



Climate Change Impacts Across California Housing

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 focuses on how a changing climate is affecting the housing sector and key issues the Legislature faces in responding to those impacts. This is one of a series of reports summarizing how climate change will impact different sectors across California.

In this report, we find that climate change will affect where and how new housing should be built. For example, decision makers will not be able to depend solely on historical data—such as on maps of past flooding and fire activity—when determining where to locate new housing. Instead, given increasing climate change impacts, decisions will need to incorporate information about the projected future risks of these hazards. Some existing homes and communities also will need to adapt to ensure they are adequately protected from growing climate change-driven hazards. For instance, many older homes are not elevated sufficiently to protect them from flooding and were built without features—such as air conditioning, modern insulation, and air filtration—to mitigate the effects of extreme heat or outdoor wildfire smoke. We further find that climate change is likely to put upward pressure on residential property insurance and housing costs, and to disproportionately impact low-income residents who tend to live in geographic areas and housing types (such as older housing units) that are more vulnerable to the effects of climate change.

To respond to these impacts, the Legislature may want to consider whether the state should take additional actions to influence where and how housing should be constructed and modified. Additionally, encouraging community-level mitigations, keeping the residential property insurance market healthy, and mitigating the disproportionate risks faced by low-income residents are areas where the Legislature could consider additional actions.

As the Legislature considers its preferred actions to address the impacts of climate change on housing, it will be important for it to weigh the relevant trade-offs, particularly those related to potential effects on housing affordability. Housing affordability is a serious and widespread challenge in California. While many factors have a role in driving California's high housing costs, the significant shortage of housing is the most substantial. Increased housing development is of foremost importance to address the state's housing challenges. Thus, while climate change can and will negatively impact housing in some locations, curbing housing development overall is untenable given the state's housing shortage. Instead, an increased focus on where and how new housing is built will be necessary to mitigate and adapt to the current and growing impacts of climate change.

Introduction

This report contains three primary sections: (1) the major ways climate hazards impact housing, (2) significant existing state-level efforts underway to address climate change impacts on the housing sector, and (3) key questions for the Legislature to consider in response to these impacts. 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 housing 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 is also 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 buildings to be more energy efficient). However, the state’s mitigation and adaptation policies are not necessarily mutually exclusive. For example, strategically building more dense communities can both mitigate the future effects of climate change *and* help to respond to its current impacts. This is because building dense housing—near jobs,

schools, and other community amenities that can be accessed with public transportation—can help reduce dependence on vehicles, thereby limiting greenhouse gas emissions. Additionally, if dense housing is placed strategically, it can enable the state to build more housing without having to resort to building in locations that are at the highest risk for climate change impacts such as wildfires and extreme heat.

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

Below, we discuss specific impacts these hazards will have on housing.

Major Climate Change Impacts on Housing

We expect climate change to impact housing in a variety of ways. We discuss these impacts within the broader context of the serious and widespread housing affordability challenges in California. Increased housing development is of foremost importance to address the state’s housing challenges. Moreover, responding to climate change impacts does not preclude the state from meeting its housing goals. Instead, an increased focus on where and how new housing

is built will be vital to mitigating and adapting to the current and growing impacts of climate change. As we discuss further below, climate change also will necessitate changes to existing homes and communities, affect housing costs, and have disproportionate impacts on low-income residents.

