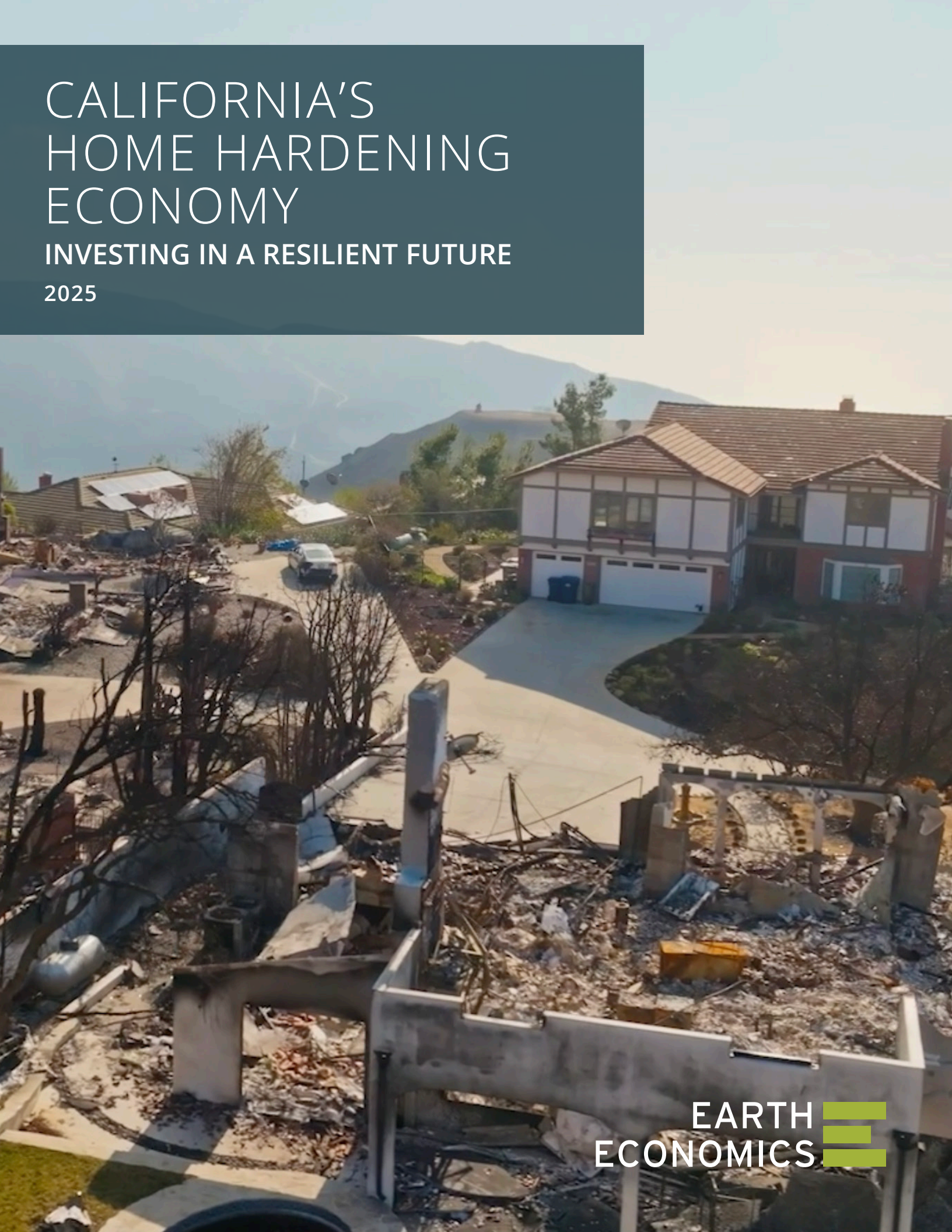
CALIFORNIA'S HOME HARDENING ECONOMY

INVESTING IN A RESILIENT FUTURE

2025



EARTH ECONOMICS

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Earth Economics acknowledges that we operate on the lands of the Coast Salish peoples, specifically the ancestral homelands of the Puyallup Tribe of Indians, and the 1854 Medicine Creek Treaty.

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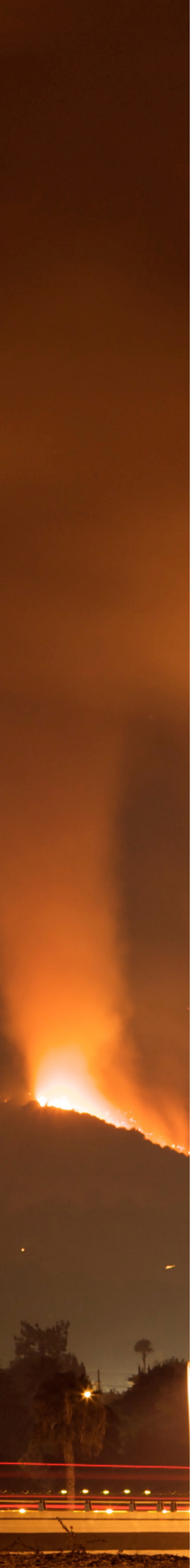
EARTH ECONOMICS



EXECUTIVE SUMMARY

Home loss from wildfires is escalating in California as more people are living in fire-prone wildlands while climate change increases extreme fire weather. Home hardening is a critical way to protect structures from igniting during wildfires. Wildfire home hardening is the process of retrofitting the exterior of homes and altering their immediate surroundings to increase resilience to embers, flames, and radiant heat.

Most home loss during wildfires (60-90%) is caused by wind-blown embers that travel ahead of the fire, rather than the flaming front of a wildfire. Home hardening retrofits include modifications to homes such as installing fire-resistant roofing, fine-mesh screens on exterior vents, flashings, and caulking on home exteriors to prevent embers from entering homes. Home hardening also involves keeping the first five feet from the home—Zone 0—clear of combustible materials to prevent flames close to the home. Home hardening can be done at various levels and prices that confer different amounts of protection, including low-cost, high-benefit retrofits like installing fine-mesh screens.

Home hardening is required under California law for new home construction in fire-prone areas. For existing homes, some home hardening requirements are in place and more are underway. For example, homeowners replacing roofs must use fire-resistant class materials (Class A roof coverings like asphalt shingles, tile or cement shingles, or metal panels). California is currently developing requirements for "Zone 0" home hardening work that is targeted to be completed by the end of 2025.

Investments in home hardening retrofits are important to increase community resilience and mitigate post-disaster expenses. However, little information is available on how these home hardening investments will support local and state economic development. This report explores how investments in home hardening for existing homes can support jobs, economic activity, and tax revenues. Understanding the potential magnitude of investment required for home hardening and its economic benefits will support decision-makers in their resilience spending priorities.

This report finds that each dollar invested in retrofitting homes ripples throughout the economy and returns about $1.70 in total economic activity. Hardening a single-family home in California can cost between $2,000 and $87,000, depending on the level of hardening. The low estimate represents minimal standards for home hardening while the high estimate includes all major renovations such as full roof, siding, and deck replacements.

