



Standardized Regulatory Impact Assessment: Title 8, Residential Fall Protection Standards

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1. Introduction

The Occupational Safety and Health Standards Board (Standards Board) of the Department of Industrial Relations is proposing to amend fall protection rules for residential construction activities.¹ The proposed changes would lower the height at which fall protection is required for residential framing from 15 feet to 6 feet and for residential roofing from 15 or 20 feet to 6 feet to conform with Federal OSHA's 6 foot trigger height for residential construction. California Labor Code Section 142.3(a)(2) requires the Standards Board to adopt regulations at least as effective as federal standards. The updated rule would be published in Title 8, California Code of Regulations, and would be enforced by the Division of Occupational Safety and Health (DOSH or Cal/OSHA).

The proposed regulation is designed to increase the number of workers in residential construction covered by fall protection requirements. Under current regulations, for most residential framing and roofing activities, workers working on a single-story dwelling, or the first story of a multi-story dwelling, are not required to have fall protection. The proposed regulation lowers the "trigger height" at which fall protection is required and would therefore require contractors to provide fall protection strategies for nearly all residential construction.

This Standardized Regulatory Impact Assessment (SRIA) provides an economic analysis of the Standards Board's proposed revisions to the residential framing and roofing fall protection standards. The analysis identifies the affected industries, potential direct compliance costs for each industry, and expected direct benefits from improved worker safety. Results show that the proposed regulation would increase compliance costs by approximately \$53.6-\$63.8 million per year by 2020 and \$53.6-\$105.7 million per year by 2030, providing approximately \$64 million per year in benefits to workers from averted mortality and reduced injuries. This SRIA also quantifies the projected macroeconomic impacts of the proposed regulation and finds that there would be a small, negative impact in terms of macroeconomic indicators considered (gross state product, real output, employment, and household income).

The following sections of the report discuss each of the economic dimensions of the proposed regulation that are required for the SRIA. The introduction includes a discussion of the regulation, reasoning behind the major regulation threshold determination, documentation of public engagement, baseline assumptions, and a brief overview of affected entities. The section on direct costs outlines the methodology and results for determining the likely incremental compliance costs for industry as these would result of the proposed regulation. The section on direct benefits estimates and monetizes the expected decrease in mortality and averted injuries from increasing the stringency of the safety standards. A section on macroeconomic impacts

¹ Title 8 Division 1 Chapter 4 of the California Code of Regulations 1716.2, 1731

discusses the model used in this analysis as well as the estimated impact of the proposed regulation on the overall California economy. A brief section on fiscal impacts discusses the potential impacts of the proposed regulation on state and local governments.

1.1. Background and Summary of Proposed Regulations

Fall-related incidents are a common cause of workplace injuries and the lead cause of fatalities in the construction sector. Title 8 Division 1 Chapter 4 Sections 1716.2 and 1731 of the California Code of Regulations outlines the requirements for providing fall protection for workers involved in residential framing activities (§1716.2) and residential roofing activities (§1731). The current regulations state that fall protection must be provided to workers engaged in framing activities at heights greater than 15 feet and for roofing activities at eave heights above 15 or 20 feet, depending on the building type.² The California Occupational Safety and Health Standards Board is proposing to modify these existing residential framing and roofing fall protection standards beginning July 1, 2018 by lowering the trigger height threshold for all residential framing and roofing activities to 6 feet.

Cal/OSHA's updated fall protection standards follow trigger height requirements set by the federal Occupational Safety and Health Standards Board (OSHA) in 1995. Section 1.3 discusses OSHA finding that California is not commensurate with the Federal standard.

1.2. Major Regulation Determination

A proposed regulation is determined to be a major regulation if the estimated economic impact of the regulation is expected to exceed \$50 million per year once fully implemented. Both the direct compliance costs and direct benefit of the proposed regulation are independently expected to exceed this threshold. The direct compliance costs are estimated to be between \$53.6-\$105.7 million per year once the regulations are fully implemented and the direct benefits are estimated to be approximately \$64 million per year. Therefore, modifying the fall protection standards for residential construction qualifies as a major regulation, requiring a complete SRIA.

1.3. Public Outreach and Input

Federal Subpart M Fall Protection in Construction became effective on February 6, 1995 and lowered the fall protection trigger height to 6 feet (among other provisions). In response to stakeholder concerns, Federal OSHA delayed enforcement of the 6-foot trigger height by issuing *OSHA Interim Fall Protection Compliance Guidelines for Residential Construction, STD 3.1*,

² The current regulations for roofing specify a trigger height of 15 feet for production residential construction (e.g., tract housing) and a trigger height of 20 feet for non-production housing. The proposed regulation would reduce the trigger height for both types of construction to 6 feet (eave height).

December 8, 1995. The interim policy allowed employers to implement alternative procedures to prevent falls, i.e., unwritten administrative plans, without having to demonstrate infeasibility for complying with the written standard. With California stakeholder input, a Fall Protection Guidebook for Residential Construction was developed in 2002 to protect employees from falls. In 2004, the Standards Board adopted Title 8, Construction Safety Orders, Section 1716.2 for residential framing and light commercial construction. CSO Section 1716.2 contains standards addressing residential wood and light gage steel construction framing standards (joists or trusses resting on stud walls) including but not limited to: definitions, raising walls, work on top plate, work on floors or other walking working surfaces, work on starter board, use of scaffolding and employee training. It also specifies that fall protection be used when the roof slope is steep (greater than 7:12) and when the fall height exceeds 15 feet. It refers the reader to the fall protection requirements of CSO Article 24.

The Standards Board believed that Section 1716.2 effectively addressed fall protection issues and was commensurate to the comparable federal standard. (Note: the 15-foot trigger height was chosen to indicate a dividing line between 1 and 2 story construction).

Federal OSHA rescinded their interim policy in 2013, thereby reinstating the 6-foot trigger height and in 2015 deemed the California standards for residential construction and roofing not commensurate with the OSHA standards. At Federal OSHA request, the Standards Board convened stakeholder advisory committee meetings in an effort to develop a consensus rulemaking proposal to lower the fall protection trigger height to 6 feet in residential construction and roofing. On January 21, 2016, at the Standards Board's monthly meeting, representatives from Federal OSHA warned that California must conform to the 6-foot trigger height or face the possibility of concurrent jurisdiction.³

1.4. Baseline

Both the direct costs and benefits, as well as the macroeconomic impacts of the proposed regulation, are evaluated in this SRIA relative to a baseline scenario. It is assumed that under the baseline scenario the trigger height remains at 15 feet for residential framing activities and the trigger height for roofing remains at 15/20 feet. The costs and benefits associated with the proposed regulation should therefore be the incremental costs and benefits associated with reducing the trigger height to 6 feet.

³ Concurrent jurisdiction is a scenario in which the results of one or more evaluations conducted during the operation of a State plan and prior to an 18(e) determination reveal that actual operations as to one or more aspects of the plan fail in a substantial manner to be at least as effective as the Federal program, and the State does not adequately resolve the deficiencies in accordance with subpart C of part 1953, and the appropriate level of Federal enforcement activity is reinstated.

