

“It’s not about saving the structure. It’s about giving folks more time to get out of the building.”



Playing With Fire

Code or no code, cost or no cost, fire safety is an issue builders and manufacturers can't afford not to get right—now

BY LES SHAVER / ILLUSTRATIONS BY CATALOGTREE

Inside its Kelso, Wash.-based Western Fire Center, just across the river from Portland, Ore., Boise Cascade Co. is testing new solutions monthly with one goal in mind—to develop I-joists that can meet the International Code Council's (ICC) requirement that a floor assembly stand up to fire for 15 minutes.

"We're talking to coating manufacturers and chemical companies" says Dennis Huston, vice president of sales and marketing for Boise. "We test and research everything."

That research is warranted.

In 2014, 2,419 Americans could have used more time to get out of their homes. That's how many people died in residential fires, according to the U.S. Fire Administration. Overall, fire fatalities are down—3,900 people died in homes 10 years earlier (and fire deaths fell 26% from 2002 to 2011). Smoke alarms have helped.

But as fatalities fall, evidence exists that new a threat lurks—in the form of new, modern homes and furnishings that present dangers not found in homes built a generation ago.

Recent research says open floor spaces can fuel fires faster in today's house versus one of 30 years ago. But that's only part of the problem. Today's furniture and drapes, often manufactured with synthetics, can go up in flames quicker than the furnishings of yesteryear. For instance, Underwriters Laboratories reports that modern chairs release peak heat in 4 minutes and 20 seconds, while older chairs released peak heat in just over 15 minutes.

And that's not the only problem.

"When you look at products [in the home] everything is synthetic," says Peg Paul, communications manager for the Home Fire Sprinkler Coalition (HFSC). "Once that product is on fire, it's a whole different type of poisonous burn that's toxic."

The fire threat is real, and Boise isn't alone among manufacturers trying to give people more time to escape a burning home. Building product manufacturers are working on products that extend the amount of time occupants have to get out of a home or suppress the fire altogether. These initiatives could mean life or death in some instances.

But, for myriad reasons, builders haven't lined up to adopt such products. Code confusion gets blamed in some cases. In others, the issue is cost—with home building associations' fighting against fire protection measures in local and state codes. But as these technologies evolve and fire's threat explodes, builders may need to pay more attention.

The Building Materials

Larry Zarker, CEO of the Building Performance Institute, thinks building a home that stands a better chance of surviving fire may mean going back in time—something today's builders and home buyers are loath to do.

"If fire is enough of a concern, the best choice is to look at the materials that go into the construction," he says. "I don't think anybody is going to go back and plaster walls, but they could use a fire-resistant drywall."

Instead of turning back the clock, myriad building products manufacturers are pushing fire-retardant technology forward.

"It's not about saving the structure," says Ben Skoog, vice president of growth and innovation for Nashville, Tenn.-based LP Building Products. "It's about giving folks more time to get out of the building."

LP offers FlameBlock Fire-Rated OSB Sheathing, which sports an exterior OSB sheathing with a magnesium oxide coating. The company currently is experimenting with other technologies that could make materials—like wood—fire resistant. Maybe it's an overlay, a coating, a laminate, or, under a

best-case scenario, a chemical treatment that is cost effective, maintains all the workability features, and retards fire. In a kitchen (from 2007 to 2011, cooking caused 43% of home fires, according to the National Fire Protection Association), Skoog thinks an innovation in floors, ceilings, walls or a different approach to cabinets could be very effective.

"There are more parts to the house that burn other than structural members or exterior claddings," he says. "Let's look at the fire resistance of interior panels and furnishings, like a replacement for drywall or case goods that slows down fire spread. If you can keep rooms from going to the flashover stage [when the entire room is engulfed in flames], you could help save lives that way. If you can build a room out of fire-resistant materials, you can possibly delay that flashover point by 10 or 15 minutes or sometimes even an hour."

Tacoma, Wash.-based Eco Building Products got into the game with Eco Red Shield. The product, protected by a coating that controls the moisture in lumber and protects the lumber from mold, wood-rot, termites, and fire, according to the company.