In early 2025, 32 million acres of land were categorized as Fire Hazard Severity Zones, containing about 620,000 to 770,000 single-family homes.[1] Depending on the level of hardening pursued by homeowners, direct expenditures to harden these homes can range from $1.2 billion to $67 billion. **For comparison, the losses associated with the 2025 Palisades and Eaton fires are estimated to be upwards of $76 billion to $131 billion.** If these homes were moderately hardened,[2] it could cost upwards of $16 billion to $20 billion. **These direct expenditures would support between 74,000 to 92,500 jobs, bolster economic growth by $10.3 billion to $13 billion, add $21 billion to $26.5 billion in economic activity, and increase current tax bases upwards of $593 million to $742 million in local and state taxes and $1.4 billion to $1.7 billion in federal taxes.**

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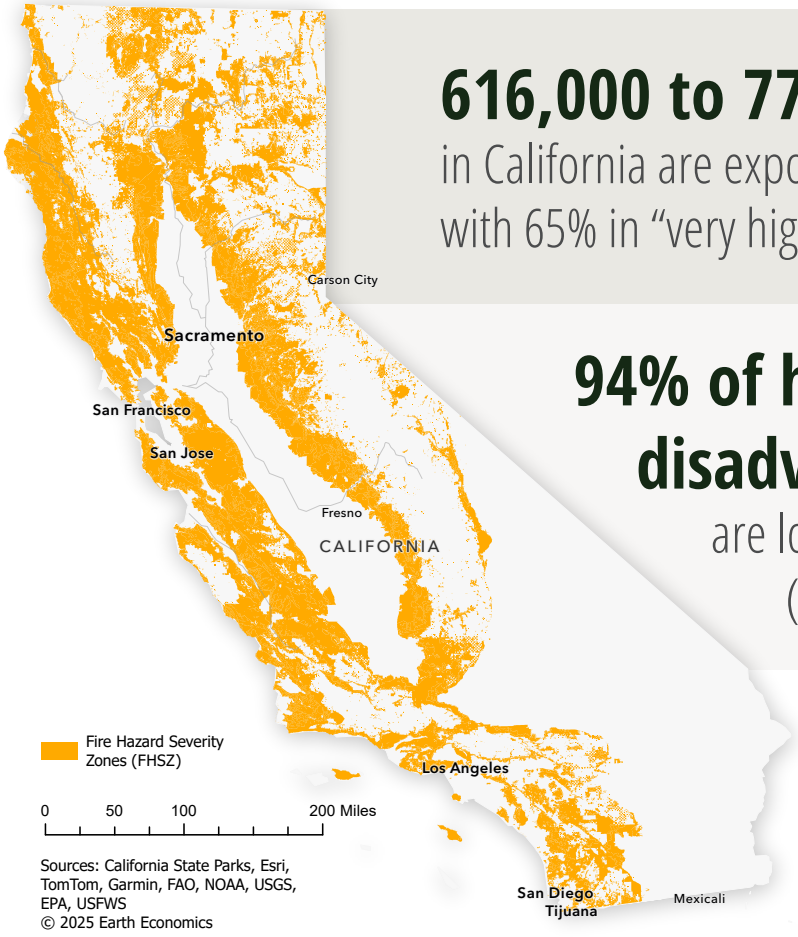
1 The Fire Hazard Severity Zones were updated in March 2025. This analysis is based on Calfire's previous definition of the zones.

2 Defined as better hardening, low cost scenario in the methodology.

THE COST OF PROTECTING HOMES FROM WILDFIRES



616,000 to 771,000 homes

in California are exposed to potential wildfires, with 65% in "very high" fire hazard zones.

94% of homes at risk to wildfires in disadvantaged communities

are located in "very high" fire hazard zones (2,500 to 2,800 homes)

EVERY $1 SPENT

on home hardening for protection

WOULD RETURN $1.66 TO $1.73

in economic activity in the state

GOOD HARDENING

Low-cost, high-benefit retrofits, focused on ember resistance

AVERAGE COST

Per home: **$12,500**
To harden all homes in FHSZ: **$9.6 billion**

JOBS SUPPORTED

9,100 to 123,300

STATE & LOCAL TAX REVENUE

$63 million to $1 billion

TOTAL ECONOMIC ACTIVITY

$2.1 billion to $30.7 billion

BETTER HARDENING

Major renovations with less costly ember and flame resistant material options, provide protection from embers, direct flames, and radiant heat.

AVERAGE COST

Per home: **$48,500**
To harden all homes in FHSZ: **$35.5 billion**

JOBS SUPPORTED

74,000 to 254,300

STATE & LOCAL TAX REVENUE

$593 million to $2.2 billion

TOTAL ECONOMIC ACTIVITY

$21.3 billion to $78.5 billion

BEST HARDENING

Major renovations with an emphasis on using the most resistant construction strategies and the use of non-combustible materials, provide protection from embers, direct flames, and radiant heat.

AVERAGE COST

Per home: **$70,500**
To harden all homes in FHSZ: **$50.3 billion**

JOBS SUPPORTED

240,000 to 493,100

STATE & LOCAL TAX REVENUE

$1.9 billion to $3.9 billion

TOTAL ECONOMIC ACTIVITY

$57.5 billion to $116.4 billion

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INTRODUCTION

Fire is a natural, recurring, and necessary process for ecosystems across California (CalWild, 2025). California can adapt to fire by implementing effective wildfire mitigation strategies that reduce the potential for loss of life and property. California home losses during wildfires have escalated in recent years due to a combination of factors, including urban sprawl, which has placed more homes and people at risk, effectively compounding wildfire losses (Cal Wild, 2025). Furthermore, climate change is lengthening the fire season and increasing the likelihood and severity of extreme fire weather—periods of hot, dry, windy conditions—priming fires to spread while creating fire suppression difficulties (Goss et al., 2020; Zhuang et al, 2021; Hawkins et al., 2022). As a result, recorded wildfires have become larger and more destructive with 19 of the 20 largest and 18 of the 20 most destructive wildfires occurring since the year 2000 (Cal Fire, 2025). The recent 2025 Palisades and Eaton fires in Los Angeles highlight this upward trend, with estimated damages ranging between $76 billion to $131 billion (Li & Wu, 2025).

In the face of growing wildfire risk, increased investments in wildfire home hardening can be an effective way to protect homes and communities during such events. Home hardening existing structures is the process of retrofitting a home's exterior with non-combustible materials and altering its nearby landscape to make it more resistant to embers, flames, and radiant heat. Most home ignitions (60 to 90 percent) are caused by embers where small pieces of burning materials are blown by the wind and enter homes or accumulate on home exteriors (Restaino et al., 2020). Home hardening retrofits include installing fire-resistant roofing, metal eave and foundation vents, metal flashings at roof-to-wall intersections, and caulking gaps in the home's exterior to prevent embers from entering. Near-home landscaping strategies involve keeping the first five feet of the home clear of combustible materials, including removing overhanging vegetation and replacing combustible fencing and decking with fire-resistant materials. Research and post-fire analysis have shown that home hardening strategies can reduce the probability of home ignitions and prevent property losses (Knapp et al., 2021; Syphard & Keeley, 2019; Maranghides et al., 2022). Preventing individual home ignitions interrupts the cascading disaster sequence, effectively reducing the likelihood of structure-to-structure fire spread and mitigating community-wide losses.

Hardening existing homes can be achieved at a range of levels and costs. For example, some homes may only need to replace vent screening, while others may require new roofing with non-combustible materials costing upwards of tens of thousands of dollars. There are many low-cost, high-benefit hardening strategies, such as simple but effective retrofits like installing metal vents, placing metal flashing along deck-to-wall intersections, and removing near-home debris (Barret & Quarles, 2024). Full retrofits, which include replacing major home features such as roofing, siding, and windows, are substantially more costly. Achieving the highest level of wildfire protection could cost upwards of $100,000 per home (Barret & Quarles, 2024).

Due to home hardening's importance for community fire safety, California State law requires new home construction in fire-prone areas to use hardened materials. Existing homes in fire-prone areas were not built to such standards. Although some hardening requirements are already in place, they do not call for immediate retrofit investments. For example, homeowners who need to replace a roof as part of typical home maintenance must use fire-resistant class materials, such as Class A roof coverings like asphalt shingles, tile or cement shingles, or metal panels.

Assistance programs for pre-disaster resilience strategies, such as FEMA's Hazard Mitigation Assistance grants or California's Wildfire Mitigation Program, provide some limited financial support to homeowners for home hardening. These programs, however, are not sufficient to support hardening throughout the state at scale. Broader incentive programs, such as those that support earthquake retrofitting and clean energy investments, could be offered to incentivize home hardening and increase community resilience state-wide.