The incremental compliance costs of these lower trigger heights include the additional fall protection to protect workers engaged in activities on single-story housing or the first floor of multi-story dwellings. The incremental benefits of lowering the trigger height includes reduction in fall-related injuries and fatalities that currently occur at heights between 6 feet and 15 feet. For the macroeconomic assessment, the baseline is assumed to follow the Department of Finance conforming forecast for the California economy. All macroeconomic results are presented relative to the model baseline using this forecast.

1.5. Affected Entities

The proposed regulation is expected to primarily affect firms and employees in two industries: residential framing and residential roofing. The regulation also requires framing and roofing contractors engaged in residential-like framing and roofing activities to comply with the proposed regulation.

The proposed regulation states that activities considered as residential-type framing include “installation of floor joists, floor sheathing, layout and installation of walls, hanging and nailing of shear panels, setting and bracing roof trusses and rafters, installation of starter board, roof sheathing, and fascia board; installation of windows, siding and exterior trim.” Roofing activities would include “roofing and re-roofing work including roof removal performed on single-family homes, townhouses, duplexes, and other structures,” as well as “loading and installation of roofing materials, including related insulation, sheet metal that is integral to the roofing system, and vapor barrier work, but not including the construction of the roof deck.”

Table 1 shows the number of entities, employees, and financial characteristics of the residential framing and roofing industries in California in 2015. Because the proposed regulation is expected to change the compliance costs for the residential framing and roofing sectors, other sectors in the residential construction supply chain may also be affected by the proposed regulation. For example, if framing contractors must rent additional scaffolding to provide fall protection, the firms that provide this service would also be affected. These issues are discussed in greater detail below.

Table 1: Characteristics of Industries Affected by the Proposed Regulation

Sector	NAICS Code	Number of Establishments	Number of Employees	Total Wages (million \$2015)
Residential Framing Contractors	238131	570	15,669	\$582.2
Residential Roofing Contractors	238161	1,945	13,303	\$555.1

Source: Quarterly Census of Employment and Wages (QCEW), California Employment Development Department

2. Direct Costs

The proposed regulation is expected to have direct impacts on the operational costs of several industries: residential framing contractors and residential roofing contractors. Businesses engaged in residential roofing and framing activities will be required to provide fall protection to all employees working at heights greater than 6 feet above the surrounding level. The current Cal/OSHA standards require fall protection only for heights of 15 feet and above.

This section of the SRIA discusses the various changes in compliance costs for framing and roofing contractors. As noted in the baseline description, costs discussed here are the incremental costs of compliance for roofing and framing activities conducted at heights between 6 feet and 15 feet, since work done at heights 15 feet and above are already covered under the current Cal/OSHA rules.

Total direct costs for industry are expected to be, on average, between \$53.6 million and \$105.7 million per year in 2030, the final year of the analysis period. A summary of the total 2030 compliance costs by industry quantified in this SRIA is shown in Table 2. A more detailed discussion of how these costs were estimated is provided below.

Table 2: Summary of Total Annual Compliance Costs for Residential Framing and Roofing

Industry	Total Annual Costs in 2030 (million 2015\$)	
	Higher Residential Construction Growth	Low Residential Construction Growth
Residential Framing Contractors	\$76.6 (\$63.0 - \$90.2)	\$31.7 (\$26.3 - \$37.0)
Residential Roofing Contractors	\$29.1 (\$22.0 - \$36.1)	\$21.9 (\$16.7 - \$27.1)
Total	\$105.7 (\$85.0 - \$126.3)	\$53.6 (\$43.0 - \$64.2)

2.1. Estimating Compliance Costs

Compliance costs for framing and roofing contractors are estimated by multiplying the expected incremental compliance cost of the new standards by the projected number of new housing/commercial units or re-roofing projects in California from mid-2019 (the beginning of the proposed regulation) to 2030. The following sections outline the assumptions used for generating the incremental unit costs of providing fall safety in each industry, as well as for the projections of the number of new residential units and the projections of the number of units undergoing re-roofing.

2.1.1. Residential Framing

Incremental compliance costs for fall protection in framing were obtained from a variety of sources, including industry experts familiar with the likely actions that framing contractors would take to come into compliance with the new regulations and DIR staff experts. Lowering the trigger height from 15 feet to 6 feet will require that framing contractors provide fall protection for all new single-story residential housing units and on the first story of all new multi-story residential. While there are a number of possible compliance actions that contractors could take to provide fall protection at the lower trigger height, for this SRIA we develop incremental costs estimates based on the assumption that 50% of contractors will provide personal fall protection harness and tie-off systems, 40% of contractors will provide bracket scaffolding with guardrails, and 10% of contractors will develop fall protection plans (FPPs). While other fall protection strategies, or a combination of the above strategies, could be employed depending on the specific situation, our assumptions provide a reasonable estimate of the likely approaches necessary to bring most firms into compliance with the new regulations.⁴

Table 3 summarizes the incremental unit costs of providing fall protection for residential framing. For personal fall protection systems, we assume that a harness and tie-off system costs, on average, approximately \$80 per worker and that the average useful life of a harness system is 2.5 years. Average incremental costs for scaffolding are considerably higher since contractors must either buy or rent the scaffolding and allocate labor resources to erecting and disassembling the scaffolding systems. Scaffolding costs were based on consultation with industry experts and ranges were constructed to reflect the need for different systems based on the characteristics of different residential units, including housing type and size.

Fall protection plans are the most cost-effective strategy, since a single plan can be applied to multiple similar units; however, based on consultation with regulatory and industry experts, the use of these plans is expected to be limited to no more than 10% of new units. For this analysis, we assume that a fall protection plan would require approximately 8 hours of the contractor's time, with an average wage of \$25/hour, and each FPP would cover approximately 50 housing units.

⁴ The use of safety nets is regulated by CCR, Title 8, CSO Section 1671 and provides specifications for design and placement of nets. Safety nets cannot be used unless it has been determined that personal fall protection is clearly impractical.

