OSHA mandate the implementation of low cost PM_{2.5} sensors that count particles within a given space in real-time on a publicly available platform. To enhance local real-time PM_{2.5} monitoring, each location should install several sensors given the area of the given workplace. We recommend that these sensors supplement the existing recommendation to monitor AQI using Cal/OSHA's list of recommended websites, as these sensors can provide inaccurate readings if not properly installed or maintained. The local sensors can aid worksites to analyze real-time trends to determine how rapidly local air conditions are worsening.

12. Fund organizations to assist workers

Communicating with workers about their rights and the dangers of heat is extremely important. There are already many organizations that specialize in providing support for workers like 805 UndocuFund, Warehouse Workers Resource Center, IDEPSCA, and California Rural Legal Assistance (CRLA). The best way to facilitate communication of these important topics is for the State of California to directly fund organizations that are already known and trusted by migrant workers.

In addition to the organizations mentioned above, there are others that focus on helping indigenous speaking workers like Centro Binacional located in Fresno or Mixteco/Indigena Community Organizing Project (MICOP) in Oxnard, and Comunidades Indígenas en liderazgo (CIELO) in Los Angeles. MICOP, for example, runs Radio Indigena, which broadcasts in multiple

128 State of California. §5141.1 Protection from Wildfire Smoke. Article 107, Group 7, Subchapter 7. Sacramento, CA: 2020, https://www.dir.ca.gov/title8/5141_1.html (accessed April 15, 2022).

129 Air Now. "About AirNow." Office of Air Quality Planning and Standards, accessed April 15, 2022. <https://www.airnow.gov/>.

130 "Air Fire Tool Monitoring v4.1.1." U.S. Forest Service Wildland Air Quality Response Program, accessed April 15, 2022. https://tools.airfire.org/monitoring/v4/#!/?category=PM2.5_nowcast&erlat=42&erlon=-95&zoom=4&monitors=370670030_01.

native languages programming for workers who face language barriers and as a result tend to not have easy access to information on their rights. Some estimates say that about a third of farmworkers are from Indigenous communities¹³¹ meaning at least 165,000¹³² workers speak Mixteco, Zapoteco, or one of the dozens of native languages found in Mexico and Central America. By funding these organizations the state can improve their capacity to provide resources, assistance, and vital information on worker rights throughout the sweltering summer months.

Many organizations are already doing the work; simply speaking, more funding can facilitate better and more accessible lifesaving information for workers across the state.

SPECIFICALLY PROTECTING OUTDOOR WORKERS



13. Provide clean air refuges during a wildfire smoke events

In addition to proposed recommendations that strengthen Cal/OSHA's regulatory power, we recommend that employers perform their due diligence to identify and create temporary clean air spaces in order to reduce smoke exposure to outdoor workers. These temporary refuges would allow employers to reduce employee's smoke exposure.. These spaces are temporary structures with HEPA air filtration systems, which use a fan to force air through a fine mesh to trap wildfire particulate matter. These air cleaners can dramatically reduce indoor particle levels, in some cases by more than 90 percent.¹³³ Employers must also be aware that HEPA filters should be checked frequently and changed as needed, especially during prolonged smoke events. Employees could use these structures during work breaks to rest and reduce their exposure to wildfire smoke.

14. Make growers liable

Growers can evade responsibility for workplace violations by shielding themselves via farm labor contractors who act as brokers. In our stakeholder interviews, field experts and worker advocates noted the current system allows laborer contractors to evade Cal/OSHA compliance. When the growers do not evade compliance, current fines and penalties are miniscule. After an

131 Ullisaz, Alena and Vanessa Teran. "Not Everyone Speaks Spanish! The Need for Indigenous Language Interpreters in California's Agricultural Workforce." UC Davis Western Center for Agricultural Health and Safety, June 19, 2018.

<https://aghealth.ucdavis.edu/news/not-everyone-speaks-spanish-need-indigenous-language-interpreters-californias-agricultural>.