The Sprinkler Fight

While the building industry continues to work on technologies to withstand fire, code officials seem to be leaning in another direction.

"Over the last 10 or 15 years, the trend has gone from passive to active fire detection—sprinklers and smoke detection as opposed to fire-rated walls," says James Langhorne, a 30-year veteran of the California Fire Service and currently a consulting Fire Protection Engineer.

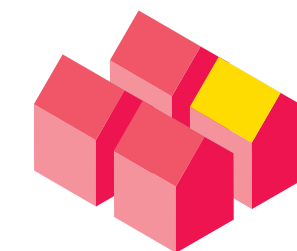
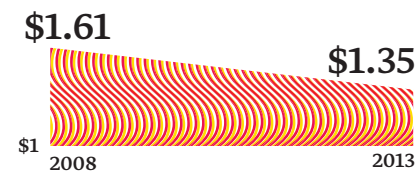
Unlike the sophisticated wood coatings, sprinklers are not a new technology. First introduced in the Theatre Royal in the United Kingdom in 1812, they're now mandated in California and Maryland.

FIRE SPRINKLERS REDUCE LOSS

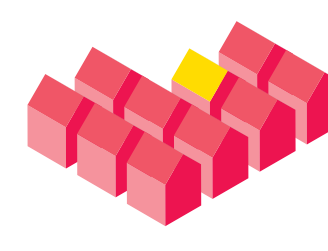
\$2,166 AVERAGE FIRE LOSS IN A HOME WITH SPRINKLERS

82 REDUCTION IN % OF FIRE DEATH RATE PER 1,000 REPORTED HOME STRUCTURE FIRES WITH WET-PIPE SPRINKLERS

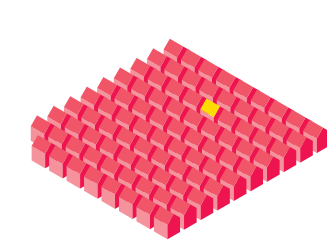
AVERAGE RESIDENTIAL SPRINKLER SYSTEM COSTS PER SPRINKLERED SQUARE FEET



Chances your household will have a reported home fire in an average lifetime: **1 in 4**



Chances that someone in your household will suffer a fire injury in an average lifetime: **1 in 10**



Chances that someone in your household will suffer an injury in a reported fire in an average lifetime: **1 in 89**

They've met resistance in other states. In 2012, Alabama adopted the 2009 International Residential Code, but opted not to impose the code's fire sprinkler installation standard. In 2009, several states passed legislation to block government-mandated sprinkler codes. Minnesota recently passed a bill requiring sprinklers in homes larger than 4,500 square feet, but the measure got shot down in the courts.

NAHB officials, who declined a request to comment for this article, sharply oppose sprinkler laws, citing a litany of factors. They

include installation cost; housing affordability; freezing concerns in cold climates; more complex design, installation, and inspection requirements (that increase costs); and liability for failures in installation.

Colorado—in the news lately for wildfires—is a state where home builders successfully pushed back on sprinkler mandates. Todd Anderson, chief operating officer of Colorado Springs-based Challenger Homes, says the mandate would have added roughly \$15,000 to the price of a home.

"It would add \$18,000 in sales price," he

THE EXTERIOR THREAT

In fire-prone areas, like Colorado and California, builders have learned a lot about defending homes from exterior fires and making it easier for responders to arrive when a threat is imminent. Here are their tips:

Defensive Space In Ventura County, Calif., if a homeowner doesn't maintain a 100-foot space between burnable fuel load, like brush or trees, and buildings, they get a ticket and have 30 days to fix the issue. The program apparently works. In October 2014's wildfires, Ventura County lost only 24 homes, while nearby San Diego County lost 3,600 homes. "They have put in place the strongest building codes and defensible space requirements," says Robert Raymer, senior engineer and technical director for the California Building Industry Association. "Those work very well when they're enforced."

Blocking the Gates In the Angora Fire, in Lake Tahoe, Calif., 242 homes were lost. A big reason: Burning embers entered through attics and cracked single-pane windows. While tempered glass solved the window issue, requirements mandating vents that either have mesh or close when exposed to heat appear to have kept the embers on the outside. "The ability of fire to gain access to the home through vent or window has been all but shut down," Raymer says.