Table 3: Incremental Compliance Costs for New Residential Framing

	Incremental Employee/Unit Cost (\$/year)		
	Average	Low	High
Harness System (per employee)			
Harness + Tie-off	\$32	-	-
Scaffolding (per housing unit)			
Single-Story, Single Family	\$1,176	\$941	\$1,411
Multi-Story, Single Family	\$1,279	\$1,023	\$1,534
Multi-Family	\$125	-	-
Fall Protection Plans (per housing unit)	\$4	-	-

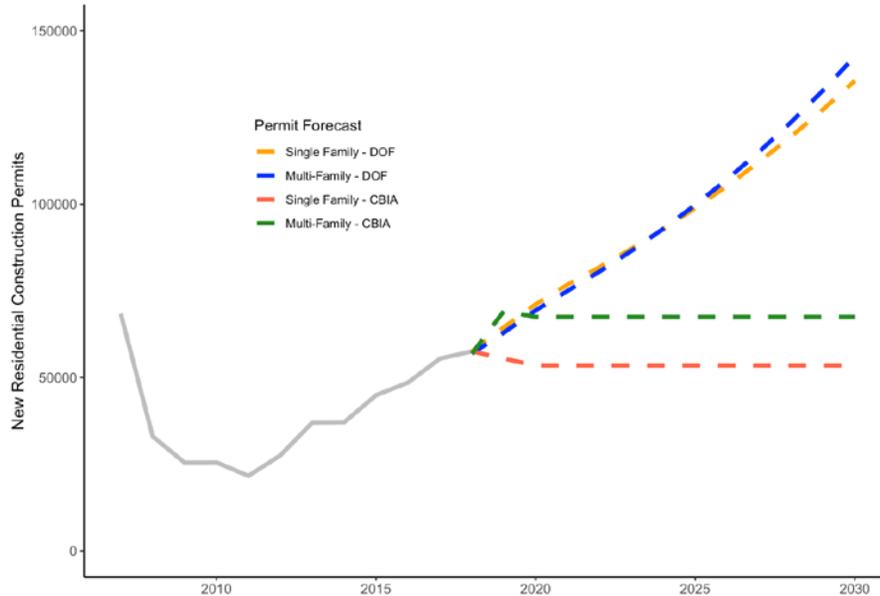
Source: California Professional Association of Specialty Contractors (CALPASC)

The incremental cost for providing scaffolding for framers working on single-story, single-family units is between \$941/unit and \$1411/unit, with an average incremental cost of \$1,176/unit. For the first story of multi-story, single-family units, the incremental costs are expected to range from \$1,023/unit to \$1,534/unit, with an average of \$1,279/unit. The incremental cost of providing scaffolding for multi-family homes is expected to be approximately \$125/unit. This cost is considerably lower because of the higher dwelling density and the lower number of exterior walls that require framing.

Assessing the overall compliance costs for scaffolding and fall protection plans requires multiplying the incremental unit costs of providing fall protection, described above, by an estimate of the number of new units that will be built in California. For this projection, we rely on two estimates of residential construction growth rates. The first is based on the California Department of Finance’s growth projections, which represent a more optimistic scenario of housing growth in the state. The second is from the California Building Industry Association (CBIA), which assumes slower residential construction growth over time. Figure 1 shows historical data and projections for new single-family and multi-family construction permits in California, for both the DOF and CBIA assumptions. While demand for new permits has grown steadily since the end of the 2007/2008 recession, the CBIA projects that new home permits will level off beginning in 2020. While the CBIA projections only go out to 2023, we have extended the assumption that new residential construction permits will remain constant until 2030. DOF’s growth projection for single family residential construction are 12.2%, 12%, 10.3%, 8%, and 6.5% for 2018-2022, respectively, with annual growth remaining at 6.5% per year until 2030. Similarly, for multi-family residential construction, DOF projects annual growth rates of 7.4%, 10.7%, 10.2%, 8.1%, and 7.4% for 2018-2022, respectively, and we assume annual growth from 2023-2030 of 7.4% per year. The difference in these growth projections highlight that the

construction industry is inherently volatile, and a number of macroeconomic and policy factors could affect the growth rate of new residential building.⁵

Figure 1: New Residential Construction Permits



Source: California Department of Finance and California Building Industry Association

CBIA estimates that approximately 25% of new single family-homes will be single-story. The remainder of new single-family homes are expected to be multi-story. Both types of units would incur additional cost. However, the incremental cost varies slightly due to the nature of the fall protection required.

The total incremental costs of providing personal fall protection in the form of harness tie-off systems was calculated by multiplying the incremental cost of the harness system by an estimate of the additional workers that will be required under the revised regulations to use harnesses. According to the Bureau of Labor Statistics Occupational Employment statistics, there were 146,080 carpenters working in California in 2015. BLS estimates that approximately 20.6% of these carpenters work in residential construction. To be conservative, we assume that extra harness system equipment will need to be purchased for approximately half of the 30,092 residential carpenters in California. This estimate is likely to be high given that many framers already require fall protection and not all residential carpenters are involved in framing. However, because more reliable data was not available, this conservative approach was warranted.

⁵ Factors include economic growth conditions, demand in regional labor markets, residential zoning and permitting policies, etc.

Comparing impacts on the overall building sector for these baselines should be done with care. Clearly, more rapid expansion of baseline sector growth would not only increase compliance cost, but also output, employment, and earnings for the entire sector. For either baseline, the latter would be expected to significantly exceed compliance costs. Because our net benefit calculations for the regulation are done only with respect to a single baseline, we do not capture the growth dividend implicit in DOF’s projections for long term housing supply.

The total incremental (fixed baseline, varying fall safety regulation) framing costs for 2020-2030 are shown in Table 4 for both the high and low residential construction growth scenarios (based on new permit growth rates from DOF and CBIA). Total framing costs are very sensitive to this assumption. Assuming higher growth rates from the Department of Finance suggest average framing costs increasing from \$40.6 million in 2020 to \$76.6 million in 2030. The lower growth rate assumptions from CBIA suggest that average total framing costs would remain constant at \$31.7 million per year beginning in 2020 since the number of new permits is assumed to remain constant. The majority of this cost (approximately two thirds) is attributed to increased fall protection for multi-story, single family homes in California. For 2019, the cost is assumed to be half of a fully implemented year since the proposed standards are assumed to come into effect half way through 2019.

Table 4: Incremental Costs for Residential Framing Contractors by Type of Residence (million 2015\$)

Year	Single-Story, Single Family	Multi-Story, Single Family	Multi-Family	Total
Average Cost				
2020	8.85	27.79	3.98	40.63
2030	16.44	52.52	7.67	76.63
Low Cost				
2020	7.18	22.33	3.98	33.49
2030	13.25	42.12	7.67	63.04
High Cost				
2020	10.53	33.25	3.98	47.76
2030	19.62	62.92	7.67	90.21
Estimates Based on CBIA Residential Construction Assumptions				
2019	3.39	10.51	1.94	15.84
2020+	6.78	21.01	3.88	31.67

2.1.2. Residential Roofing

The proposed revisions to the Cal/OSHA residential fall protection standards would affect residential roofing contractors working on both new units and re-roofing existing units. The

incremental compliance costs for each segment of this sector are outlined below. In general, we follow a similar assumption as with framing in terms of the assumed 50%-40%-10% compliance split between harness systems, scaffolding systems, and fall protection plans, respectively.

Re-Roofing of Existing Units

Residential roofing contractors that are re-roofing existing dwellings would also be required to comply with the revised fall protection requirements. The incremental compliance cost per housing unit and the number of re-roofing projects both differ considerably from the unit cost and number of units for roofing new units. In this section we discuss our assumptions for developing incremental cost estimates for re-roofing.

