



Climate Change Impacts Across California Workers & Employers

Other Reports in This Series



Summary

Climate change will have a number of serious impacts on California, including public health risks, damage to property and infrastructure, life-threatening events, and impaired natural resources. This report—which focuses on how a changing climate is affecting workers and employers—is one of a series summarizing how climate change will impact different sectors across California.

In this report, we discuss ways climate change impacts workers and employers. In particular, changing conditions—including more days of extreme heat and wildfire smoke—increase the likelihood of worker injuries, illnesses, and fatalities, especially for those who primarily work outdoors or indoors without adequate air conditioning or ventilation. In general, the most heavily impacted industries tend to employ mostly low- and middle-wage workers, meaning climate impacts will disproportionately affect these workers. Many workers likely also will face greater work instability, both in the short term due to extreme weather events, but also in the longer term, as some industries will need to shift operationally or geographically. Climate change will impact employers as well, including the state, as they will have to adapt to ensure worker safety and minimize losses in labor productivity. These adaptation measures will have costs for businesses and consumers, as well as for state and local governments. The state likely also will incur costs from the need to expand its workforce to respond to climate change impacts—including more firefighters and emergency responders, as well as new engineers and scientists to assess vulnerabilities and carry out the state's responses to climate risks.

Given these impacts, the Legislature may want to consider whether the state should play a more proactive role in ensuring labor standards adequately protect workers from the hazards that climate change impacts present. The Legislature also will want to evaluate which workers, industries, and regions will be disproportionately affected and how the state might want to help address those challenges. Adapting workplace practices to improve safety as well as preparing workers to respond to the economic impacts caused by climate change will be both challenging and, in many cases, costly. However, preemptive efforts that help workers and industries adapt could bring longer-term health benefits and be less economically disruptive for the state compared to if actions were not undertaken. To the degree the state will incur additional costs—such as for an expanded workforce to address climate impacts—the Legislature may want to incorporate anticipated costs into longer-term budget considerations and climate adaptation planning efforts. An additional important question for the Legislature to consider is what data the state currently has to help address climate change impacts on workers and employers, and whether it needs to collect additional information to inform its decisions.

Introduction

This report contains three primary sections: (1) the major ways climate hazards impact workers and employers, (2) significant existing state-level efforts underway to address these impacts, and (3) key questions for the Legislature to consider in response to impacts on workers and employers. Given the complexity of the issues, this report does not contain explicit recommendations or a specific path forward; rather, it is intended as a framing document to help the Legislature adopt a “climate lens” across the labor policy area.

Because some degree of climate change already is occurring and more changes are inevitable, this document focuses primarily on how the Legislature can think about *responding* to resulting impacts. Of note, the state also is engaged in numerous efforts to *limit* the degree to which climate change occurs by enacting policies and programs to reduce

emissions of greenhouse gases (such as by encouraging work equipment, vehicles, and facilities to be more fuel and energy efficient).

California Faces Five Major Climate Hazards. As discussed in depth in our companion report, *Climate Change Impacts Across California: Crosscutting Issues*, California confronts five major hazards as the result of climate change. Specifically, increasing temperatures, a changing hydrology, and rising sea levels are leading to:

- Higher average temperatures and periods of extreme heat.
- More frequent and intense droughts.
- Increased risk of floods.
- More severe wildfires.
- Coastal flooding and erosion.

Major Climate Change Impacts on Workers and Employers

Climate change is having uneven impacts across different industries, occupations, and regions in the state. Affected workers face increased occupational hazards, decreased productivity, and greater likelihood of work disruptions. The adverse effects of climate change impacts can be minimized, though not eliminated, by state and employer actions that help workers adapt safely to climate change. The state and employers likely will incur higher costs to adapt to these climate change impacts. We discuss the significant ways in which climate change affects workers, employers, and industries in further detail below.