132 Marquez, Abraham and Zaydee Sanchez. "Unheard, Overlooked, and Exposed" USC Annenberg Center for Health Journalism, October 15, 2021. <https://centerforhealthjournalism.org/fellowships/projects/unheard-overlooked-and-exposed>.

133 California Air Resources Board. "Indoor Air Cleaners and Wildfire Smoke FAQ." State of California, accessed February 11, 2022. <https://ww2.arb.ca.gov/resources/fact-sheets/indoor-air-cleaners-and-wildfire-smoke-faq-0>.

incident, contractors may change their name and legal status to continue operating, making it harder to enforce standards. These loopholes must be closed by holding the landowners and/or growers accountable. In addition, penalties should be meaningful in order to disincentivize noncompliance.

SPECIFICALLY PROTECTING INDOOR WORKERS



15. Prioritize adoption of the Indoor Heat Illness Prevention Standard

As previously highlighted, more than four years have gone by since Cal/OSHA convened an advisory meeting to develop the Heat Illness Prevention in Indoor Places of Employment standard and more than two years have passed since the last revisions were made to the draft standard. As impacts of extreme heat and air pollution accelerate, it is imperative for Cal/OSHA to develop and enforce a standard to protect indoor workers. If adopted, this regulation would establish the state of California as a leader in protecting its vulnerable worker populations and would lead the way for other states to adopt similar regulation.

16. Update the California Building Code to protect warehouse workers

The California Building Standards Commission (CBSC) and the California Energy Commission (CEC) should update the Building Energy Efficiency Standards (Title 24) to address both energy efficiency as well as indoor air temperature. Should the Commissions fail to mandate these protections, local jurisdictions, via local building and safety departments, should develop their own more protective building codes for warehouses, and then file for exemption from the state code.

17. Update international standards to include real-time indoor temperature and humidity monitoring

As discussed throughout the report, there have been long-standing gaps in Cal/OSHA's level of enforcement due to the agency's understaffed enforcement branch. The high resource usage and low enforcement for on-site monitoring across all workplaces is not unique to California. In order to address this gap, there is an opportunity for indoor workplaces to improve their heat conditions by updating the ASHRAE/IES Energy Efficiency Standard 90.1, Energy Efficiency Standard for Buildings Except Low-Rise Residential Buildings to mandate that new buildings include real-time indoor temperature and humidity monitoring. Since the International Energy Conservation Code (IECC) adopts the latest ASHRAE/IES Energy Efficiency Standard, plus any addendums and new data, updating the ASHRAE 90.1 Standard is crucial to ensuring new buildings nationwide are equipped with technology and data that can be utilized to monitor indoor temperatures to protect workers.

This data can be used by employers to provide adequate workplace safety measures when indoor temperatures equals or exceeds the defined threshold set by regulations such as the Indoor Heat Illness Prevention Standard. This data can also be made available to workers who can take steps to limit their exposure. Lastly, this data can be used to alert Cal/OSHA if temperature and humidity data at certain workplaces exceed the defined threshold.

Cal/OSHA can leverage this data to improve levels of compliance by aligning enforcement activities with real-time data that provides visibility into site performance for regulatory compliance. Monitoring technology also removes the responsibility of the worker to file a complaint against their employer and would reduce the fear of termination.

18. Prioritize research into worker productivity and absenteeism

Excellent research has already been conducted on temperature and workplace safety. However, the impacts of climate change call for additional studies examining the effects of extreme heat on essential workers and the economic costs at the individual, corporate, and regional levels. Throughout the report, we identified several health issues that affect a workers' longevity and employment. The long-term impacts of not being able to replenish bodily fluids at work increase the risk of kidney stones and diseases. Combined with air pollution, extreme heat heightens the risk for cardiovascular and respiratory issues. As these conditions become chronic, workers are forced to take time off to recover from heat-related symptoms, seek medical attention, or visit emergency rooms. We cited how an outdoor worker loses more than \$1,700 a year due to extreme heat exposure and work stoppages.¹³⁴ A majority of indoor and outdoor workers come from vulnerable communities that are the least equipped to deal with climate change. This loss in earnings affects their ability to take care of themselves and their families.