A survey of roofing contractors conducted by the Associated Roofing Contractors of the Bay Area Counties (ARCBAC) found that complying with the lower trigger height would add approximately 5-10% to the cost of a residential re-roofing project. These estimates represent the costs of providing more expensive scaffolding protection systems. For this analysis, we assume 4% additional cost since Bay Area estimates are likely to be higher than State averages and lower compliance cost options are available. We also assume that the average cost of a re-roofing job is between \$6,000 and \$10,000 per dwelling, with an average of \$8,000 per dwelling.⁶ While estimates could vary depending on the square footage of the house, pitch of the roof, and other factors, these estimates represent a reasonable average range for re-roofing projects across the State. The additional compliance cost for providing scaffolding fall protection for re-roofing projects is therefore between \$240 and \$400 per dwelling, with an average of \$320 per dwelling.

The harness system costs (per employee) and fall protection plan costs (per housing unit) are assumed to be the same for re-roofing as with framing. As with framing, we multiply the incremental harness system costs by half of the estimated 26,900 roofers in California. This is likely to be an overestimate of the new harness system costs, but without more reliable data is a reasonable approximation.

To calculate the total incremental scaffolding and fall protection plan costs, an annual estimate of the number of re-roofing projects is required. However, there is no data available on the precise number of re-roofing projects each year in California. We develop an estimate and projection for this by multiplying the total residential housing stock in California by the percentage of houses likely to be re-roofed in a given year. This number is then multiplied by the percentage of dwellings that are single story. The result is the number of dwellings that are re-roofed each year,

⁶ Re-roofing costs are derived assuming a range of \$3.5-\$5.5 per square foot and an average roof size of 1,700 square feet (source: <https://www.roofingcalc.com/roof-replacement-cost/>). For example, the low range of re-roofing cost is calculated at \$3.5/sq. ft. * 1,700 sq. ft. = \$5,950.

are not currently subject to residential fall protection standards, and will be subject to the new Cal/OSHA standards.

California Building Industry Association (CBIA) estimates show that at the end of 2013 there were approximately 13,624,106 residential dwellings in the State. Assuming a 1% growth rate through 2018, the first year of the proposed regulation, the housing stock would therefore be 14,319,072. We assume that the average useful life of a residential roof is 25 years, which implies that 4% (1/25) of the housing stock is re-roofed each year on average. As with the framing calculations above, we also assume that 25% of all residential dwellings in the State are single story. Based on these assumptions, the total number of re-roofing projects in 2018 is therefore 143,191 dwellings that would require additional fall protection.⁷

The total annual cost of residential re-roofing attributable to the proposed regulations is therefore the number of dwellings re-roofed each year multiplied by the incremental cost of re-roofing a dwelling. Our estimates for total annual costs therefore range from between \$14.5 million and \$23.8 million, with an average of approximately \$19.2 million in 2020. Since the housing stock requiring new roofs is projected to remain fairly constant from 2019 to 2030, we assume that re-roofing costs do not change, in real terms, over the analysis period. This re-roofing estimate is expected to be the same regardless of which residential construction growth rates projections are assumed since these new residential units are not likely to need roof replacements during the analysis period.

Roofing of New Units

In addition to the re-roofing market, many new residential units would be affected by the proposed regulation. The new standards would apply only to roofing contractors working on single story residential units. All multi-story residential buildings already require fall protection for roofers.

While the incremental costs of providing fall protection are generally similar for roofing new units and re-roofing existing units, there are some important differences. Based on discussions with industry experts and DIR staff, we assume for this SRIA that the incremental unit cost of fall protection with scaffolding systems is between \$375 and \$625 per unit, with an average of \$500 per unit. The incremental costs of harness systems and fall protection plans are assumed to be the same as with re-roofing projects.

⁷ The calculation for estimating annual re-roofing projects is total housing stock in year t x % of residential homes re-roofed each year x % of the housing stock that is single story = 14,319,072 (in 2018) x (1/25) x (0.25) = 143,191 re-roofing projects in 2018.

The new single-story residential housing projections discussed in the framing sector are also used as an estimate of the number of new roofs that will require compliance under the lower trigger height. Roofing multi-story units would not incur additional fall protection costs since roofing contractors are already required to provide fall protection for such units.

Using these estimates for incremental unit costs of providing fall protection for roofing and the projected number of new residential units that will be subject to the new regulations, we develop an estimate of the total cost of the proposed regulation on roofing contractors working on new residential units. Using DOF's residential construction growth assumptions, the total incremental costs of the proposed standards for roofing new residential units is estimated to be \$3.1 million to \$4.9 million per year in 2020, with an average incremental compliance cost of approximately \$4.0 million per year. Costs would increase to an average of \$7.2 million in 2030, with a range of \$5.5 million to \$8.9 million. If residential construction growth rates remain low, following the CBIA assumptions, incremental roofing costs will not escalate over time and will remain at an average of \$4.0 million, in real terms, over the analysis period.

2.2. Total Compliance Cost for Industry

The total direct costs of the proposed regulation would therefore be on average \$63.8 million per year in 2020, escalating to \$105.7 million in 2030. If residential construction growth rates follow a more conservative (low growth) trajectory, total incremental costs are likely to be much lower in 2030, with average costs estimated to be \$53.6 million per year over the analysis period. In the first year of the regulation, 2019, total costs would be approximately half of this estimate since the regulation would go into effect half way through the year.

This SRIA quantified all compliance costs for which reliable data is available. The proposed regulation notes that the revised fall protection standards would apply to residential construction. Non-residential ("light commercial") construction is not impacted. As a result, framing and roofing contractors engaged in these activities are unlikely to incur additional compliance costs similar to those estimated for residential framing and roofing.

2.3. Impact on Small Businesses

As discussed above, the proposed regulation to the fall safety standards are expected to primarily affect residential framing operations (NAICS code 238130), and roofing/re-roofing operations (NAICS code 238160) in California. Both of the industries are predominately comprised of small businesses, as shown in Table 5.⁸ According to U.S. Census Bureau data, in 2015 95.3% and

⁸ The California legislature defines small businesses as businesses that have fewer than 100 employees, are not dominant in their field, and are independently owned and operated (A.B. 1033, Ch. 346, 2016). Data is only

99.1% of framing and roofing contractors, respectively, had fewer than 100 employees. This suggests that small businesses will bear nearly all of the compliance costs of the proposed regulation.

Table 5: Number of Affected Establishments Defined as Small Businesses

Description	NAICS	Number of Establishments		% Small Business
		< 100 Employees	≥ 100 Employees	
Framing Contractors	238130	743	37	95.3%
Roofing Contracts	238160	2,080	19	99.1%

Source: U.S. Census Bureau, County Business Patterns 2015

2.4. Other Impacts to California Businesses

The SRIA requires discussion of three additional categories of impacts for California businesses:

- Expected impacts on innovation
- The Creation or elimination of businesses
- Competitive advantage or disadvantage

The proposed regulation is not expected to have a considerable impact on innovation in the state. It is plausible that firms will find more innovative ways to meet the standards at lower costs, thus slightly reshaping how framing and roofing activities under 15 ft. are conducted. It is also plausible that the increased demand for fall protection equipment (both scaffolding and harness systems) could induce some innovation in those fields, but it is difficult to predict a priori what the innovation, if any, would look like. It is also impossible to say if such innovations would actually represent an enhancement to worker safety and be found to be acceptable for use as a true fall protection method by the Division of Occupational Safety and Health.