Climate Change Impacts Increase Occupational Hazards. As summarized in **Figure 1**, the changing climate is increasing

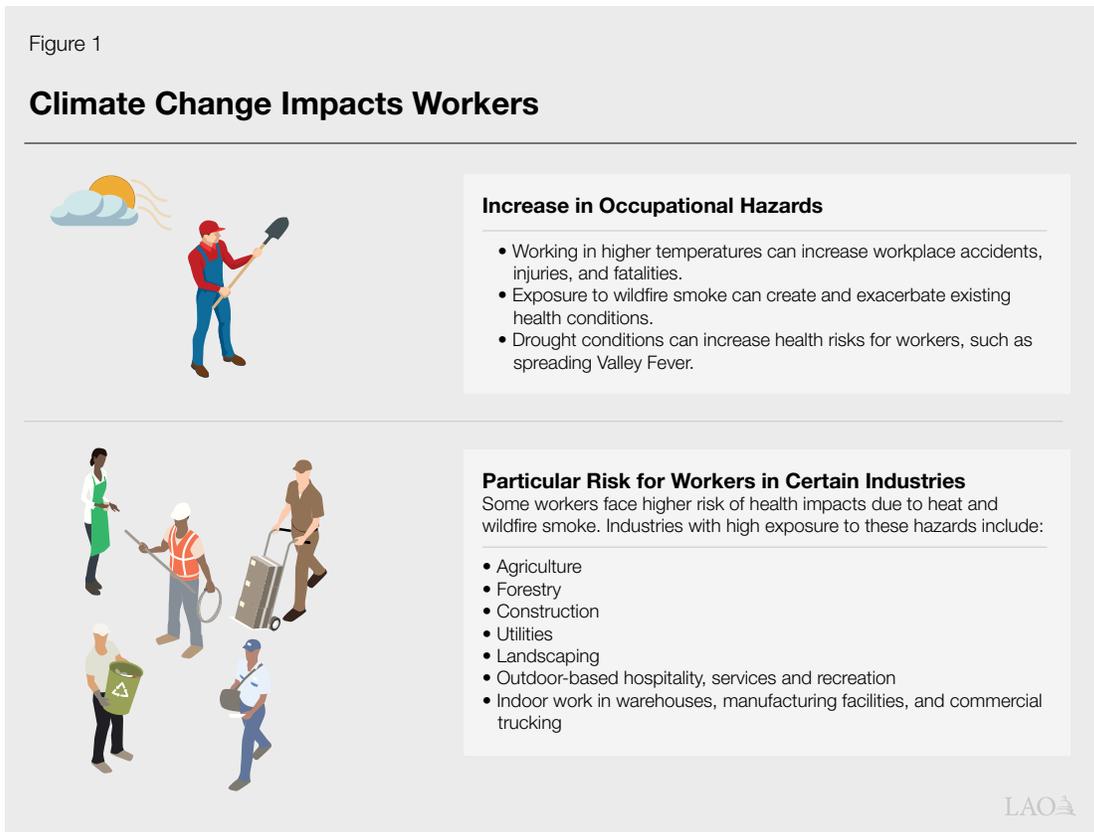
health risks for workers in certain settings—particularly for those workers who face increased exposure to heat and wildfire smoke. Working in high temperatures, for example, can result in heat stress, a condition that in severe cases has caused worker fatalities. Working outdoors in extreme temperatures also has been **shown** to increase the incidence of workplace accidents and injuries. Though outdoor workers are most at risk of illness and injuries caused by excessive heat, preliminary **research** suggests that indoor workers also can experience heat-related health impacts. Heat is particularly threatening for workers in warehouses, commercial delivery truck drivers, and workers at indoor manufacturing facilities where air conditioning is unavailable or inadequate. Additionally, conditions that expose workers to wildfire smoke—even on a short-term

basis—may cause eye and respiratory tract irritation and can aggravate pre-existing respiratory and cardiovascular disease. Furthermore, a recent [study](#) linked exposure to wildfire smoke during the 2020 fire season to increased incidence of COVID-19 infection and fatalities, suggesting smoke exposure can lead to additional health vulnerabilities. Droughts also can lead to higher occupational risk. For example, Valley Fever, a fungal infection that spreads through spores in dry soil, can more easily proliferate with a drier climate and increased dust storms, increasing potential exposure for agricultural workers, construction workers, and other outdoor-based occupations.