Ease of Access In Colorado, Andy Stauffer, CEO of Stauffer & Sons Construction, says the threat of fire plays a big role in where a home is placed on a lot. "We look at the proximity of fire hydrants and ability of fire trucks to get in and fight a fire," he says. "Those are aimed at getting people out in case of fire and getting fire responders in."

A FIRE DEPARTMENT RESPONDED TO A FIRE EVERY 24 SECONDS IN 2014



ONE HOME FIRE WAS REPORTED EVERY 85 SECONDS IN 2014



consumer. How do you put a price tag on it? If you're talking to a guy who is struggling to support his family and you hit him with thousands of dollars of bills because the code requires it, he's going to look at you and say, 'I won't build. I'll go rent.'

Flooding is another issue with sprinkler systems that concerns Hudek, though Langhorne says those can usually be solved by better installation training.

"We're having activations that occur that don't have to do with fire," Langhorne says. "How stable are these sprinkler systems?" is becoming a question. Best practices need to be incorporated into what we're doing."

But Lorraine Carli, vice president of outreach and advocacy for the NFPA, contends that isn't a common scenario. "Only the sprinkler closest to the fire typically activates," she says. "Most fires are contained and controlled by one sprinkler."

Beyond questions of flooding, the sprinkler debate comes down to the core issues of costs and effectiveness. Just how much is enough to spend on something that, by all accounts, can save lives?

"Home fire sprinklers reduce the chance of dying in a home fire, give people time to escape, and offset the impact that we're seeing with the way homes are being built today," says Carli, who contends sprinklers cost about \$1.35 per square foot.

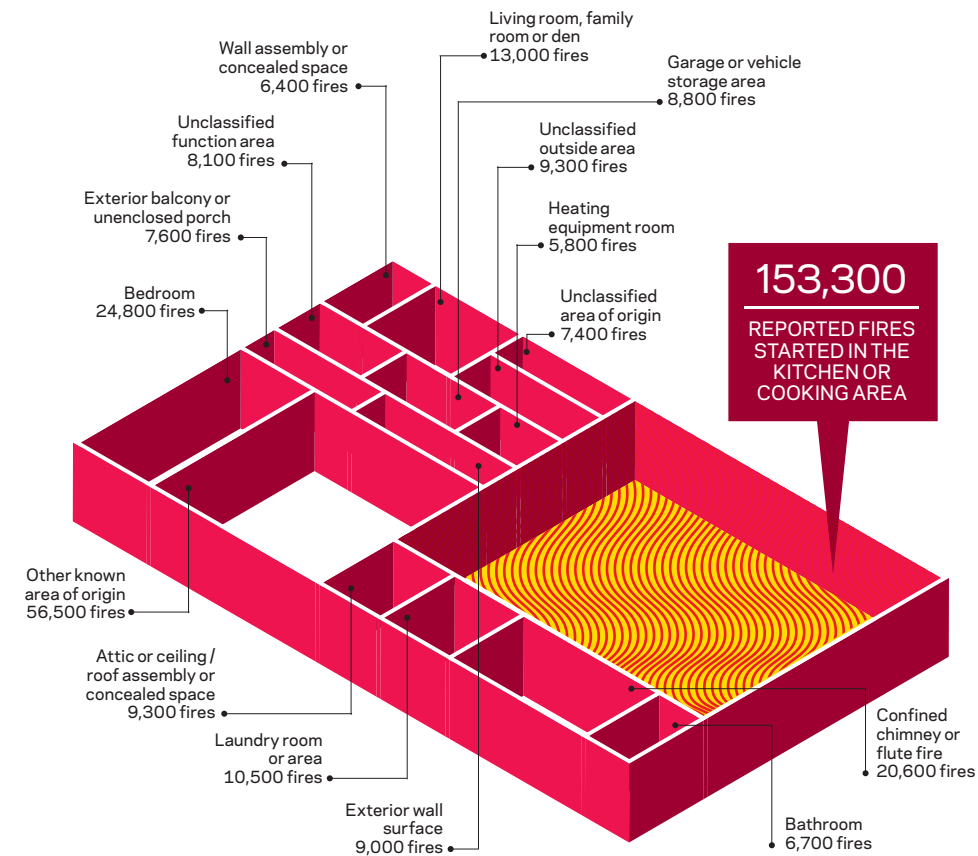
As with I-joists and coating, sprinkler technology is also evolving. Manufacturers have developed partial sprinkler systems to protect places where a lot of fires break out—such as the basement—while also saving money.