The new demand for scaffolding and harness systems is likely to create new business opportunities in the state for firms in those sectors. This could be new firms entering the market or existing firms expanding their operations to meet the new demand.

Because all residential roofing and framing activities in the state are covered by the proposed regulations, we do not expect the proposed regulation to put California businesses at a competitive disadvantage relative to framing and roofing firms outside of the state. All companies seeking to do business in California would incur, on average, identical costs.

available to distinguish firm size based on the number of employees so we only apply that criteria to define small businesses for the purposes of this SRIA.

3. Direct Benefits

The Standards Board expects that the proposed revisions would improve safety for workers in residential framing and roofing. Requiring additional fall protection at the 6-foot threshold is expected to generate the following benefits for workers:

- Reduction in the number of fall-related fatalities
- Reduction in the number and severity of non-fatal fall-related injuries

Both of these benefits are quantified in this SRIA and are summarized in Table 6. Assumptions for deriving these benefits estimates are described in the following sections.

Table 6: Summary of Expected Benefits

Benefit Category	Benefit (million \$2015 per year)
Avoided Mortality	\$24.72
Avoided Injuries	\$38.87
Total	\$63.59

3.1. Avoided Fatalities

Falls, slips and trips account for approximately 50% of all fatalities in the construction sector. Total annual fall-related fatalities in California's construction sector are shown in Table 7.⁹ In 2015, California had 34 fatalities due to falls, slips, or trips in the construction sector. Between 2011 and 2015, there were an average of 24.6 fatalities per year due to fall-related incidents.

Table 7: Construction-Related Fatalities in California (2011-2015)

Year	Total Fatalities	Fatalities due to falls, trips, slips
2011	60	23
2012	54	20
2013	64	22
2014	39	24
2015	69	34
Total	286	123

Source: Census of Fatal Occupational Injuries, California Department of Industrial Relations

⁹ Census of Fatal Occupational Injuries (CFOI), California Department of Industrial Relations, Data available at <https://www.dir.ca.gov/oprl/CFOI/index.htm>

Official data reported in the Census of Fatal Occupational Injuries does not distinguish between residential and non-residential construction fatalities. Therefore, not all fatalities reported in Table 1 would have been avoided under the proposed amendments, which would apply only to residential construction activities. In order to identify the approximate number of fatalities that may have been prevented if the proposed regulations were in place, DIR staff reviewed incidence reports for all fall-related fatalities in the construction sector. The results of that analysis suggested that 14 of the 123 incidents between 2011 and 2015 could be attributed to residential falls from roof heights ranging between 6 feet and 15 feet. This represents approximately 11.4% of the construction fatalities related to falls, trips, and slips. Assuming that under baseline conditions the number of fatalities per year is equal to the annual average from 2011-2015, we would expect approximately 2.8 fatalities per year due to fall-related incidents between 6 feet and 15 feet. It is reasonable to assume that these fatalities would be prevented as a direct result of the proposed regulation.

Based on recommended guidelines from the U.S. Environmental Protection Agency (EPA) for cost-benefit analysis, the expected reduction in premature mortality discussed above can be monetized using the value of a statistical life (VSL) concept.¹⁰ The VSL is a measure of an average willingness to pay for a reduction in mortality risk. The EPA recommends using a value of \$7.4 million (in 2006\$). For this SRIA the recommended value is updated to \$8.83 million in 2015\$ using the Consumer Price Index.

Multiplying the expected annual incidence rate for fatalities (2.8 fatalities per year) by the VSL (\$8.83 million per fatality) suggests that the proposed regulation would result in approximately \$24.72 million per year in benefits from avoided deaths. This benefit would apply to California workers in residential construction.

3.2. Reductions in Non-Fatal Injuries

Reductions in non-fatal injuries due to falls in the residential construction sector are expected to be another significant source of benefits from the proposed regulation. Based on incidents reported to the Department of Industrial Relations' Worker's Compensation Information System (WCIS) between 2012 and 2016, there were 3,219 fall-related injuries (643.9 per year on average) in the residential construction sector.¹¹

In order to quantify the potential reduction in injuries, we examined compensation payments made to workers that reported fall-related injuries to DIR. Three categories of costs were

¹⁰ U.S. EPA, National Center for Environmental Economics, Office of Policy, 2010. *Guidelines for Preparing Economic Analysis, Appendix B: Mortality Risk Valuation Estimates*. EPA 240-R-10-001. Washington, DC. Available at [https://yosemite.epa.gov/ee/epa/erm.nsf/vwAN/EE-0568-22.pdf/\\$file/EE-0568-22.pdf](https://yosemite.epa.gov/ee/epa/erm.nsf/vwAN/EE-0568-22.pdf/$file/EE-0568-22.pdf)

¹¹ Worker's Compensation Information System (WCIS), Division of Worker's Compensation, Department of Industrial Relations. Information available at <https://www.dir.ca.gov/dwc/wcis.htm>

included: medical payments, indemnity payments, and settlement payments (Table 8). Over the five years of data analyzed for this SRIA, the average costs per case for medical, indemnity, and settlement payments were \$25,827, \$25,571, and \$8,974, respectively. The average annual cost per case of all payments was \$60,372. While cost reimbursements are not equivalent to willingness to pay for an avoided injury, WTP estimates were not available for this analysis.

Table 8: Compensation for Fall-Related Injuries in Residential Construction

Year of Injury	Cases	Cases with indemnity reported	Average Cost per Case			
			Medical	Indemnity	Settlement	All Costs
2012	547	329	\$27,416	\$35,519	\$13,698	\$76,633
2013	581	355	\$32,600	\$26,230	\$11,046	\$69,876
2014	614	377	\$23,286	\$26,116	\$9,999	\$59,401
2015	724	455	\$22,415	\$24,064	\$6,416	\$52,895
2016	753	395	\$23,416	\$15,927	\$3,713	\$43,056
Total	3,219	1,911	Average Cost			
			\$25,827	\$25,571	\$8,974	\$60,372

Source: Worker’s Compensation Information System (WCIS), California Department of Industrial Relations

Unlike with the avoided mortality estimation, it was not feasible to review all 3,219 residential construction fall-related injury incidents to determine how many would be avoided under the proposed regulation. Instead we assume that all of the reported incidents would be avoided if more stringent fall protection standards applied to residential roofing and framing workers. This is meant to represent an upper bound for the avoided costs of injuries. The actual avoided costs are expected to be lower.

Multiplying the upper-bound incidence rate of 643.8 fall-related injuries per year in residential construction by the average total cost per injury (\$60,372) results in a total avoided cost of \$38.87 million per year.