Climate Change Impacts Pose Particular Risks for Workers in Certain Industries.

As the climate continues to change, workers across industries will experience a range of impacts. In general, the most heavily impacted industries tend to employ predominately low- and

middle-wage workers, meaning climate impacts will disproportionately affect these workers. Specifically, workers in industries where the majority of the work occurs outdoors will be most affected based on their greater exposure to extreme heat and wildfire smoke. As highlighted in Figure 1, such industries include agricultural production, forestry, commercial and residential construction, utilities, and landscaping, as well as the outdoor-based hospitality, services, and recreation industries. As mentioned above, these industries tend to pay low- and middle-wage salaries. Specifically, median 2021 hourly pay in California for agricultural workers (\$14 per hour), forestry workers (\$15 per hour), construction workers (\$23 per hour), landscaping workers (\$15 per hour), amusement park attendants (\$15 per hour), and recreation workers (\$14 per hour) all fell below the overall statewide median hourly pay of \$23.50 per hour. More than 2 million Californians work in these jobs,



representing about 10 percent of the state's overall workforce. Furthermore, Latino workers make up a disproportionate share of the workforce in outdoor industries that face greater exposure to extreme heat and wildfire smoke. Specifically, while Latino workers represent about 38 percent of the state's overall workforce, they account for 60 percent of the workers in the outdoor industries listed above.

In Certain Regions of the State, Employees Are Disproportionately Working Outdoors.

Certain areas of the state are home to higher proportions of the industries most affected by climate change, and as such, are already disproportionately experiencing more significant impacts on employment and workers. These impacts will increase as climate change escalates. For example, some of the primary industries in the Central Valley—construction, agriculture, and landscaping—and Sierra region—logging, grounds maintenance, and tourism—are all based outdoors. As such, under a changing climate, the workers in these regions are being more frequently exposed to occupational risks. As noted next, these same Central Valley and Sierra industries—and their workers—also are more significantly impacted by increasingly frequent and intense droughts. In contrast, the leading industries in the San Francisco Bay Area—technology, information, and professional services—are primarily based indoors, leaving workers in that region comparatively more protected from heat, smoke, and variable precipitation trends. The heavily populated Southern California region is home to a mix of indoor and outdoor industries.

Workers and Operations in Impacted Industries Will Need to Adjust as Climate Shifts.

Some of the industries and regions most affected by the impacts of climate change likely will need to make long-term adjustments to remain viable. Such disruptions could have significant implications for associated workers. For instance, due to increased temperatures and

more frequent droughts, agricultural production in the Central Coast may need to **shift away** from water intensive, temperate crops to more resilient products, potentially changing planting and harvesting seasons or practices for workers. In more dramatic cases, work in affected industries and sectors could shift substantially—in many cases driving changes that require fewer workers (either due to new practices or a smaller economically viable market) or in some cases calling for a larger workforce. In each case, workers likely will need to relocate, train to adopt new industry practices, or shift to new types of work as industries adjust to climate shifts. For example, in the Central Valley, even higher temperatures and greater water limitations render drought impacts more severe than along the Central Coast. As such, sustaining existing levels and methods of agricultural operations very likely will not be operationally or economically viable there in the coming years. A significant decrease in agricultural production could have considerable employment impacts in that region, such as fewer jobs overall and unpredictable changes to the nature of remaining jobs.

Work in Some Industries May Also Become Less Stable.