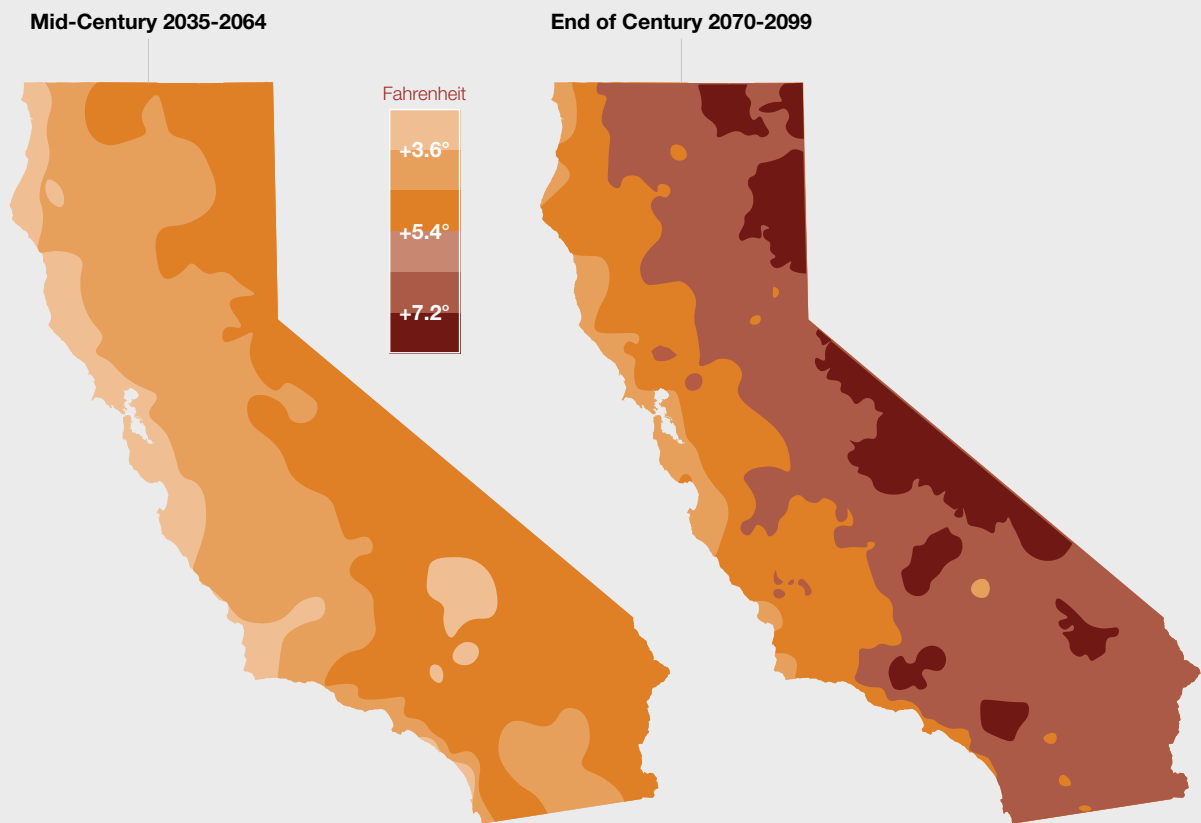
Climate Change Will Affect Where New Housing Should Be Built. In recent years, much of the new housing construction in the state

has occurred in areas that are at significant risk of the effects of climate change. For example, over the past decade, six out of ten of the state's fastest growing counties have been in the Central Valley and Inland Empire, which are regions that are a comparatively high risk of excessive heat. As shown in **Figure 1**, these areas also are anticipated to become hotter in the future. Historically, climate change has not been a major consideration in locating new housing. Increasingly, however, this will need to change, and the risks posed by a changing climate will need to be considered as a more significant factor when building new housing. Given that large parts of the

state are at risk of one or more effects of climate change and increased housing development is critical to addressing the lack of affordable housing in the state, avoiding construction of new housing in all at-risk areas likely is not feasible. However, those areas that are at highest risk may no longer be suitable for new development absent sufficient planning and mitigation. Moreover, decision makers will not be able to depend solely on historical data—such as on maps of past flooding and fire activity—when determining where to locate new housing. Instead, given increasing climate change impacts, decisions will need to incorporate information about the projected future

Figure 1

Projected Increases in Average Maximum Temperatures Are Greatest in Inland and Southern California



Reflects changes from historical baseline 30-year average maximum temperatures (1961-1990). These estimates assume the moderate climate change scenario of "RCP 4.5," in which international practices result in the rate of worldwide greenhouse gas emissions slowly declining in the coming decades.

Data from www.Cal-Adapt.org

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risks of these hazards. For some hazards, such as sea-level rise, maps showing the areas that are anticipated to be inundated under various possible future scenarios are widely available, although the time horizon for when the changes will occur is uncertain. For other hazards, such as wildfire, while maps of current risks are widely available, maps of anticipated future risks are not. This is in part because the evolution of these risks over time is complicated to model. The lack of widely available maps of the full range of future climate-driven risks makes it more difficult for decision makers to fully incorporate these risks into their planning activities. Additionally, since some communities face multiple risks from climate change, understanding how maps of future risks for individual hazards overlay to affect a community's overall risk will be important.