In addition to potentially over-estimating the reduction in injuries attributable to the proposed regulation, it is also plausible that the lower trigger height could introduce a degree of fall risk that is not present under current fall protection standards. The installation and breakdown of scaffolding systems, which are expected to be a widely used compliance action by framing contractors, could present a fall risk to workers. Workers installing and breaking down scaffolding are not subject to the current or proposed residential fall protection standard and therefore it is not likely that fall protection systems would be established to prevent injuries from falls.

3.3. Benefits to Businesses

All employers are required under the California Labor Code to purchase workers compensation insurance for their employees. Workers compensation rates are influenced by metrics such as the experience modification or x-mod (the x-mod is a loss-based comparison of a given employers compensation claims experience to other employers of a similar size operating in the same business and is used to tailor insurance costs to the characteristics of a given business). Any reduction brought about by the proposal resulting in a reduction in accident/fatality rates would have the effect of lowering the employer's x-mod and the employer's WC premium.

It is also possible that firms that develop more effective fall protection strategies in a less-costly manner may have a competitive advantage over firms that are less efficient in meeting the updated fall protection requirements. Thus, there could be a disproportionate impact on certain firms depending on their compliance efficiency and capacity to comply with the new standards.

4. Macroeconomic Impacts

4.1. Methodology

The economy-wide impacts of the proposed residential fall protection amendments are evaluated using the BEAR forecasting model. The BEAR model is a dynamic computable general equilibrium (CGE) model of the California economy. The model explicitly represents demand, supply, and resource allocation across the California economy, estimating economic outcomes over the period 2015-2030. For this SRIA, the BEAR model is aggregated to 60 economic sectors, with detailed representation of the construction sectors most likely affected by the proposed changes to fall protection standards.

The current version of the BEAR model is calibrated using 2015 IMPLAN data. Both the baseline and policy scenarios use the Department of Finance conforming forecast from June 2017. The conforming forecast provides assumptions on GDP growth projections for the State and population forecasts.

4.2. Scenarios

The macroeconomic impact results are based on the expected changes in compliance costs and health expenditures for the residential framing and roofing industries. The main scenario, *Proposed*, represents the expected macroeconomic impact of the average compliance costs. As discussed in previous sections, the direct compliance costs in the residential construction sector are subject to considerable uncertainty. We attempt to quantify the macroeconomic consequences of this uncertainty by considering two sensitivity scenarios. We consider a *High Cost* and a *Low Cost* scenario that use the compliance cost bookends discussed in the direct cost section. A summary of the three scenarios is shown in Table 9. For each of these three scenarios, we also estimate the macroeconomic impacts for both DOF and CBIA assumptions regarding growth rates in the number new residential construction units. Results for all scenarios are presented relative to a business-as-usual scenario that assumes that current fall protection standards remain in place.

Table 9: Scenarios Considered in Macroeconomic Assessment

Scenario	Description
<i>Proposed</i>	Average compliance costs in the roofing and framing industries. Reflects average unit costs for an average residential dwelling in California.
<i>High Cost</i>	Upper bound direct cost estimate for roofing and framing industries. Costs could be higher due either to above average square footage, more complex fall protection requirements, higher than expected growth in residential housing markets, and higher average re-roofing cost.
<i>Low Cost</i>	Lower bound direct cost estimate for roofing and framing industries. Costs could be lower due either to higher density housing requiring less fall protection per unit, or lower than expected growth in residential housing markets, and lower average re-roofing cost.

An analysis of regulatory alternatives that considers two alternatives to the proposed regulation was also completed and results are reported in Section 5.

4.3. Inputs to the Assessment

The proposed regulatory changes are analyzed in the BEAR model by changing the costs/expenditures of affected industries. The direct costs and avoided health costs outlined in previous sections are therefore the primary inputs into the macroeconomic assessment. Compliance costs associated with increased fall protection and reduced health care expenditures are mapped directly to each input in each of the affected industries.

For residential framing and roofing contractors, we assume that the total compliance cost is allocated to personal fall protection equipment, renting scaffolding and associated erecting/disassembling services, and fall protection plans. FPPs are modeled as an increase in labor time for the contractor.

The benefits attributable to avoided fall-related injuries are modeled as a reduction in health care expenditures for residential framing and roofing contractors. This approach assumes that health care costs are borne primarily by the firm through purchasing worker's compensation insurance. The economy-wide benefits of reducing the risk of premature fatalities are not modeled in the macroeconomic assessment. Any changes in worker productivity, either positive or negative, from the new standards are also not considered in the macroeconomic analysis due to a lack of supporting evidence.

A summary of direct costs and avoided health expenditures, mapped to BEAR sectors, is shown in Table 10 for the average, low, and high cost scenarios following DOF’s residential construction assumptions. These estimates are for a 2020 and would increase over time as residential construction grows. All monetary inputs are in real 2015\$ and no discounting adjustments have been made.

Table 10: Mapping of Direct Costs to Macroeconomic Inputs (values for 2020)

Scenario	Affected Sector (NAICS)	BEAR Sector	Cost Component	Value (million \$)
<i>Proposed</i>	Residential Framing	Residential Construction	Labor Costs	4.06
		Residential Construction	Materials Costs	36.56
		Residential Construction	Health Expenditures	-19.90
	Residential Roofing	Residential Construction	Labor Costs	2.32
		Residential Construction	Materials Costs	20.84
		Residential Construction	Health Expenditures	-18.97
<i>Low Cost</i>	Residential Framing	Residential Construction	Labor Costs	3.35
		Residential Construction	Materials Costs	30.15
		Residential Construction	Health Expenditures	-19.90
	Residential Roofing	Residential Construction	Labor Costs	1.76
		Residential Construction	Materials Costs	15.84
		Residential Construction	Health Expenditures	-18.97
<i>High Cost</i>	Residential Framing	Residential Construction	Labor Costs	4.78
		Residential Construction	Materials Costs	42.98
		Residential Construction	Health Expenditures	-19.90
	Residential Roofing	Residential Construction	Labor Costs	2.87
		Residential Construction	Materials Costs	25.84
		Residential Construction	Health Expenditures	-18.97

4.4. Results

Macroeconomic results are presented in the following sections for each of the compliance cost scenarios discussed above. This section discusses the main results, which reflect the average compliance cost scenario (*proposed*), along with the *low cost* and *high cost* sensitivity scenarios, for the residential framing and roofing sectors. Taken together, these results provide a confidence interval for the macroeconomic impact of the proposed regulation. Because compliance cost results are very sensitive to residential construction forecasts, macroeconomic results are presented for both the DOF growth rate assumptions and the CBIA’s slow growth rate assumptions.