Many of the benefits of home hardening are well known, such as resiliency benefits and mitigation of post-disaster recovery expenditures. However, there is still little information available regarding how home hardening investments can support economic outcomes. This report aims to provide baseline research by exploring how direct investments in hardening retrofits for homes within fire hazard zones can ripple throughout California's economy. Key metrics include the potential number of jobs supported, total economic activity, tax revenues, and return on investment. Furthermore, the report highlights current data limitations and potential future research opportunities to advance research. Understanding the economic benefits of home hardening can support decision-makers in developing their spending priorities to further increase the adaptability and resiliency of communities.

HOME HARDENING

Wildfire home hardening refers to improving a home's resistance to ignition from direct flame contact, radiant heat, or embers. Californian homes are typically constructed with combustible materials including wood, plastics, or fiberglass that ignite when exposed to heat or embers. Home hardening approaches range from altering the home's exterior, managing debris on home features, to near-home landscaping. For example, homeowners could replace wooden siding with non-combustible fiber-cement siding and exterior vents with finer mesh material to prevent embers from igniting the house.

Embers account for 60-90 percent of all home losses from fire (Restaino et al., 2020). Approaching wildfires carry embers through the air and onto roofs or decks, where they smolder until ignition occurs. Embers can also ignite homes when they enter vulnerable areas of homes such as attics or crawl spaces through vents. Other factors that contribute to wildfire home losses include community defensible spaces, near-home landscaping, and home density.

California's Department of Housing and Community Development Chapter 7A (2008) requires that all new home construction within wildfire hazard zones use hardened materials. Chapter 7A defines the minimum standards for appropriate hardening materials for vulnerable exterior home features. Vulnerable features are categorized into six groups including roofing, vents, exterior walls, under-eave areas, windows and doors, and decking. These standards do not apply to older homes already built within fire hazard zones. Owners of homes built before 2008 are not required to comply with Chapter 7A requirements or replace existing home features with hardened materials. However, it is critical that these homeowners voluntarily adopt the standards to prevent broader community losses from wildfire.

Approaches to hardening can vary, and homeowners have a range of hardening actions. For example, a homeowner may choose to harden only select home features or they may decide to use a more complete approach. Some homeowners may also opt to complete simple hardening retrofits themselves instead of hiring a contractor. Home hardening may also financially benefit homeowners. California Code of Regulations Section 2644.9 'Mitigation in Rating Plans and Wildfire Risk Models' is designed to reduce insurance costs for policyholders who take measures to protect their properties from wildfire risk.

COST OF RETROFITTING HOMES IN CALIFORNIA

There is limited research on retrofitting existing homes in California with hardening materials, especially in terms of total costs. This report builds on research completed by Headwaters Economics on the cost of retrofitting an average home within California titled, "Retrofitting a Home for Wildfire Resilience: Costs and Considerations." In this report, the authors created an average prototypical home for the state defined as a 2,000 square foot two-story single-family home with a footprint of 25 feet by 40 feet, or 1,000 square feet, accompanied by a 100 square foot attached deck. Using this prototypical home and Chapter 7A hardening requirements, Headwaters Economics estimated the cost to retrofit a home within California to three hardening levels: good, better, and best scenarios.

The good scenario represents minimal home alterations, better includes more extensive material replacements, and best assumes all major renovations. Materials required to be replaced to accommodate each scenario are defined by the authors. For a complete list of home hardening materials per scenario, please refer to the Appendix. They report that the cost to harden a single home can range from $2,000 to upwards of $100,000 depending on the hardening scenario and materials used. This analysis uses Headwater Economics' prototypical home, hardening scenarios, and material costs to estimate the potential economic impacts of home hardening within California.

ECONOMIC IMPACT ANALYSIS

This report analyzes the economic impact of investing in home hardening at the state level. Economic impact analyses model how spending in one industry ripples throughout a local economy. Input-output (IO) models help to estimate the scale of employment, wages, and taxes that each sector supports for a given level of expenditures. IO models draw on empirical data to capture the economic linkages between industries. This analysis utilizes the industry-standard IO platform, IMPLAN, which estimates the effect of expenditures on multiple economic factors. Apart from tax revenues, IMPLAN categorizes each factor as either a direct or a secondary effect. Direct effects measure the economic activity of industries directly supported by spending on goods and services (e.g. contractor services). Secondary economic effects reflect how businesses in the local economy respond to that demand and are categorized as either indirect or induced effects.

Indirect effects are the business-to-business impacts that are spurred from purchases of goods or services. For example, when contractors make purchases from local hardware stores, that increased spending drives demand for wholesalers of manufacturers of those products. In other words, construction material sellers and their suppliers indirectly benefit from home hardening investments. Induced effects are driven by employee spending from industries directly and indirectly affected by hardening expenditures. For example, the local economy benefits when a contractor employee spends their paycheck on rent and groceries locally. Depending on the internal connectivity of the local economy, induced effects can recirculate multiple times.

METHODOLOGY

Estimating the economic impacts related to various levels of wildfire home hardening within California requires bringing together multiple methods and data sources. Steps include identifying homes at risk, defining prototypical homes, compiling strategies and costs for hardening, and extracting IMPLAN data. This section provides a high-level overview of the methods applied to estimate the economic impacts of potential home hardening within the state.

Identifying Homes at Risk

Statewide Fire Hazard Severity Zones (FHSZ), delineated by California's Department of Forestry and Fire Protection (2024), identify areas exposed to potential wildfire events. These zones include moderate, high, and very high levels of wildfire exposure. This analysis considered all zones to identify homes vulnerable to wildfire. The study maps FHSZ and other spatial data described below with Esri's ArcGIS Pro.

After identifying wildfire zones, the spatial analysis incorporates Microsoft's (2023) nationwide building footprint data to identify building locations and footprint extents. In this layer, buildings are defined as any structure including detached garages, sheds, single-family homes, multi-family homes, and commercial buildings. This data is "clipped" by overlaying the FHSZ data. The map output includes all buildings vulnerable to wildfire throughout the state. California state zoning data are spatially joined to the vulnerable building footprints dataset.

ECONOMIC EFFECTS DEFINED

TOTAL ECONOMIC OUTPUT is the value of all sales in industries directly and indirectly supported by the initial expenditures. It can be useful for understanding the size of one sector relative to others. Comparing total expenditures for home hardening against total economic output reveals the magnitude of economic activity generated for every dollar spent—known as the multiplier effect.

VALUE ADDED TO GDP is calculated by subtracting the value of intermediate inputs (e.g. raw materials, business-to-business services) from the total economic output. It reflects the additional value created by the initial expenditures to the economy.

EMPLOYMENT is supported by home retrofit spending for contractor services. Initial expenditure also indirectly supports employment in connected industries (e.g. local hardware stores, wholesalers, and manufactures) as well as industries serving their workers (e.g. grocers, real estate, medicine).

WAGES are paid to contractor employees, but also those working in connected industries, as well as those which offer services to those workers.

TAX REVENUE is generated from initial and subsequent expenditures for both state and local governments, often through sales and property taxes.

The building footprint data does not provide details on building attributes such as total square footage, building type, number of stories, or other descriptive information useful to identify residential single-family homes. As such, the analysis incorporates and filters additional data into the dataset.

To identify residential buildings vulnerable to wildfire, the dataset is filtered to only include buildings within high, medium, low, and very low density residentially zoned areas. Mixed-use zoning areas, or those that include both residential and commercial uses, are excluded to avoid counting commercial facilities as residential homes. Buildings zoned as high and medium density can include multi-family structures such as large apartment complexes, condominiums, townhomes, and other large structures not relevant to single-family home hardening.

The analysis applies a filtering approach to address uncertainties in identifying single-family homes. The approach filters buildings based on footprint square footage based on California home inventory data to provide a high and low estimate. Together, these data provide a range of likely single-family homes.