At the business level, employers must scramble to address absenteeism and make up for any lost earnings. At the regional level, this consequence will not just be felt at only one facility, but many others. The collective impacts of lost earnings will continue to grow as extreme heat remains inadequately addressed in outdoor and indoor settings. Lack of worker health and well-being comes at a cost to businesses. Policymakers need to know the full costs.

We strongly recommend that the State of California, via the Fifth California Climate Change Assessment, fund a number of research studies that quantify the economic costs of extreme heat days on laborers, businesses, and regions.

¹³⁴ Dahl, Kristina and Rachel Licker. Too Hot To Work. Union of Concerned Scientists. 2020. https://ucsusa.org/sites/default/files/2021-08/Too%20Hot%20to%20Work_8-13.pdf.

ACKNOWLEDGMENTS

Climate Resolve wishes to thank the advocacy organizations who have won protections for California's workers.

The laws and regulations chronicled in this report would not have happened without their passion and persistence. No matter whether it concerned the working conditions of agricultural workers or that of indoor worker conditions in large multinational warehouses, worker protection laws would not have happened without grassroots activism. The thread of social justice continues to this day. There are tremendous groups working to protect vulnerable workers – we spoke to only a few – who continue the good fight. We hope this report honors their courageous work.

Climate Resolve would like to thank those organizations that contributed their insights to this report, including the Warehouse Worker Resource Center, California Rural Legal Assistance (CRLA), and United Farm Workers.

We would like to thank the following list of individuals and organizations for offering their time to contribute their observations and suggestions towards developing an equitable working environment in the midst of climate change:

- Tim Shadix, Warehouse Worker Resource Center
- Teni Adewumi-Gunn, Natural Resources Defense Council (NRDC)
- Tanya Reyes, UndocuFund
- Nancy Zuniga, Institute of Popular Education of Southern California (IDEPSCA)
- Dr. Mirella Deniz-Zaragoza, Warehouse Worker Resource Center
- Marisol Aguilar, California Rural Legal Assistance (CRLA)
- Louis Blumberg, Blumberg West Consulting
- Leydy Rangel, United Farm Workers Foundation
- Laura Tam, Resource Legacy Fund
- Kurt Shickman, Adrienne Arsht Rockefeller Foundation Resilience Center at the Atlantic Council
- Owen Gow, Adrienne Arsht Rockefeller Foundation Resilience Center at the Atlantic Council
- Kevin Riley, UCLA Labor Occupational Safety & Health
- Gary Klein, Gary Klein Associates
- Ellen Reese, University of California Riverside
- David Hornung, Cal/OSHA
- Brandon Hart, Cal/OSHA

We also recognize that there are other organizations not mentioned in this report, whose advocacy also improved the lives of workers. We see you and express our deepest admiration.

Climate Resolve would like to especially thank the Resilient Cities Catalyst and the Conrad N. Hilton Foundation in providing us with this opportunity to improve the lives of California's workers.

Last, we hope the recommendations offered in this report spur new efforts to prepare for the impacts of climate change.

TABLE 1 : LAWS AND REGULATIONS

Laws and Regulations	Year	Key Sections
§3395: Heat Illness Prevention in Outdoor Places of Employment	2006	<ul style="list-style-type: none"> • §3395(c): Access to Drinking Water • §3395(d): Access to Shade • §3395(d)(3): Cool-down Rest Period • §3395(e): High-Heat Temperature Triggers and Procedures • §3395(f): Emergency Response Procedures • §3395(g): Acclimatization • §3395(h): Training • §3395(i): Heat Illness Prevention Plan
§5141.1: Protection from Wildfire Smoke	2021	<ul style="list-style-type: none"> • §5141.1(c): Identification of harmful exposures • §5141.1(d): Communication • §5141.1(e): Training and instruction • §5141.1(f): Control of harmful exposures to employees • §5141.1(f)(3)(a): Employer provides respirators to all employees (AQI >151)
SB-606 Workplace safety: violation of statutes	2021	<ul style="list-style-type: none"> • Section 6317: Enterprise-wide citation • Section 6317.8: Egregious violation