The macroeconomic impacts of the proposed changes to the fall protection standards are shown in Table 11. Relative to the size of the California economy, the impacts are quite small. Using

Department of Finance assumptions about the growth rate in residential construction, Real GDP is projected to be negatively impacted by \$106 million in 2020 and \$387 million in 2030. For the slow growth assumptions, real GDP is projected to decline by \$89 million in 2020 and \$236 million in 2030, relative to the baseline. These declines are a result of the higher costs in the residential framing and roofing. It should be noted, however, that these amounts are negligible from an economywide perspective, representing approximately a 0.0069% and 0.0042% reduction in real GSP in 2030, relative to the baselines set for the DOF and CBIA growth rate assumptions, respectively. Other pecuniary macroeconomic indicators, such as real business output, investment, and household income follow the trends in real GDP, exhibiting modest declines. Following other macroeconomic trends, employment also drops slightly due to the proposed regulations.

The same trends are the result of slightly higher costs in an employment-intensive sector of the California economy. There are two primary effects results from the higher costs. First, the additional compliance costs are assumed to be passed along to consumers of residential framing and roofing services. Since the demand for residential construction services is relative inelastic in California, the higher prices in these sectors induces expenditure shifting away from other goods and services towards residential construction spending. The second effect is the modest decrease in demand that results from the marginally higher prices in residential construction. This slight drop in demand is partially responsible for the slower employment growth over time, relative to the baseline. It is important to note that the negative employment impacts do not represent a loss of existing jobs but rather a slower job creation growth rate relative to a very optimistic baseline for sector growth. Both of these direct effects also have indirect and induced spending effects that exacerbate to the total effects for each of the macroeconomic indicators. This is why the magnitude of the total macroeconomic effect is larger than the change in direct costs and benefits outlined in previous sections.

From an industry perspective, these results should be interpreted with care. With respect to both baselines (DOF and CBIA), all estimated impacts are negligible from a macroeconomic perspective, yet they could be individually significant for the construction sector. Having said that, the baselines are so different that net effects are difficult to compare. Under a more conservative CBIA baseline, compliance costs grow modestly with the market as a whole and net effects would be slightly positive. Under the DOF baseline assumptions, the market would drive much more robust growth of earnings and all costs of operation (including compliance), assuming the industry remains competitive in this more dynamic vision of the housing market, earnings (and therefore profits) would be expected to grow much faster than costs of compliance with this single regulation. Thus, the future of the industry looks brighter under both baselines, even with compliance.

Table 11: Economy-wide Impacts of Proposed Changes to Residential Fall Protection (Difference from baseline, million 2015\$, low/high cost scenarios in parentheses)

DOF Residential Construction Growth Rate Assumptions				
	2018	2020	2025	2030
Real GDP	-38.9 (-32.6 - -46.8)	-105.8 (-88.5 - -127)	-227.2 (-189.4 - -271.9)	-386.7 (-321.5 - -462)
Employment (FTE)	-84.6 (-72 - -103.1)	-282.8 (-239.2 - -341.9)	-734.4 (-614.8 - -880.6)	-1246.5 (-1039.6 - -1491.2)
Real Output	-18.6 (-15.3 - -22.5)	-74.6 (-61.7 - -89.5)	-237.5 (-197.2 - -283.9)	-453.6 (-376.5 - -541.7)
Investment	-34.3 (-28.6 - -40.9)	-77.5 (-64.6 - -92.4)	-114.4 (-95 - -136.5)	-158.7 (-131.5 - -189.1)
Household Income	-6.9 (-6 - -8.6)	-28.4 (-24.2 - -34.5)	-91 (-76.4 - -109.3)	-173.7 (-145 - -207.9)
CBIA Residential Construction Growth Rate Assumptions				
	2018	2020	2025	2030
Real GDP	-34.5 (-27.4 - -41.6)	-88.9 (-70.8 - -107.0)	-161.5 (-129.1 - -193.8)	-236.1 (-189.0 - -283.1)
Employment (FTE)	-78 (-61 - -96)	-249 (-196 - -302)	-553 (-440 - -665)	-812 (-649 - -975)
Real Output	-16.7 (-13.8 - -20.2)	-63.9 (-50.9 - -76.9)	-175.5 (-140.5 - -210.4)	-291.6 (-233.7 - -349.3)
Investment	-29.7 (-23.9 - -35.6)	-62.6 (-50.4 - -74.9)	-73.3 (-59.9 - -87.6)	-81.3 (-65.4 - -97.3)
Household Income	-6.7 (-5.1 - -8.3)	-25.8 (-20.1 - -31.5)	-70.3 (-55.9 - -84.7)	-116.0 (-92.6 - -139.4)

Results from the low and high cost sensitivity analysis are also shown in Table 11. Neither scenario changes the general macroeconomic conclusions discussed above; however, the magnitude of the effects vary slightly. In general, the range of input costs varies the macroeconomic results for all indicators by $\pm 20\%$.

Table 12 breaks down the total change in real business output into sector-specific changes in real business output. The decline in construction sector output reflects the increase in direct costs to that industry, driven largely by the slight drop in demand from a marginal increase in the price of roofing and framing services. The decrease in service sector output is due to the indirect and induced expenditure effects of the higher costs in the construction sector. Services are important both in the supply-chain for construction (measured as indirect effects) and for household expenditure shifting (measured as induced effects). It is evident that for large, integrated sectors such as construction, these indirect and induced effects could far outweigh the direct effects of higher costs in the construction sector.

Table 12: Decomposition of Industry Output (Difference from baseline, million 2015\$)

Sector	2020		2025		2030	
	DOF Assumptions	CBIA Assumptions	DOF Assumptions	CBIA Assumptions	DOF Assumptions	CBIA Assumptions
Ag/Forestry	1.60	1.42	-0.73	-0.55	-4.08	-2.76
Mining	-0.58	-0.42	-1.85	-1.2	-3.81	-2.17
Utilities	1.33	1.17	-0.08	-0.11	-2.16	-1.55
Construction	-49.48	-40.21	-70.43	-45.15	-96.89	-49.46
Manufacturing	25.27	21.52	15.89	9.82	2.94	-2.64
Retail Trade	-6.38	-5.22	-17.28	-12.14	-31.04	-18.82
Wholesale Trade	-9.81	-8.33	-23.49	-16.96	-41.13	-25.54
Transportation	-2.45	-2.05	-8.72	-6.34	-16.92	-10.71
Services	-33.77	-31.42	-129.60	-101.88	-258.26	-176.4
Government	-0.34	-0.33	-1.18	-0.94	-2.25	-1.54

4.5. Fiscal Impact

The proposed regulations are not expected to have a significant fiscal impact on state and local governments. However, there are several areas where minor fiscal impacts could occur. For example, state and local governments both own and develop property for administrative use. If any new properties are constructed that meet the definition of residential construction in the proposed regulation, then the framing and roofing costs of such projects would increase by the incremental amount outlined in the direct cost section. This could apply to any single-story residences constructed by state and local governments, or the first-story of any multi-story residential dwellings. Data was not available to complete a detailed quantitative assessment of these impacts; however, after consultation with the Department of General Services (DGS), there are not expected to be many units built by the State that would be subject to the lower trigger height.