- High estimate - building footprint dataset is filtered to remove large and small buildings that are likely multi-family structures or detached non-home structures. Filtering is influenced by Redfin's monthly California housing inventory data. This data provides guidance on the range of home sizes categorized by single-family homes. Using this as a reference point, the upper 20 percent and lower 5 percent of raw building footprints are removed to create upper and lower bounds. The analysis assumes that buildings with footprints larger than 3,774 square feet and less than 600 square feet are not residential single-family homes.
- Low estimate – the high estimate building footprint dataset is filtered again to further mitigate the inclusion of multi-family structures. Again, the upper 20 percent of building footprints are removed. This approach assumes that buildings larger than 2,739 are not single-family residences. Again, these figures represent single story floor areas and do not account for additional structural levels

Identifying Disadvantaged Communities

This study also explored the exposure of disadvantaged communities to wildfire. The analysis applies the California Communities Environmental Health Screening Tool: CalEnviroScreen 4.0 (2023). CalEnviroScreen provides an index based on environmental and demographic factors to highlight areas that are disproportionately burdened physically and economically. Index scores are spatially linked to the building footprint dataset. The analysis uses a range of index scores and building counts to produce low and high counts of buildings within disadvantaged communities and FHSZ. Buildings with an index score above the 50th are within comparably disadvantaged communities.

Prototypical Home Design

Homes within the state vary in size and construction design (e.g., total square feet, number of stories, and building materials). Data on home design is not available, so the analysis uses a prototype to represent an average California home. Assumptions for the prototype home come from Headwater Economics' report on the retrofitting cost to harden homes within the state (Barrett & Quarles, 2024).

Headwater Economics' research on California home size and designs finds the average home to be a 2,000 square foot two-story single-family home with a 100 square foot attached deck. Home dimensions are assumed to be 25 feet by 40 feet or a 1,000-square-foot footprint. Since home characteristics are unknown, each home within FHSZ follows this prototypical home design in the analysis. Differences in house size are accounted for by taking the assumed average home design from Headwater Economics' report.

Home Hardening Strategies and Scenarios

To capture the various home hardening options, the analysis relies on Headwaters Economics' (2024) economic report. Headwaters Economics organized home hardening strategies into six groups including exterior walls, roofs, eaves, decks, doors, windows, and near home landscaping. Each category includes multiple materials that can be replaced to accomplish "good," "better," and "best" levels of home hardening. These levels of hardening acknowledge that homeowners have different thresholds for risk. Refer to the Appendix for a table of home hardening materials by scenario.

Estimating Costs to Harden Existing Homes

The quantity of each material is estimated based on the described prototypical home dimensions and California State building codes (International Code Council, 2024). A list of the materials under each hardening scenario and their associated quantities and unit costs are described in the Appendix. The cost of home hardening varies because some home hardening strategies are only applicable to certain home designs (e.g. those with enclosed eaves) and materials. Low and high quantity estimates reflect these differences. The low estimate

assumes that the home already has enclosed eaves while the high estimate assumes that the home has open eaves that must be enclosed. Doing so captures various pre-existing building strategies. For instances where multiple materials are appropriate for a single hardening strategy, the low estimate assumes replacement with the less costly materials, while the high estimate assumes the more expensive materials.

Unit costs per hardening strategy are collected from the Headwaters Economics' report. These costs are divided into five cost types including demolition labor, demolition overhead and profit, material cost, installation labor, and installation overhead and profit. These unit costs are multiplied by the low and high quantity estimates described above. The output of this process results in three hardening scenarios (good, better, and best) and two cost ranges (low and high) for a total of six cost estimates to harden the prototypical home to varying degrees. Cost estimates are divided by spending per material as well as expenditure types as described above.

Economic Impacts

To estimate the economic impacts of home hardening, this analysis first assigns IMPLAN commodity codes (residential construction goods or services that can be bought or sold within a region) to all home hardening materials. These commodities define the economic linkages between industries, enabling estimates of the economic "ripples" of initial spending. Combined, these equal the total economic impact of investments in home hardening within a region (i.e. state).

Initial spending for each material has been calculated as a percentage of total home hardening costs. Separate expenditure profiles were developed for each hardening scenario and estimate range to inform custom spending patterns within IMPLAN's residential construction industry model, which projects the economic impact of investments in building single-family residential homes. These separate expenditure profiles more accurately represent the interdependencies of the potential home hardening market. The analysis was repeated for each hardening scenario and cost range, generating per-home economic impact multipliers for the six hardening scenario-cost ranges.

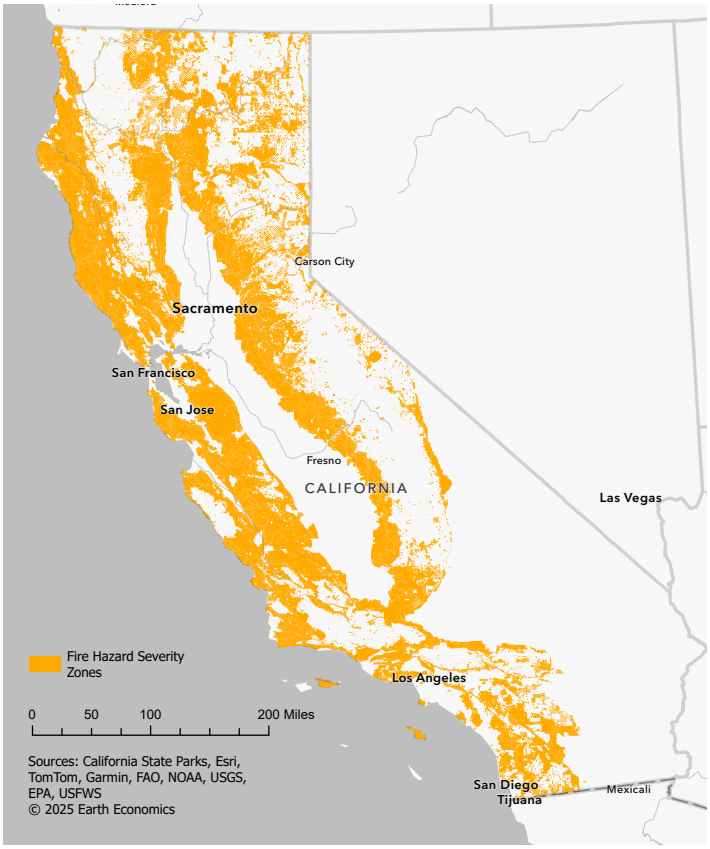
Finally, these economic impact multipliers are multiplied by the number of dwellings in the "homes at risk" sub-section, estimating a range of economic impacts associated with each level of home hardening for all at-risk homes, including those in disadvantaged communities. It should be noted that this analysis assumes a mature home hardening market in California, and that materials have been purchased within the state.

RESULTS

Number of Homes at Risk

According to the California's Department of Forestry and Fire Protection's FHSZ, there are approximately 32 million acres of land that are exposed to various levels of wildfire hazard. Proportional to the entire state, this is about 28.6 percent of the state's total land area. Figure 1 below maps the statewide FHSZ. In March of 2025, additional lands were added to the FHSZ, though they are not represented here.

Figure 1. California Fire Hazard Severity Zones



There are a significant number of buildings at risk in the wildfire hazard zones, roughly 616,000 to 770,000 homes. The range reflects uncertainty in the identification of single-family residences described in the methods above. Table 1 shows the number of homes by their hazard severity zone.

Table 1. Homes at Risk by Fire Hazard Severity Zones

Fire Hazard Severity Zone	Number of Homes (Low)	Percent of Total	Number of Homes (High)	Percent of Total
Moderate	81,357	13%	170,840	22%
High	143,319	23%	98,512	13%
Very High	391,570	64%	501,168	65%
Total	**616,246**	**100%**	**770,520**	**100%**

Columns may not be summative due to rounding.