Climate Change Will Affect How New Housing Should Be Built. Climate change will not only affect where but also how new housing should be built. This includes both the design of individual homes as well as of communities. For example, unless new homes in areas expected to face high flood risks are elevated, they could confront a greater likelihood of inundation. Similarly, new housing that is built in areas that are expected to face high wildfire risks will encounter greater threats, particularly if they do not incorporate defensible space and home hardening approaches, such as fire-resistant siding. Additionally, new communities in these high fire-risk areas will need to be built with adequate access for evacuations. New communities will also need to be surrounded by design elements that can serve as natural fuel breaks, such as roads or greenbelts. While state requirements presently exist or are planned for the construction of new homes and communities in areas currently designated as being at high risk of wildfire or under the state's responsibility for fire protection, these requirements do not cover other areas that may become high risk in the near future. Additionally,

the state does not currently have standards for the construction of new homes that comprehensively incorporate high future risks of some other hazards, such as related to sea-level rise.

Climate Change Will Necessitate Changes to Existing Housing. When considering climate change impacts, assessing the effects on existing housing, as well as new housing, is important because many existing homes are located in areas that already are at risk. For example, about 1 million structures are located in areas that the California Department of Forestry and Fire Protection classifies as being at very high risk of wildfires. Additionally, a [recent report](#) estimated that four feet of flooding expected from sea-level rise over the next 40 to 100 years could make 13,000 existing homes in the Bay Area uninhabitable, uninsurable, or undesirable places to live. Many existing homes were built to different standards than are commonplace today, making them less resilient to the effects of climate change. For example, many older homes were built with features—such as wood shake roofs, cedar siding, or single-paned windows—that make them more vulnerable to igniting during wildfires. Additionally, many older homes are not elevated sufficiently to protect them from flooding and were built without features—such as air conditioning, modern insulation, and air filtration—to mitigate the effects of extreme heat or outdoor wildfire smoke. As climate change increases the risk of hazards such as wildfires, flooding, and extreme heat, existing homes will need to be modified to make them more resilient to these risks.

Climate Change Will Require Greater Community Coordination and Intervention to Protect Housing. Even if individual homeowners take steps to protect their properties from the effects of climate change, they still will face risks if community-level mitigations—such as levees that protect communities from inundation during high-water storm events and open spaces

that serve as fuel breaks to help safeguard fire-prone communities from wildfires—are not adequate to protect against growing threats. Community-level mitigations can be complicated to undertake because they often require significant coordination among stakeholders, lengthy planning, and substantial amounts of funding.

Climate Change Will Affect Residential Insurance Availability and Cost. Homeowners purchase insurance so that they may be compensated in the event their properties are damaged or destroyed as a result of a storm, fire, or other covered event. Climate change already has increased the frequency and severity of these risks in many parts of the state which has, in turn, had significant impacts on the insurance market. For example, insurance companies experienced historically large losses due to wildfires in 2017, 2018, 2020, and 2021. In response, insurance companies have increased rates broadly and dropped homeowners in some wildfire-prone areas. While Chapter 616 of 2018 (SB 824, Lara) protects homeowners from being dropped by their insurers for one year following a wildfire, over the longer term, homeowners in areas at high risk from wildfires may increasingly have difficulty getting and maintaining insurance. Complicating matters, California's insurance regulations limit how rates are set and specify many aspects of insurance coverage. For example, rates are based on historical losses and cannot integrate models that estimate how climate change could increase some catastrophic risks in the near future. While several insurance companies voluntarily offer discounts to homeowners who have modified their homes to make them less vulnerable to igniting during wildfires, such as by maintaining defensible space, the state's current rate setting rules do not address how mitigation measures that reduce risk should be considered. (We note that the Department of Insurance recently has proposed a new regulation that would require insurance companies to consider specified

individual and community mitigations in their rate setting.) Even with appropriate mitigations, there may be increasing numbers of structures lost to natural disasters—such as wildfires and floods—as a result of climate change. This likely will put continued upward pressure on residential property insurance rates and make insurance more difficult to obtain in a greater number of areas.

Climate Change Will Put Upward Pressure on Housing Costs. Housing in California is already very expensive, primarily because there is not enough to meet demand. Many of the key ways that climate change will affect housing discussed above also could further increase housing costs. These effects likely will vary geographically based on climate change impacts. For example, the need to modify and maintain existing homes and higher insurance premiums will directly increase the costs of homeownership. This could be of particular concern to the extent it reduces the availability of less expensive housing. Additionally, climate change could impede housing supply, particularly in the short term. For example, the state's potential housing supply will be reduced to the degree climate change risks limit development in some areas, although building more densely in strategic locations would mitigate this impact. Additionally, supply will be impacted—at least in the near term—if a large number of structures are destroyed by wildfire, flooding, or other hazards. To the extent that climate change keeps the supply of housing lower than it otherwise would be, this will put upward pressure on housing costs, exacerbating the state's housing affordability challenges.