In addition to operational changes, changing climate patterns and disruptions also could make work less stable and predictable for many workers. For example, extreme heat and smoke that pose risks could shorten the viable construction season or lead to intermittent work interruptions. Other extreme weather events—such as drought cycles, flooding, and wildfires—could cause work interruptions and instability in other industries as well, including tourism, recreation, agriculture, and logistics/goods movement. For example, in the coming decades, there is an increasing risk that high-tide flooding exacerbated by sea-level rise will **disrupt** port-based commerce and goods movement along the coast, inhibiting workers' abilities to perform their jobs. To a lesser extent, in some areas, increasing

lower baseline temperatures could actually lead to fewer disruptions. For example, in areas that have historically experienced snowy winter conditions, warmer temperatures might result in less snow and expand the time frame when forestry, construction, and utilities work can occur.

Extreme Weather Is Affecting Worker Productivity in Exposed Industries.

The changing climate is, in most cases, reducing worker productivity in highly exposed industries. For example, prolonged heat exposure decreases work **capacity**, because workers need more frequent breaks and to reduce their work intensity in response to higher temperatures. Reduced productivity due to prolonged heat exposure may have several consequences, including higher costs and longer time lines for construction projects or manufacturing processes. To the extent these impacts are not mitigated by new innovations or technological solutions, productivity losses generally will cause economic growth in a region to progress more slowly than if productivity remained unaffected.

Ensuring Worker Safety Under Changing Conditions Will Result in Additional Costs to Employers. As extreme weather events become more common, employers will have to implement adaptation measures to ensure worker safety and minimize the loss in labor productivity. These measures will have associated costs for businesses and consumers, as well as state and local governments. For example, employers

might need to purchase additional air filters and masks to protect workers from smoke, incur higher utility costs from an increased need for air conditioning, provide additional training to help prevent and identify heat-related illnesses, or modify facilities to accommodate periodic flooding (such as by moving sensitive equipment to higher floors). Costs to implement these measures are unknown but potentially large.

State Labor Costs to Respond to Climate Impacts Are Increasing. Direct state costs to respond to climate change have increased substantially in recent years, particularly due to wildfire-response costs. For example, annual state costs to suppress increasingly extreme and high-severity wildfires increased from \$1.9 billion in 2015-16 to \$2.9 billion in 2020-21. As wildfires and other extreme climate events become more frequent, the state likely will need to fund an expanded workforce and more worker overtime to respond to these emergencies, further increasing state costs. Moreover, to the extent that these state emergency responders face more dangerous work conditions due to more severe wildfires or floods, costs for workers' compensation and death benefits also will rise. The state also likely will incur costs from the need to expand its workforce in other areas to respond to climate change impacts—such as by hiring additional engineers and scientists to assess vulnerabilities, plan for adaptation strategies, and design and implement the state's responses to climate risks.

Significant Existing Efforts and Funding

The state has already undertaken some actions to address the climate change impacts described above, such as adopting workplace safety standards regarding extreme heat and wildfires. In this section, we provide a summary of key existing state-level efforts and funding intended to address the effects of climate change on workers and the workplace.

Cal/OSHA Adopted Heat Illness Prevention Standard in 2006. In response to several heat-related workplace fatalities in 2006, the California Division of Occupational Safety and Health (Cal/OSHA) Standards Board issued permanent workplace heat regulations—known as the Heat Illness Prevention Standard. The standard requires employers to provide drinking water and shade at outdoor workplaces during hot periods. The standard also requires employers to train supervisors and staff to identify and prevent heat illness.

Cal/OSHA Adopted Emergency Wildfire Smoke Standard in 2020. In 2020, the Cal/OSHA Standards Board adopted emergency regulations to require employers to provide N95 masks to outdoor employees for voluntary use if the Air Quality Index (AQI) for particulate matter (PM) 2.5 is greater than 150. The regulation mandates N95 mask use in the workplace when the AQI for PM 2.5 exceeds 250 unless other safety conditions are met.