"They serve a purpose," Hudek says of partial systems. "I see having one in a utility room with furnace and water heater, but to require a whole house to be sprinkled is overkill."

Code Confusion

Boise's pursuit of an I-joist that can stand up to 15 minutes of fire isn't just good citizenship; it also wants to preserve its market share.

Boise can meet the 15-minute hurdle—al-



beit with post-installation applications such as drywall or mineral oil on the top or bottom flange. But the company wants a one-step solution, and the stakes are high.

Last year the ICC ruled that Boise's product did not meet the code. "As part of the I-joist industry we're losing market share because of this issue," Huston says. "Builders are using dimensional lumber and forgetting why they went to I joist in the first place."

Boise isn't the only manufacturer focused on fire. Weyerhaeuser offers an I joist with Flak Jacket protection with a proprietary, factory-applied coating that the company says enhances the joists' fire resistance and enables them, to meet both single- and multi-family

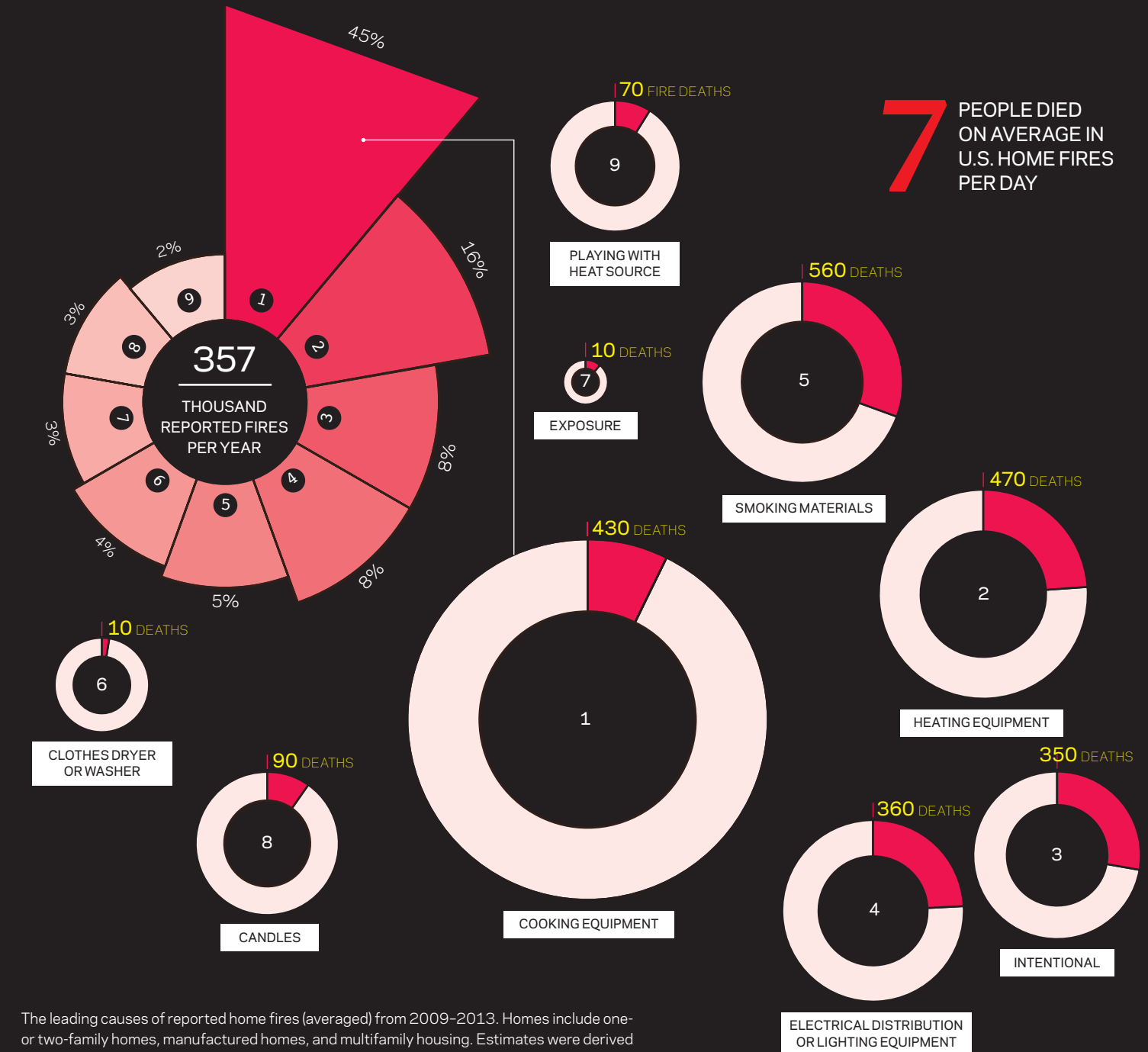
fire protection code requirements.