Climate Change Will Have Disproportionate Housing Impacts on Lower-Income Residents. The scale of climate change impacts on housing will vary geographically and across housing types. In many cases, impacts will be felt most acutely by low-income households who disproportionately live in (1) areas of the state that will be exposed to higher risks and

(2) types of housing that are typically less resilient. For example, many inland areas that tend to be at increased risk of extreme heat also are home to higher proportions of low-income households. Low-income households also are more likely to live in communities that face greater climate impacts related to historical discriminatory housing policies. Specifically, recent research suggests that communities the federal government designated in the 1930s as “hazardous” for real estate investment through a process known as redlining tend to experience **hotter temperatures** and more **flood risk** than other areas. In addition, these areas often have fewer parks and trees and more paved surfaces that radiate heat. Similarly, rural communities that are dependent on wells and less sophisticated water systems have experienced or are at greater risk of experiencing water shortages due to droughts. These communities tend to be home to large proportions of lower-income households, due in part to historical housing discrimination practices that restricted which racial groups could live and purchase homes in the communities that contained larger and more developed water systems.

Low-income residents also are more likely to live in older housing that requires modifications to adapt to increased risks. For example, low-income households are less likely to live in homes with central air conditioning than are higher-income households, and may also find it challenging to pay for electricity to run the systems they have. Notably, low-income residents also are

more likely to live in rental housing, and thus more likely to be reliant on landlords to conduct modifications to their homes to mitigate the effects of climate change. While current state regulations require that landlords provide their tenants with heating facilities to maintain a minimum temperature of 70 degrees, there is no comparable requirement for cooling mechanisms to avoid exceeding any maximum threshold.

Climate Change Will Further Affect State Costs Related to Housing. Private parties, such as homeowners and renters, likely will bear many of the costs that climate change imposes on housing. However, there also likely will be some additional increased state costs. For example, the state likely will continue to face growing costs associated with protecting communities from climate-fueled disasters, such as wildfires, and helping to rebuild communities that are affected. Illustrating this example, the costs to the state General Fund of providing fire protection have increased substantially in recent years—growing from roughly \$750 million in 2005-06 to about \$2.9 billion in 2020-21. Additionally, state costs associated with removing debris—such as the remains of homes—from the 2020 fires are estimated at roughly \$700 million. Furthermore, because the state helps fund affordable housing, to the degree construction costs are higher to protect against climate change impacts, this also would reduce the number of units the state could fund with a given amount of funding.

Significant Existing Efforts and Funding

The state has undertaken various efforts aimed at making housing more resilient to the impacts of climate change, such as through encouraging more robust local planning and imposing certain requirements on new construction. We describe some of these efforts below.

Safety Elements of Local General Plans. Chapter 608 of 2015 (SB 379, Jackson) requires that climate change adaptation and resilience be addressed in the safety elements of all general plans in California. Additionally, Chapter 202 of 2019 (SB 99, Nielsen) and Chapter 681 of 2019 (AB 747, Levine) require that safety elements identify evacuation routes.

California Green Building Standards Code (CALGreen). Among other components, the CALGreen state-mandated building code includes requirements that new and certain retrofitted homes meet higher water efficiency standards for their outdoor landscapes. The CALGreen codes also include measures related to heat reduction for new and retrofitted homes, but they are voluntary, not mandatory.

Update to Fire Hazard Planning Technical Advisory. Undertaken by the Governor's Office of Planning and Research (OPR), as required by Chapter 626 of 2018 (SB 901, Dodd) and Chapter 641 of 2018 (AB 2911, Friedman), this effort is intended to assist local governments develop effective policies, codes, standards, and programs aimed at mitigating fire hazards.

Minimum Fire Safe Regulations. These regulations include requirements for Very High Fire Hazard Severity Zones and the State Responsibility Area, such as for ingress/egress, signage, and fuel reduction.

Wildfire Mitigation Partnership and Safer From Wildfires Framework. The Department of Insurance, working with other state agencies and stakeholders, has developed a list of specific mitigations for existing homes and communities in order to help homeowners reduce their individual risk. The Insurance Commissioner proposed a regulation in February 2022 that would require insurance companies to incorporate these mitigations in their rate setting, to provide information about wildfire risk to homeowners, and to create a process through which homeowners may correct or appeal the insurers' assessment of this risk.