Legislature Directed Cal/OSHA to Regulate Indoor Heat Exposure. Chapter 839 of 2016 (SB 1167, Mendoza) required the Cal/OSHA Standards Board to issue indoor heat illness prevention regulations by January 1, 2019. The board delayed meeting this deadline and as of this writing is still working on preparing preliminary indoor heat regulations in accordance with SB 1167.

Legislation Ensures Farmworkers' Access to Personal Protective Equipment (PPE) and Wildfire Smoke Safety Education.

Chapter 322 of 2021 (AB 73, Rivas) includes farmworkers in the definition of essential workers as it pertains to health emergencies, including during wildfire smoke events. Under this bill, farmworkers, as essential workers, must receive PPE from the state stockpile in a health emergency. In addition, this bill requires Cal/OSHA to review, update, and publish on its website its wildfire smoke training. The bill further requires employers to provide wildfire smoke training to their employees taking into account their language backgrounds and educational levels.

State Spent \$2.9 Billion on Wildfire Response in 2020-21, in Part for State Employee Costs. The California Department of Forestry and Fire Protection spent an estimated \$2.9 billion on wildfire response in 2020-21, in part to respond to some of the most destructive fires in state history. This included funding for firefighting staff, support staff, and other costs to support firefighting operations. Roughly \$600 million of these costs are anticipated to be reimbursed by the federal government.

2021-22 Budget Included \$600 Million in Regional Grants for Economic Resilience.

The 2021-22 budget included \$600 million in one-time federal American Recovery Plan Act funds for regional partnerships to plan for and implement economic transition strategies. These funds are primarily for jobs training programs in clean technology fields in response to state and federal steps to reduce greenhouse gas emissions. While specific grant requirements are not yet available as of this writing, partnerships could potentially use a portion of the grant funds to address climate impacts currently affecting workers and industries in their regions.

Key Issues for Legislative Consideration

Given the magnitude of the health, safety, and economic implications of climate change on workers and employers, the Legislature will want to consider what role the state should play in addressing these impacts. Below, we discuss several key considerations for the Legislature, including issues such as improving workplace safety in a changing climate; addressing the distributional economic impacts of climate change on workers, employers, and regions; and incorporating climate change into long-term budget considerations. We also summarize these issues in **Figure 2**.

How Can the State Help Improve Workplace Safety Under a Changing Climate? Historically, Cal/OSHA has primarily been a reactive entity, only changing workplace safety standards in response to fatal and harmful incidents that occur. Based on this practice, Cal/OSHA likely will wait until climate change impacts such as extreme heat and wildfire smoke become more prevalent before adopting additional policies to address them. The division's enforcement of workplace safety regulations is similarly reactive, mainly undertaken in response to worker complaints. While Cal/OSHA has adopted some changes to standards based on conditions the state has begun experiencing (which are highlighted above), more likely will be needed as conditions worsen.

The Legislature may want to consider whether the state should play a more proactive role in ensuring state labor standards adequately protect workers from the hazards that various climate change impacts

present. Examples of potential legislative interventions include the following:

- The Legislature could direct Cal/OSHA to conduct a vulnerability assessment of the effects of climate change on workplace safety to proactively identify how the state's standards should prepare for changing conditions and how prepared workplaces currently are to address climate change impacts.
- The Legislature also could direct the Labor and Workforce Development Agency to monitor how often the workers' compensation program is being used for heat-related injuries or illnesses to identify whether this safety issue might need more state intervention.
- Should these data suggest additional steps are merited, the Legislature could consider other mechanisms to support implementation of safety upgrades and enforcement of safety standards. For example, the state could encourage employers to implement adaptation strategies, such as installing air conditioning units and shifting work hours to cooler parts of the day. Such adaptation strategies will range in costs

Figure 2

Climate Change Impacts on Workers and Employers: Key Issues for Legislative Consideration

- ✓ How can the state help improve workplace safety under a changing climate?
- ✓ What is the role of the state in addressing impacts on workers in regions and industries most affected by climate change?
- ✓ How should the state address climate change impacts—and associated costs—for state employees?
- ✓ How do the merits of preparing for changing conditions compare with the consequences of failing to prepare?

and burden to employers and workers. For instance, shifting work hours to cooler parts of the day could provide protection from extreme heat but disrupt workers' family, education, and other schedules and obligations. The state will need to assess these types of trade-offs when considering which adaptation strategies to encourage.