According to the California Communities Environmental Health Screen Tool, a proportion of these homes are also within disadvantaged communities. Homes within disadvantaged communities range from between 0.3 to 0.4 percent of all homes within the FHSZ, depending on the total home estimates. The 50th percentile of scores were used to identify disadvantaged communities. Vulnerability scores were heavily right skewed, meaning there are more census tracts with lower scores. In turn, this explains the limited number of homes in the upper 50th percent. This equates to about 2,500 to 2,700 homes in total. Table 2 shows the range of homes in disadvantaged communities compared to all California communities located in FHSZ.

Table 2. Homes within Disadvantaged Communities and Fire Hazard Severity Zones (FHSZ)

Fire Hazard Severity Zone	Number of Homes (Low)	Percent of Total	Number of Homes (High)	Percent of Total
Moderate	60	2.4%	69	2.5%
High	84	3.3%	93	3.4%
Very High	2,400	94.3%	2,600	94.1%
Total	**2,544**	**100%**	**2,762**	**100%**

Columns may not be summative due to rounding.

Cost to Harden a Single Home

Home hardening costs vary greatly. The cost to minimally harden a home can range between $2,000 to $23,000 depending on the preexisting materials from construction. Better hardening can range from around $26,000 to $71,000. Finally, optimal home hardening for an average home can cost anywhere between $54,000 and $87,000. Table 3 below shows the home hardening cost by hardening scenario and cost range.

Table 3. Costs to Harden a Home by Scenario and Cost Range

Hardening Scenario	Estimate Type	Cost per Home
Good	Low	$2,000
Good	High	$23,000
Better	Low	$26,000
Better	High	$71,000
Best	Low	$54,000
Best	High	$87,000

Economic Impacts per Home Hardened

The economic impacts of home hardening also vary given the wide range in home hardening costs. The economic impact results account for the economic ripple effects of home hardening spending and include direct, indirect, and induced impacts. Depending on the hardening scenario and cost range, hardening a single home can support between 0.01 to 0.64 jobs. The wages paid for these jobs vary from $1,000 to about $51,000 per home. New economic activity, or value-added, ranges from $2,000 to $89,000. The total economic activity generated by hardening investments can support between $3,300 and $150,000 per home. Table 4 below presents these results based on the hardening scenario and estimate range.

Table 4. Total Economic Impacts per Home

Hardening Scenario	Range	Jobs	Labor Income	Value Added	Output
Good	Low	0.01	$1,000	$1,900	$3,300
Good	High	0.16	$13,300	$23,300	$39,800
Better	Low	0.12	$9,100	$16,800	$34,600
Better	High	0.33	$26,400	$50,100	$101,900
Best	Low	0.39	$31,700	$56,600	$93,200
Best	High	0.64	$51,000	$89,300	$151,000

Home hardening investments support local, state, and federal tax revenues (Table 5). Federal taxes receive between $250 and $7,800 for each home hardened. State tax revenue ranges from $70 to $2,000 per home. Local tax revenue ranges between $10 to $580 and are divided into three categories including sub-county general, sub-county special districts, and county.

Table 5. Tax Impacts by Tax Type per Home

Hardening Scenario	Range	County	State	Federal
Good	Low	$30	$70	$250
Good	High	$380	$900	$3,300
Better	Low	$290	$700	$2,300
Better	High	$870	$2,000	$6,700
Best	Low	$910	$2,200	$7,800
Best	High	$1,490	$3,500	$12,500

Economic Impacts of Statewide Home Hardening

Hardening all single-family homes within FHSZ and disadvantaged communities supports the economy through jobs and taxes. Total direct investment in hardening all vulnerable homes ranges between $1.2 billion to $67 billion. Depending on the hardening scenario and cost range, 9,100 and 493,000 jobs are supported by statewide home hardening. These jobs provide incomes that total $632 million to $39.2 billion. Impacts to state gross domestic product (GDP) vary from $1.1 billion to $68.7 billion. The total economic activity generated by these investments provides $2 billion to $116.4 billion to California. Every dollar invested in home hardening returns approximately $1.66 to $1.73 in total economic activity. Table 6 summarizes these results. Note that the range estimates reflect the low and high count of homes, pre-existing materials, and hardening costs.

Table 6. Total Economic Impact by Hardening Scenario and Cost Range

Hardening Scenario	Range	Jobs	Labor Income	Value Added	Output
Good	Low	9,100	$632,000,000	$1,147,000,000	$2,063,000,000
Good	High	123,300	$10,276,000,000	$17,961,000,000	$30,662,000,000
Better	Low	74,000	$5,628,000,000	$10,370,000,000	$21,330,000,000
Better	High	254,300	$20,336,000,000	$38,586,000,000	$78,528,000,000
Best	Low	240,000	$19,516,000,000	$34,868,000,000	$57,454,000,000
Best	High	493,100	$39,273,000,000	$68,783,000,000	$116,359,000,000

Home hardening investment provides $157 million to $9.6 billion in federal taxes. While impacts to state tax revenue are less than federal impacts, they can provide $45 million to $2.7 billion. Combined local taxes vary between $18 million and $1.1 billion depending on the hardening scenario and cost range. Overall, state and local governments can bolster their tax base by approximately $53 million to $3.8 billion. These results show that home hardening investment provides local job opportunities while bolstering California's GDP and generating income for federal, state, and local governments.

Table 7. Tax Impacts by Hardening Scenario and Cost Range

Hardening Scenario	Range	County	State	Federal
Good	Low	$18,000,000	$45,000,000	$157,000,000
Good	High	$295,000,000	$712,000,000	$2,517,000,000
Better	Low	$179,000,000	$414,000,000	$1,407,000,000
Better	High	$670,000,000	$1,535,000,000	$5,133,000,000
Best	Low	$559,000,000	$1,369,000,000	$4,815,000,000
Best	High	$1,145,000,000	$2,734,000,000	$9,627,000,000

Economic Impacts of Hardening Homes within Disadvantaged Communities

Residents within disadvantaged communities face social, environmental, and/or economic burdens. Many of the 2,544 to 2,762 homes within FHSZ and disadvantaged communities may require financial assistance to invest in home hardening due to economic constraints. Total investments to harden at-risk homes depends on the number of homes targeted, their existing conditions, and the level of hardening applied. Total costs to harden homes at risk within California could reach up to $241 million. The economic impacts of these investments can inform mechanisms for financial assistance to support home hardening. For example, knowing the employment and economic development potential of home hardening as well as the increase in local and state tax bases can help determine the magnitude of funding for statewide incentives. These results can be used to estimate the potential return on investment of using public funds to incentivize home hardening.

Initial investments in home hardening could support between 40 and 1,800 jobs, with associated wages ranging from $2.6 million to $140.8 million. The state's GDP could increase by up to $4.7 million to $246.6 million, resulting from $8.5 million to $417.1 million of total economic activity. Each dollar invested in hardening homes within disadvantaged communities could return $1.73 in total economic activity. Table 8 presents these results. Note that the range estimates reflect the low and high count of homes, pre-existing materials, and hardening costs.

Table 8. Total Economic Impacts from Hardening Homes within Disadvantaged Communities

Hardening Scenario	Range	Jobs	Labor Income	Value Added	Output
Good	Low	40	$2,600,000	$4,700,000	$8,500,000
Good	High	440	$36,800,000	$64,400,000	$109,900,000
Better	Low	310	$23,200,000	$42,800,000	$88,100,000
Better	High	910	$72,900,000	$138,300,000	$281,500,000
Best	Low	1,000	$80,600,000	$143,900,000	$237,200,000
Best	High	1,800	$140,800,000	$246,600,000	$417,100,000

Initial home hardening investments could generate between $650,000 to $34.5 million in federal taxes and $190,000 to $9.8 million in state taxes. At the county and sub-county level, hardening could generate $75,000 to $4.1 million in taxes. In total, state and local governments could receive between $265,000 million to $13.9 million. Table 9 shows the tax impacts from home hardening within disadvantaged communities.