Regional Housing Needs Assessment (RHNA) Reform Study. Chapter 159 of 2019 (AB 101, Committee on Budget) requires the Department of Housing and Community Development (HCD), in collaboration with OPR,

to develop recommendations for an improved regional housing needs allocation process. While not explicitly required, these recommendations could potentially include greater attention to climate change impacts during the RHNA process, among other considerations.

Moratorium on Non-Renewals of Homeowner's Insurance. Chapter 616 of 2018 (SB 824, Lara) prevents insurers from cancelling or refusing to renew a homeowner's insurance policy based solely on the fact that the insured structure is located in an area in which a wildfire has occurred for one year after the declaration of a wildfire state of emergency.

Funding for Regional Planning. The 2021-22 budget package included funding for regional efforts that could help communities plan for and help mitigate the impacts of climate change on housing. This included \$275 million across three years for OPR to administer climate adaptation planning and implementation grants for local governments and regional partnerships. The budget also provided \$600 million in one-time funds for HCD to administer planning and implementation grants to regional entities for activities targeted towards the state's climate goals and reducing vehicle miles traveled, such as infill developments.

Weatherization Programs for Low-Income Californians. The Department of Community Services and Development administers the federal Weatherization Assistance Program (WAP) and the state Low-Income Weatherization Program (LIWP). Both programs help reduce energy usage and costs and help regulate temperatures in homes by providing energy efficiency upgrades for eligible low-income households. LIWP also funds solar panel installations, and focuses on energy efficiency and renewable energy for farmworker housing and multifamily affordable housing in addition to single-family housing.

The state budget has provided \$227 million from the Greenhouse Gas Reduction Fund for LIWP since 2014, and the 2021-22 budget package committed an additional \$75 million

total from the General Fund through 2024 (with \$25 million in 2021-22 dedicated exclusively to the farmworker housing component). Federal funding for WAP in 2020-21 was around \$8.3 million.

Key Issues for Legislative Consideration

Traditionally, cities and counties have made most of the decisions about housing in their communities. However, given the potentially severe and widespread effects of climate change on the housing sector, the Legislature may want to consider whether the state should take additional actions to mitigate these effects. Below, we provide several key questions for the Legislature to consider regarding its role in influencing where and how housing should be constructed and modified, encouraging community-level mitigations, addressing the effects of climate change on the residential insurance market, and mitigating the disproportionate climate change risks faced by low-income residents. We also summarize these issues in **Figure 2**. Given the magnitude of climate change's impact on housing, the Legislature likely will need to take a comprehensive approach that addresses the problem from multiple angles, while also keeping in mind the importance of promoting housing affordability.

What Role Should the State Play in Influencing Where New Homes Are Built? Cities and counties generally decide when, where, and to what extent housing can be built within their jurisdictions. As climate risks increase, the Legislature could consider whether to make changes to the existing processes for planning for new housing to more fully and consistently

consider those risks. These changes could address various components of the housing planning and building process:

- ***Determining Statewide Housing Needs.*** The Legislature could consider whether the state should make changes to the [RHNA](#) process to ensure that climate change is considered when existing and projected housing needs are allocated to cities and counties. These changes could include determining whether state-level population estimates should incorporate climate-related migration effects.
- ***Requirements for General Plans.*** The Legislature could consider whether to require local governments to more fully consider climate change impacts in the housing elements of their general plans, such as by ensuring that they comprehensively integrate

Figure 2

Climate Change Impacts on Housing: Key Issues for Legislative Consideration

- ✓ What role should the state play in influencing where new homes are built?
- ✓ What steps should the state take to influence how new homes are built?
- ✓ What should the state's role be in helping mitigate risks to existing housing?
- ✓ What should the state's role be in encouraging community-level efforts to mitigate climate change impacts on housing?
- ✓ What actions should the state take to respond to climate change impacts on the residential insurance market?
- ✓ How should the state address disproportionate risks and costs faced by low-income residents?

disaster risk. (Under existing state law, cities and counties must consider disaster risk when they create the safety element of their general plans, but not the housing element.) For example, local governments could be required to implement adaptation measures like requiring land to be set aside surrounding developments for uses that can serve as natural fuel breaks to help reduce the fire risk to those developments.

- **Affordable Housing Construction.**

The Legislature could consider whether additional risk factors should help guide where state-funded affordable housing is built, given the amount of state investment involved and the vulnerable communities it serves.

As it considers these questions, the Legislature will face difficult choices about how to balance the trade-offs of potentially limiting construction of new homes in the riskiest areas against other competing priorities, such as ensuring adequate housing is built across the state, housing affordability concerns, and preserving local control.