- The Legislature could require Cal/OSHA to expand enforcement of safety standards by more frequently inspecting workplaces in highly impacted industries to ensure safety standards are met.

What Is the Role of the State in Addressing Impacts on Workers in Regions and Industries Most Affected by Climate Change?

In areas where a significant portion of the workforce is employed in a sector that will be highly affected by climate change, workers might need to relocate or retrain for a different type of work. In addition, some workers might face work instability, as unpredictable and changing conditions disrupt economic activity. The Legislature will want to consider which workers, industries, and regions will be disproportionately affected and how the state might want to help address those challenges. One current challenge is that the state often does not collect the data necessary to make this assessment. One option to begin addressing this problem could be to direct workforce agencies to start collecting and reporting data on utilization of workforce programs among workers in specific industries and occupations with high exposure to heat, drought, inclement weather, or other manifestations of climate change. Additional data could give the state a clearer sense of whether existing state programs, such as unemployment insurance and workforce development programs, are equipped to address the needs of workers impacted by climate change. For example, should the state target workforce development and training programs specifically to address

workers from industries and regions where climate change impacts result in significant job losses? As another example, should existing state programs that support workers account for the instability of work impacted by climate change? Given they are overrepresented in affected industries, should the state focus its efforts on addressing the anticipated impacts on lower-wage workers? What steps might be better left to employers to address, rather than the state?

How Should the State Address Climate Change Impacts—and Associated Costs—for State Employees?

As noted, the state is likely to incur higher costs for state employees to respond to wildfires and other climate impacts because more personnel will be needed to address the increasing severity of the impacts. The Legislature may want to incorporate these types of anticipated costs into its longer-term budget considerations and climate adaptation planning efforts. Are there steps the state can take to constrain such costs? Along with any actions or incentives it adopts for private employers, are there additional steps the state should take to ensure and improve upon the safety of state employees?

How Do the Merits of Preparing for Changing Conditions Compare With the Consequences of Failing to Prepare?

Adapting workplace standards and practices to improve worker safety as well as preparing workers to respond to the broader regional economic impacts caused by climate change will be both challenging and, in many cases, costly. However, preemptive efforts that help workers and industries adapt to climate change impacts could bring longer-term health benefits and be less economically disruptive for the state compared to if actions were not undertaken. For example, over time, the costs of implementing new workplace safety standards for employers could be significantly less costly than potential losses in labor productivity and worker health benefits if current practices continue

under increasingly hazardous conditions. What is the nature and magnitude of risks to workers and economic activity if significant adaptation actions are not undertaken? Are there steps the state should take—such as funding for

specific research efforts—to try to evaluate these cost-benefit trade-offs? What tools does the state have—and what information does it currently lack—to help inform its decisions around how to address climate change impacts on workers?

Conclusion

Workers and employers will increasingly experience the effects of climate change. For affected workers, climate change impacts likely will increase the risk of occupational hazards, decrease productivity, and cause work disruptions—particularly in industries where a majority of the work occurs outdoors or indoors without adequate ventilation and cooling. Moreover, adapting to changing conditions likely will lead to additional costs for employers—including the state. While these

challenges are daunting, the state can help address negative impacts by proactively and deliberately assessing, planning, and preparing for these impacts. As described above, inaction likely will have significant statewide health and economic consequences. The extent to which climate change will impact workers and employers will depend directly upon that the degree to which local governments, private businesses, and the state prepare in the coming years.

LAO Publications

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