That code grandfathers in dimensional lumber is a point of contention. Some question whether a 2x10 can withstand fire for 15 minutes. But ultimately, that's just one example of code confusion. Manufacturers and builders alike see issues with codes. And, if codes are contradictory, unclear, or not enforced, it can be worse than not having codes at all.

Raymer says not all California municipalities enforce the statute requiring defensible space clearance (see sidebar, p. 97) provided up to 100 feet or the property line. "If a jurisdiction has sporadic enforcement or no enforcement, you have a problem," Raymer says.

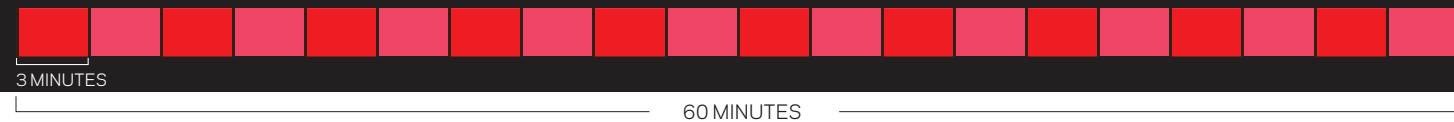
But this isn't just a problem in California.

FIRE BY THE NUMBERS

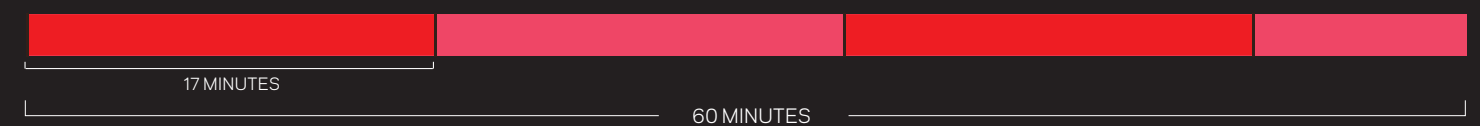


The leading causes of reported home fires (averaged) from 2009–2013. Homes include one- or two-family homes, manufactured homes, and multifamily housing. Estimates were derived from the U.S. Fire Administration's National Fire Incident Reporting System and the National Fire Protection Association's annual fire department experience survey.

MINUTES TO GET OUT OF A HOUSE TODAY: 3 OR 4



MINUTES TO GET OUT OF A HOUSE 30 YEARS AGO: 17



“Codes are discretionarily enforced,” Skoog says. “States and municipalities may or may not enforce them.”

In other areas of the country, well-intentioned codes actually seem to be getting in the way of fire safety. For instance, Skoog recalls an incident where fire officials, concerned that flames would scale the side of a building and enter the attic through vented soffits, mandated aluminum flashings over the vents or solid soffits. The problem: ventilation code dictated that those areas not be covered.