What Steps Should the State Take to Influence How New Homes Are Built?

Typically, building new homes to be resilient to climate change is more cost-effective than modifying existing homes later. Accordingly, the Legislature could consider how it can encourage new homes to be built with climate resilience in mind, when feasible. The state imposes certain requirements for how housing must be built through the adoption of statewide building codes, which local governments can then strengthen based on their own priorities. The Legislature may want to consider whether the state should set new or different requirements for how homes are to be built. For example, this could include strengthened or broadened requirements for fire-resistant home exteriors.

What Should the State's Role Be in Helping Mitigate Risks to Existing Housing?

Mitigating risks to housing is largely a property owner's responsibility, but in certain cases the Legislature may want to consider encouraging and/or supporting these efforts. Specifically, the Legislature could consider taking actions to require or incentivize property owners to undertake modifications to existing houses and apartments. For example, the Legislature could require property owners to undertake specific mitigations when properties are sold or undergo major renovations, such as attic insulation to better moderate heat. The Legislature also could consider whether to provide targeted financial assistance in some cases. This could include support for homeowners who have limited financial resources, for publicly supported affordable housing, or when the inaction of homeowners can impose significant costs on others. For example, as we discuss in our recent report, [*Reducing the Destructiveness of Wildfires: Promoting Defensible Space in California*](#), one argument for providing state support for maintaining defensible space is that when homeowners fail to do so, it could increase the risk that nearby homes will ignite, thus imposing costs on the broader community and state. The Legislature also may want to consider whether different approaches are needed to mitigate risks to rental housing, since landlords may not be fully incentivized to modify their properties for climate change impacts such as heat and wildfire smoke, when their tenants—and not the property itself—will bear many of the associated costs.

What Should the State's Role Be in Encouraging Community-Level Efforts to Mitigate Climate Change Impacts on Housing?

The Legislature also will want to consider the appropriate role for the state in supporting community-level mitigations. There may be certain targeted areas where providing some financial support for these activities has

merit, such as providing “seed money” to help spur local adaptation project planning efforts. (As discussed above, the 2021-22 budget package included funding through both HCD and OPR for regional planning activities.) Besides providing financial support, the state also could encourage community-level efforts through other actions, such as facilitating coordination among relevant entities and by collecting and disseminating information.

What Actions Should the State Take to Respond to Climate Change Impacts on the Residential Insurance Market? The state will need to grapple with how to address the impacts of climate change on the insurance market. As it does so, the Legislature will need to weigh conflicting goals, such as promoting the availability and affordability of insurance while also aligning the incentives for homeowners to consider disaster risks in their housing decisions. Some key questions for the Legislature to consider include (1) to what extent homeowners in lower-risk areas should be required to subsidize homeowners in higher-risk areas; (2) whether and to what extent the state should use insurance to influence

private actions, such as through linking home modifications more closely to rates; (3) whether rules governing insurance rates and coverage should be different for new homes versus existing ones; and (4) whether insurance companies should be allowed to consider factors such as modeling of future climate risk in setting their rates.

How Should the State Address Disproportionate Risks and Costs Faced by Low-Income Residents? The Legislature may want to consider how the state could address the unequal effects that climate change is likely to have on certain groups' housing, such as low-income households. Since past government actions—such as redlining—have exacerbated the disproportionate risks that some communities face and they may have fewer resources upon which to draw, the Legislature may want to consider whether the state should take actions such as targeting assistance to certain neighborhoods. Additionally, the state could explore opportunities to incentivize landlords to modify their rental properties to mitigate the effects of heat and wildfire smoke on their tenants.

Conclusion

Climate change will have significant and growing effects on the housing sector. In order to lessen these effects, climate change will need to be a more central consideration in future housing-related policy and planning decisions. The state can build off of its existing efforts by taking additional steps to increase the resilience of new and existing homes and communities, protect the health of the residential insurance

market, and address the disproportionate risks faced by low-income residents. Notably, while taking such additional steps will be important to mitigating the effects of climate change, they will come with trade-offs. Accordingly, it will be important for the state to consider these trade-offs, including ensuring that impacts on housing supply and affordability are appropriately considered as part of any actions.

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This report was prepared by Lourdes Morales, Helen Kerstein, and Brian Weatherford, and reviewed by Rachel Ehlers and Carolyn Chu. The Legislative Analyst's Office (LAO) is a nonpartisan office that provides fiscal and policy information and advice to the Legislature.

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