Table 9. Tax Impacts from Hardening Homes within Disadvantaged Communities

Hardening Scenario	Range	County	State	Federal
Good	Low	$75,000	$190,000	$650,000
Good	High	$1,000,000	$2,600,000	$9,000,000
Better	Low	$740,000	$2,000,000	$6,000,000
Better	High	$2,400,000	$5,500,000	$18,400,000
Best	Low	$2,300,000	$6,000,000	$20,000,000
Best	High	$4,100,000	$9,800,000	$34,500,000

CONCLUSION

Wildfires are a frequent and costly hazard in California. Climate change has increased the likelihood and intensity of extreme fire weather (EPA, 2016), while increased development in fire-prone wildlands has placed more people and assets at risk. Together, these factors magnify the potential losses associated with wildfire events. Recent events, such as the 2025 Palisades and Eaton fires in Los Angeles County, are reminders that even densely populated areas are at risk from wildfire. These fires show that even the losses of a single wildfire can result in damages far greater than the cost to harden all homes within wildfire hazard zones (i.e., $76 billion to $131 billion in wildfire losses compared to $1.2 billion to $67 billion to harden homes).

Local, county, state, and federal governments can prepare for, and adapt to, wildfire risks. Addressing these risks can include investment in effective wildfire safety strategies such as establishing defensible space, emergency warning and evacuation planning, land use planning, and home hardening. Home hardening makes houses more resilient to wildfire while mitigating potential losses and bolstering local and state economies.

The cost of home hardening varies widely depending on the level of hardening, house size, and a home's pre-existing features. There are many low-cost, high-benefit home hardening measures that can be affordable to many homeowners. However, some high-cost home hardening measures, such as replacing roofing, siding, or windows, may prevent many homeowners, especially those within disadvantaged communities, from participating, potentially limiting the resiliency of communities.

This report estimates that hardening a 2,000-square-foot single-family home can cost between $2,000 and $87,000. The range in cost reflects the variety of home hardening strategies. The low estimate assumes minimal home alteration and does not include major renovations such as replacing roof or siding materials, while the high estimate assumes all major renovations. These costs do not need to be incurred all at once. Regular home maintenance can present opportunities to retrofit home features with hardened materials.

The home hardening industry is nascent with limited supply chains and a small pool of qualified contractors, comparable to the emergence of the solar and wind industries. Economies of scale have not yet lowered material costs and contractor travel time to work sites, particularly to homes in rural areas, increases overall hardening costs. These early-industry barriers could be alleviated by public sector investment, which would accelerate the growth of supply chains, new materials availability, and the contractor base.

Until recently, home hardening was the sole responsibility of the homeowner. In 2019, the California Wildfire Mitigation Program (CWMP) was formed to strengthen community-wide resilience against wildfires. The CWMP has funded home hardening in a small number of demonstration hubs (one home had been hardened as of summer 2024). This program could be expanded or similar programs developed to invest in large-scale home hardening at a state level, creating broad economic benefits for California.

Investment in home hardening at a state level would create broad economic benefits. Home hardening not only avoids losses but also bolsters local and state economies by directly and indirectly supporting jobs and increasing total economic activity. Spending on hardening materials drives economic activity through an increase in manufacturing as well as labor income. This analysis finds that every dollar invested in home hardening generates between $1.66 and $1.73 in total economic activity. Direct investment in hardening wildfire-exposed single-family homes could cost up to $1.2 billion to $67 billion depending on the level of hardening. These investments would result in approximately 9,100 to 493,100 jobs, $2 billion and $116 billion in total economic activity, and increase local and state tax revenue by $53 million to $3.8 billion. Home hardening also mitigates losses for homeowners and preserves property tax revenue for governmental entities by protecting the value of between 616,000 to 770,000 homes.

Retrofitting homes with hardened materials is a crucial step in reducing losses associated with wildfires. As wildfire risks have increased insurance agencies are adapting by raising rates or avoiding offering policies to homes in California. This can have significant economic impacts as mortgage lenders typically require wildfire insurance as a condition prior to lending. This could augment the housing market in California and prevent new sales or development within the state. If private insurance companies leave the wildfire market it could burden current or future state wildfire insurance programs, such as the Fair Access to Insurance Requirements plan (FAIR). Overall, home hardening at scale throughout California provides significant and diverse benefits for stakeholders within the state.

RECOMMENDATIONS

Research into home hardening costs and associated economic impacts is nascent and additional research is needed, especially in California. One next step could be to survey homes within FHSZ communities to establish an inventory of home attributes, such as pre-existing features, to generate more precise estimates of the materials required for potential home hardening. Incorporating spatial data could help to map distributions of community home attributes throughout the state. Such a survey could also allow for more precise models of homes and even communities.

As the cost of hardening a home can vary significantly depending on the retrofit option, a survey of homeowner preferences in relation to financial incentives would help generate more precise estimates. Socio-economic metrics of homeowners can augment willingness to harden a home based on community characteristics and public investment programs. Data such as this would help model the return on investment estimates for different funding mechanisms.

A case study analysis of hardened homes (such as the CWMP demonstration hubs) could help inform research assumptions by accounting for the actual decision-making processes surrounding home hardening. For example, examining home attributes pre- and post-hardening could improve cost estimates. As the home hardening industry becomes more established, greater data records will support such an analysis. The case study could inform a model that can be applied to other communities throughout the state.

Finally, future research should explore additional benefits of home hardening that are not included within this analysis, such as the preservation of property values and its subsequent impact on the current tax base. By reducing the likelihood of home losses, investments into home hardening protects household assets thereby stabilizing property tax revenues. Understanding the magnitude of these effects can further support public and private investments into home hardening at scale across California.

PHOTO CREDIT: Nicolas Lira, Anna Niubo, UC Berkeley Wildfire Prepared Home Design Winners

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APPENDIX

Limitations

This study is limited by the availability of spatially explicit home attribute data. Available data sources do not describe detailed attributes such as number of windows, roof and foundation vents, eave type, siding area, building type, or other features required to estimate the quantity of hardening materials required. As the accuracy of results relies on estimates of the total quantity of required materials the analysis uses two variations of an average model home to reflect different pre-existing features. Assuming an average home attempts to capture nuances in home size, however, the extent to which they differ is unknown.

The dimensions of an average home within California were collected from Headwaters Economics' report. However, the specific home attributes were unknown. The analysis makes informed assumptions using California building codes and overall building dynamics to estimate specific home attributes and dimensions. Despite these assumptions, the analysis still needed data on the quantity of materials required for hardening. To produce conservative estimates, the analysis assumed home features followed simple designs such as a roof with no dormers or siding to roof intersections.

As parcel data was not available, the analysis used building footprint data. Specifically, California State home inventory data was collected from Redfin to inform thresholds of single-family home sizes. Based on these data, the high estimate removed the upper 20 percent of building footprints within FHSZ while the low estimate removed the upper 20 percent of filtered homes. While this method provides the likely number of homes exposed to wildfire, the data may include small multi-family structures and exclude large single-family homes.

Homeowners may choose to harden their homes to different extents. To reflect this the analysis used a range of hardening scenarios. However, the range in costs for these scenarios is significant. More precise hardening scenarios require additional data on homeowner preferences.

The production of hardening materials differs from conventional ones. For example, vinyl siding is produced by different manufacturers and materials than fiber-cement siding. Additionally, IMPLAN's input-output software defines 528 unique industries and commodities, which do not directly align with each hardening material, impacting the precision of results. For example, while IMPLAN may have a siding commodity the tracked industry interdependencies may differ from home hardening materials.