The proposed regulations are not expected to have a fiscal impact on the implementing agency. DOSH will implement the propose regulations using currently approved resources and staffing levels. If the agency anticipates additional resources being necessary, a budget change proposal will be submitted.

The very modest macroeconomic stimulus arising from the proposed standards can also be expected to have an induced impact on fiscal revenue. However, because the macroeconomic impact is estimated to be negligible, any change in government revenue is also expected to be quite small.

5. Analysis of Regulatory Alternatives

As required for major regulations, this SRIA considers two regulatory alternatives to the proposed regulation. For this analysis, the proposed scenario reflects results assuming DOF’s residential construction growth rates.

First, a more stringent regulatory alternative (*stricter*) considers an alternate approach to mandating the trigger height requirement. Instead of allowing framing and roofing contractors the option to utilize either scaffolding or personal fall protection equipment, the stricter approach would mandate scaffolding for all work that would be covered under the new regulations. It is unclear whether such an approach would improve safety outcomes.

Second, a less stringent regulatory alternative, where current Title 8 Fall Protection standards are maintained, is considered. Such an approach would impose no new compliance costs on the roofing and framing industry, and worker safety benefits from improved fall protections would also not be realized.

5.1. Economic Impacts of the Regulatory Alternatives

5.1.1. More Stringent Regulatory Alternative

To assess the direct costs for the more stringent regulatory alternative, we assume that the 50% of workers in the core scenario assumed to comply with the lower trigger height requirement using personal fall protection (ie, harness systems) will instead comply using more expensive scaffolding systems. The per unit and per worker cost assumptions for scaffolding systems remains unchanged from the analysis conducted for the proposed regulation scenario.

Table 13 shows the impact of the assumption of scaffolding vs personal fall protection on the roofing and framing sectors. Under the regulatory alternative, total direct costs are estimated to be \$153.51 million in 2020, increasing to \$258.19 in 2030. This is \$90 million and \$105.7 million higher, in 2020 and 2030 respectively, than the total costs under the proposed regulation.

Table 13: Compliance Costs by Sector for the Proposed Regulation and More Stringent Regulatory Alternative (million 2015\$)

	Proposed		Stricter Alternative	
	2020	2030	2020	2030
New Roofs	\$3.99	\$7.22	\$8.90	\$16.96
Re-Reroofing	\$19.16	\$21.85	\$46.74	\$53.44
Framing	\$40.63	\$76.63	\$97.87	\$187.79
Total	\$63.78	\$105.70	\$153.51	\$258.19

There is no data available to analyze what the direct benefit of the more stringent regulatory alternative. One would be required to know exactly the relative safety of the personal fall protection system versus a scaffolding system. Instead we assume that the benefits would be similar to those estimated under the analysis proposed regulation. This includes \$24.72 in mortality benefits and \$38.87 million in non-fatal injury benefits. Under these assumptions the benefit cost ratio would decrease substantially under the regulatory alternative, suggesting that the regulatory alternative is not a cost-effective approach.

The macroeconomic impact of the stricter regulatory alternative is shown in Table 14. As is expected, the higher costs in the framing and roofing industries are passed along to the broader economy, although the effects are negligible, relative to the overall size of the California economy. However, relative to the size of the proposed regulation, the macroeconomic impacts of the regulatory alternative are 2-3 times as large (in the negative direction) for all core macroeconomic indicators.

Table 14: Macroeconomic Impact of the Residential Fall Protection Regulatory Alternative (Difference from baseline, million 2015\$, proposed regulation impact shown for reference)

	2018		2020		2025		2030	
	Proposed	Stricter	Proposed	Stricter	Proposed	Stricter	Proposed	Stricter
Real GDP	-38.9	-93.5	-105.8	-254.4	-227.2	-549.2	-386.7	-938.8
Employment (FTE)	-84.6	-204.4	-282.8	-681.7	-734.4	-1773.3	-1246.5	-3021.6
Real Output	-18.6	-44.8	-74.6	-179.3	-237.5	-572.9	-453.6	-1099.1
Investment	-34.3	-82.1	-77.5	-186	-114.4	-277.1	-158.7	-386.8
Household Income	-6.9	-16.9	-28.4	-68.6	-91	-219.7	-173.7	-420.7

5.1.2. Less Stringent Regulatory Alternative

There are no direct costs to regulated entities of the less stringent regulatory alternative. Current costs associated with residential fall protection above the current trigger height would remain unchanged, but new costs would not be incurred. However, there is an opportunity cost associated with this regulatory alternative: the cost of foregone worker safety benefits under the proposed regulation (measured above as \$24.72 million in mortality benefits and \$38.87 million in non-fatal injury benefits).

Macroeconomic impacts of the less stringent regulatory alternative were not calculated. Since there was no change in compliance costs under this scenario, there are expected to be no effects on the broader economy, relative to the baseline.

5.2. Comparison to Proposed Regulation

Both regulatory alternatives are less attractive from an economic perspective than the proposed regulation. The less stringent alternative does not deliver any worker safety benefits to framing and roofing sector workers. The more stringent alternative is estimated to be a more expensive approach and would not clearly improve worker safety beyond the proposed regulation. Based on this analysis, the proposed regulation appears to be the most cost-effective approach to delivering the intended worker safety benefits.

6. Interpretation of Economic Results

The Department of Industrial Relations' proposal to lower the trigger height at which fall protection is required for residential construction is expected to generate both benefits in terms of improved worker safety, as well as additional compliance costs for residential roofing and framing contractors. The benefits of the proposed regulation are the reduction in fatalities and injuries at heights below the current trigger height and above the proposed 6-foot trigger height. Roofing and framing workers would be the primary beneficiaries of this proposed regulatory change. The additional compliance costs are the incremental costs necessary to provide workers additional fall safety protections, including the costs of harness systems, scaffolding, and fall protection plans. These costs are expected to accrue to framing and roofing contractors, and ultimately would be passed along to consumers. The benefit-cost ratio for the average cost scenario is 1.19, implying that the direct benefits of the proposed regulations are approximately 19% higher than the direct compliance costs.

Macroeconomic results show the proposed revisions will likely have a negligible aggregate impact on the California economy, measured in terms of Gross State Product, employment, real business output, and household income. The higher compliance costs in the residential construction sector are expected to modestly slow the growth rate in output and employment in both the residential construction sector and supporting sectors within the economy; however, the magnitude of these impacts is quite small. These slight adverse macroeconomic impacts assume that the incremental fall protection costs in residential construction are passed along to consumers and thus raise the prices of these services marginally.

From an industry perspective, the impacts of the regulation should be interpreted with care. Compliance costs are positive regardless of the choice of sector growth baseline, with higher relative cost in the DOF baseline. It must be emphasized, however, that this baseline also stipulates much more rapid housing stock expansion than CBIA estimates. This means correspondingly rapid growth sector employment and earnings, the latter far outweighing the expansion of compliance costs with either regulatory regime. For this reason, we estimate that, other costs equal, sector profitability would be significantly higher with compliance under the DOF baseline.