This analysis assumes a mature home hardening market where contractors and material manufacturers are available within the state and can meet market demand. In reality, wildfire home hardening materials are relatively nascent compared to other materials. Interviews with contractors who currently offer home hardening services mentioned that some materials must be purchased from out-of-state producers. The analysis assumes that eventually, these materials will be available for purchase by manufacturers within the state. The analysis also assumes that unit costs will be augmented as hardening materials become more prevalent within the state. Costs are assumed to be stable as the analysis cannot estimate how material costs may decrease with an increase in supply efficiency or increase if demand outpaces production.

The analysis assumes that all homeowners will choose to contract out retrofitting activities due to a lack of data. In reality, some homeowners may choose to pursue retrofitting home hardening strategies on their own, which would lower total labor and installation costs.

The analysis does not include all costs. Data was lacking on miscellaneous costs associated with home hardening, such as the purchase of additional materials from local hardware stores. There was also no data on homeowners taking on landscaping to create defensible spaces. Cost estimates also do not account for the potential to reveal preexisting home damage discovered during the demolition phase of home hardening, which may require additional labor hours and materials.

Sensitivity Analysis

It is unlikely that all homes within FHSZ will be retrofitted with hardened materials. To reflect the uncertainty of home hardening uptake, a sensitivity analysis is conducted. This analysis assumes four different uptake rates including 1, 5, 25, and 50 percent of homes all homes within FHSZ. These results highlight how the economic impacts range based on the number of homes hardened and can be used to scale potential outcomes. Table 10 below highlights the estimates for the number of homes to be hardened by uptake rate.

Table 10. Number of Homes Hardened by Rate of Uptake

Rate of Uptake	Low	High
1%	6,162	7,705
5%	30,812	38,526
25%	154,062	192,630
50%	308,123	385,260

These home estimates are then multiplied by the same cost and hardening scenarios described in the Methodology section. The results are presented in Table X below showing economic impacts by rate of implementation, hardening scenario, and cost ranges. If one percent of homes within FHSZ were moderately hardened they would support approximately 700 jobs, produce $56 million in wages, increase GDP by $104 million, and generate 213 million in total economic activity. If five percent of homes were moderately hardened, jobs would increase to 3,700, providing $281 million in wages, support $519 million in value added to GDP, and about $1 billion in total economic activity throughout the state. If 25 percent of homes within the FHSZ were moderately hardened, 18,500 jobs would be supported producing $1.4 billion in wages, GDP would increase by about $2.6 billion, and total economic growth would be upwards of $5.3 billion. If 50% of households were moderately hardened 37,000 jobs would be created totaling about $2.8 billion in wages, create an additional $5.2 billion in GDP, and $ generate $10.6 billion in economic activity.

Table 11. Economic Impacts of Potential Home Hardening

Rate of Uptake	Scenario	Range	Jobs	Labor income	Value added	Output
1%	Good	Low	100	$6,000,000	$11,000,000	$21,000,000
	Good	High	1,200	$103,000,000	$180,000,000	$307,000,000
	Better	Low	700	$56,000,000	$104,000,000	$213,000,000
	Better	High	2,500	$203,000,000	$386,000,000	$785,000,000
	Best	Low	2,400	$195,000,000	$349,000,000	$575,000,000
	Best	High	4,900	$393,000,000	$688,000,000	$1,164,000,000
5%	Good	Low	300	$32,000,000	$57,000,000	$103,000,000
	Good	High	6,200	$514,000,000	$898,000,000	$1,533,000,000
	Better	Low	3,700	$281,000,000	$519,000,000	$1,066,000,000
	Better	High	12,700	$1,017,000,000	$1,929,000,000	$3,926,000,000
	Best	Low	12,000	$976,000,000	$1,743,000,000	$2,873,000,000
	Best	High	24,700	$1,964,000,000	$3,439,000,000	$5,818,000,000
25%	Good	Low	1,500	$158,000,000	$287,000,000	$516,000,000
	Good	High	30,800	$2,569,000,000	$4,490,000,000	$7,665,000,000
	Better	Low	18,500	$1,407,000,000	$2,593,000,000	$5,332,000,000
	Better	High	63,600	$5,084,000,000	$9,646,000,000	$19,632,000,000
	Best	Low	60,100	$4,879,000,000	$8,717,000,000	$14,363,000,000
	Best	High	123,300	$9,818,000,000	$17,196,000,000	$29,090,000,000
50%	Good	Low	3,100	$316,000,000	$574,000,000	$1,032,000,000
	Good	High	61,600	$5,138,000,000	$8,980,000,000	$15,331,000,000
	Better	Low	37,000	$2,814,000,000	$5,185,000,000	$10,665,000,000
	Better	High	127,100	$10,168,000,000	$19,293,000,000	$39,264,000,000
	Best	Low	120,200	$9,758,000,000	$17,434,000,000	$28,727,000,000
	Best	High	246,600	$19,636,000,000	$34,392,000,000	$58,180,000,000

If one percent of homes within FHSZ were moderately hardened it could support about $1.8 million in county and subcounty, $4.1 million state, and $14 million in federal taxes. If five percent of homes were hardened, tax revenues would increase by about $9 million for county and sub-county entities, $20.7 million for state revenues, and $70.3 million for the federal government. If 25 percent of households were moderately hardened, county tax revenues expand by about $45 million, the state would see $104 million increase, and federal government taxes would be bolstered by $352 million. Finally, if 50 percent of homes were moderately hardened county taxes within California would rise by about $90 million, the state would benefit from a $207 million increase, and would produce $703 million in federal taxes.

Table 12. Tax Impacts by Rate of Uptake, Scenario, and Cost Range

Rate of Uptake	Scenario	Range	County	State	Federal
1%	Good	Low	$180,000	$450,000	$1,570,000
	Good	High	$2,950,000	$7,120,000	$25,170,000
	Better	Low	$1,790,000	$4,140,000	$14,070,000
	Better	High	$6,700,000	$15,350,000	$51,330,000
	Best	Low	$5,590,000	$13,690,000	$48,150,000
	Best	High	$11,450,000	$27,340,000	$96,270,000
5%	Good	Low	$940,000	$2,300,000	$7,800,000
	Good	High	$14,740,000	$35,600,000	$125,800,000
	Better	Low	$8,980,000	$20,700,000	$70,300,000
	Better	High	$33,470,000	$76,800,000	$256,600,000
	Best	Low	$27,970,000	$68,400,000	$240,700,000
	Best	High	$57,230,000	$136,700,000	$481,400,000
25%	Good	Low	$4,690,000	$11,000,000	$39,000,000
	Good	High	$73,720,000	$178,000,000	$629,000,000
	Better	Low	$44,910,000	$104,000,000	$352,000,000
	Better	High	$167,300,000	$384,000,000	$1,283,000,000
	Best	Low	$139,840,000	$342,000,000	$1,204,000,000
	Best	High	$286,150,000	$684,000,000	$2,407,000,000
50%	Good	Low	$9,400,000	$23,000,000	$78,000,000
	Good	High	$147,400,000	$356,000,000	$1,258,000,000
	Better	Low	$89,800,000	$207,000,000	$703,000,000
	Better	High	$334,700,000	$768,000,000	$2,566,000,000
	Best	Low	$279,700,000	$684,000,000	$2,407,000,000
	Best	High	$572,300,000	$1,367,000,000	$4,814,000,000

Home Hardening Materials by Scenario

Some strategies are only relevant to certain home construction strategies. For example, a home can have an open or closed eave, which will determine the hardening strategy and subsequent cost. Table 13, continued on the next page, is adapted from Barrett & Quarles (2024).

Table 13. Quantity of Home Hardening Materials by Scenario with Associated IMPLAN Codes and Costs

Category	Features	Good	Better	Best	Low	High	Unit	IMPLAN Code	IMPLAN Description	Ratio	Total cost	Unit
Exterior Walls	Flashing at wall-to-deck intersections	X	X	X	10	-	Lf	3231	Sheet metal work (except stampings)	1	$4.14	Lf
	Non-combustible flame and ember resistant vents in foundation	X	X	X	-	25	Ea	3231	Sheet metal work (except stampings)	1	$229.32	Ea
	Non-combustible material to replace first 6-12 inches of vertical siding		X		65	130	Sq ft	3195	Cement manufacturing	0.5	$6.67	Sq ft
	Non-combustible material to replace first 6-12 inches of vertical siding		X		65	130	Sq ft	3148	Asphalt shingles and coating materials	0.5	$7.67	Sq ft
	Non-combustible flame and ember resistant vents in gable ends		X	X	2	2	Ea	3231	Sheet metal work (except stampings)	1	$420.80	Ea
	Non-combustible exterior wall siding (fiber-cement material)			X	1,288	2,576	Sq ft	3195	Cement manufacturing	0.5	$6.67	Sq ft
	Non-combustible exterior wall siding (fiber-cement material)			X	1,288	2,576	Sq ft	3148	Asphalt shingles and coating materials	0.5	$7.67	Sq ft
	Fire-rated panelized gypsum product			X	1,288	2,576	Sq ft	3201	Gypsum products	1	$1.24	Sq ft
	Fire-rate caulk	X	X	X	107	107	Lf	3168	Adhesives	1	$4.38	Lf
	Metal dryer vents			X	1	2	Ea	3231	Sheet metal work (except stampings)	1	$68.70	Ea
	Metal intake air vents			X	-	1	Ea	3231	Sheet metal work (except stampings)	1	$106.11	Ea

Category	Features	Good	Better	Best	Low	High	Unit	IMPLAN Code	IMPLAN Description	Ratio	Total cost	Unit
Roof (including roof vents)	Asphalt fiberglass composition shingles	X	X		-	1,186	Sq ft	3148	Asphalt shingles and coating materials	1	$6.29	Sq ft
	Synthetic underlayment	X	X		-	1,186	Sq ft	3148	Asphalt shingles and coating materials	1	$1.33	Sq ft
	Standing metal roof covering			X	1,186	1,186	Sq ft	3231	Sheet metal work (except stampings)	1	$18.68	Sq ft
	Non-combustible flame and ember resistant ridge vent		X	X	40	40	Lf	3231	Sheet metal work (except stampings)	1	$33.77	Lf
	Metal drip edge	X	X	X	140	140	Lf	3231	Sheet metal work (except stampings)	1	$2.93	Lf
	Flat tempered-glass skylight			X	-	2	Ea	3194	Glass products made of purchased gl ass	1	$1,434.88	Ea
Eaves and Gutters	For open eave design: circular non-combustible flame and ember resistant vents	X			-	80	Ea	3231	Sheet metal work (except stampings)	1	$53.02	Ea
	For open eave design: fire-rated caulk for gaps between blocking and adjacent members	X			-	195	Lf	3168	Adhesives	1	$4.38	Lf
	For open eave design: non-combustible soffit material to enclose eave		X		-	136	Sq ft	3195	Cement	0.5	$3.92	Sq ft
	For open eave design: non-combustible soffit material to enclose eave		X		-	136	Sq ft	3231	Sheet metal work (except stampings)	0.5	$4.92	Sq ft

Category	Features	Good	Better	Best	Low	High	Unit	IMPLAN Code	IMPLAN Description	Ratio	Total cost	Unit
Eaves and Gutters	Non-combustible flame and ember resistant vents in eaves		X		20	20	Ea	3231	Sheet metal work manufacturing	1	$105.05	Ea
	For enclosed eave with combustible soffit: replace with non-combustible soffit			X	136	136	Sq ft	3195	Cement	0.5	$4.51	Sq ft
	For enclosed eave with combustible soffit: replace with non-combustible soffit			X	136	136	Sq ft	3231	Sheet metal work (except stampings)	0.5	$5.51	Sq ft
	For enclosed eave with non-combustible soffit: non-combustible flame and ember resistant vents			X	20	20		3231	Sheet metal work manufacturing	1	$106.24	Ea
	Metal gutter guard	X	X	X	84	84	Lf	3231	Sheet metal work (except stampings)	1	$4.48	Lf
	Metal gutter systems		X	X	-	84	Lf	3231	Sheet metal work (except stampings)	1	$18.78	Lf
Deck (including under-deck area)	Metal grate to replace first deck board that's parallel to the home	X			-	10	Lf	3232	Ornamental and architectural metal products	1	$104.13	Lf
	Higher-density material (e.g. bamboo) deck surface incl. fasteners; substructure and foil-faced bitumen tape around joists and posts		X		-	100		3131	Other millwork, including flooring	1	$27.22	Sq ft

Category	Features	Good	Better	Best	Low	High	Unit	IMPLAN Code	IMPLAN Description	Ratio	Total cost	Unit
Deck (including under-deck area)	Higher-density material for deck surface (e.g., plastic composite), does not incl. structural support		X		320	-		3185	Other plastics products	1	$7.93	Lf
	Noncombustible deck surface (e.g., concrete slab), demolition not included			X	100	100	Sq ft	3196	Ready-mix concrete	1	$11.17	Sq ft
	Noncombustible deck surface and support system (metal surface and structural support)			X	100	100	Sq ft	3231	Sheet metal work (except stampings)	1	$66.76	Sq ft
	Incl. excavation/ footings			X	-	4	Ea	3056	Maintained and repaired residential structures	1	$255.84	Ea
	Incl. metal framing			X	12	12	Ea	3228	Fabricated structural metal products	1	$116.95	Ea
	Noncombustible (metal) stairway			X	-	4	Ea	3232	Ornamental and architectural metal products	1	$676.37	Ea
	Noncombustible (metal) railing for stairs			X	-	35	Lf	3232	Ornamental and architectural metal products	1	$91.11	Lf
	Noncombustible mesh screen skirting for underdeck area	X	X	X	39	78	Sq ft	3230	Metal windows and doors	1	$27.03	Sq ft
Windows and Doors	Protective shutters		X		72	144	Sq ft	3230	Metal windows and doors	1	$46.78	Sq ft

Category	Features	Good	Better	Best	Low	High	Unit	IMPLAN Code	IMPLAN Description	Ratio	Total cost	Unit
Windows and Doors	Double-paned, tempered metal-clad glass windows (2' x 3'), does not incl. flashing and trim		X		12	24	Ea	3194	Glass products made of purchased gl ass	1	$755.46	Ea
	Fiberglass framed exterior pedestrian door		X		2	3	Ea	3230	Metal windows and doors	1	$1,517.14	Ea
	Metal framed exterior pedestrian door			X	2	3	Ea	3230	Metal windows and doors	1	$1,246.87	Ea
	Fiberglass framed exterior sliding door with tempered insulated glass		X		-	1	Ea	3230	Metal windows and doors	0.5	$9,819.00	Ea
	Fiberglass framed exterior sliding door with tempered insulated glass		X		-	1	Ea	3194	Glass products made of purchased gl ass	0.5	$9,820.00	Ea
	Metal framed exterior sliding door with tempered insulated glass			X	1	2	Ea	3230	Metal windows and doors	1	$2,681.00	Ea
	Metal kick plate for exterior pedestrian (wood) door	X			2	3	Ea	3231	Sheet metal work (except stampings)	1	$120.41	Ea
	Fiberglass framed exterior garage door		X		-	1	Ea	3230	Metal windows and doors	1	$3,903.00	Ea
	Metal framed exterior garage door			X	-	1	Ea	3230	Metal windows and doors	1	$2,358.00	Ea
	Metal kick plate for exterior garage (wood) door	X			1	1	Ea	3231	Sheet metal work (except stampings)	1	$265.61	Ea
	Weather stripping around exterior pedestrian and garage doors	X	X	X	1	3	Ea	3230	Metal windows and doors	1	$530.29	Ea

EARTH ECONOMICS