“Well-intentioned codes put themselves in conflict. There’s no realistic way to meet all of the different codes,” Skoog says, noting that builders are “frustrated in trying to figure out which code they’re not going to meet.”

Growing Trend

While Skoog sees the frustration with codes, he thinks the people creating them are coming from a good place. “I have empathy for code officials,” Skoog says. “They’re trying to pass codes to save lives; building science and construction processes are complex.”

In 1991, a fire raged through the hillsides of

northern Oakland, Calif., and southeastern Berkeley, killing 25 people and destroying 2,843 single-family dwellings and 437 apartment and condominium units. In the aftermath, local jurisdictions and insurance companies demanded changes to code—regardless of whether builders liked it.

Still, concessions were made. California’s energy code already requires the use of dual-pane windows, but the state fire marshal simply required that one of the two panes be tempered glass, which lowered the cost of compliance from \$6,000 to less than \$1,500.

“It doesn’t break the bank and it can stop fire from penetrating,” Raymer says. “By doing that, we kept the cost way down.”

California remains possibly the nation’s toughest place to build. “The California Building Code has some intense restrictions and mandates,” says Charles McKeag, California land division president for Meritage Homes. “There’s not a whole lot more you can do to California codes [as far as fire protection].”

Raymer acknowledges that reality. “California uses the national code as basis for its state code,” Raymer says. “California statute

allows our state code to be more stringent than the national code, but not less stringent.”

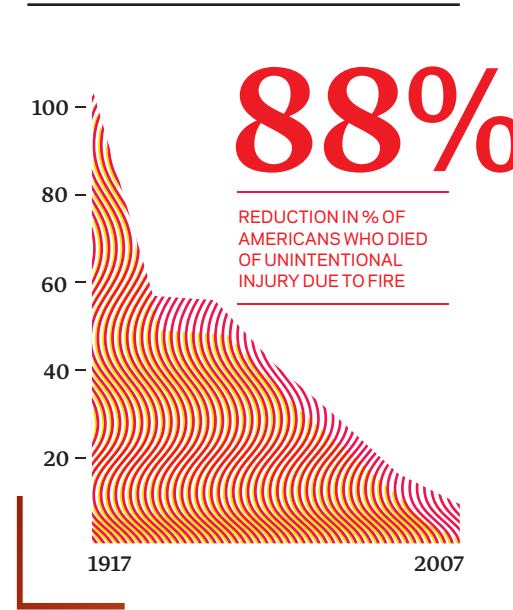
As the cost of fire increases up to \$11.6 billion in 2014, according to the NFPA, it’s not out of the question for other states to look to California as a template for codes. Raymer wouldn’t be surprised. “You have to pass a plan check and multiple inspections as a building is put up,” Raymer says. “We’re seeing Oregon, Washington, Idaho, and jurisdictions in Colorado using much of what we’ve done.”

And, as insurance companies look to mitigate their risk, more stringent fire codes could seep east of the Rockies and wildfire territory. Just look at sprinklers—while a number of states have beaten back sprinkler mandates, others are considering stronger regulation.

The NFPA says New Jersey currently has a bill on the governor’s desk that would make it the third state to require sprinklers statewide. “I believe that fire sprinklers in the residential environment will be adopted around the country,” Langhorne says.

If builders can get ahead of these changes and still make a profit, they might be able to save some lives in the process. **B**

OUT OF 1 MILLION AMERICANS, THE AVERAGE NUMBER WHO DIED OF UNINTENTIONAL INJURY DUE TO FIRE HAS DECREASED OVER TIME



FIRE DEFENSE

Andy Stauffer has learned of the destruction that fire can wreak firsthand. As CEO of Stauffer & Sons Construction in Colorado Springs, Colo., he’s rebuilt 21 homes destroyed by the Waldo Canyon Fire in 2012, and Black Forest Fire in 2013.

When a 2,000-degree fire barrels down the side of a mountain, there’s very little a home builder can do to prevent damage. But in less ferocious circumstances, an ounce of prevention goes a long way.

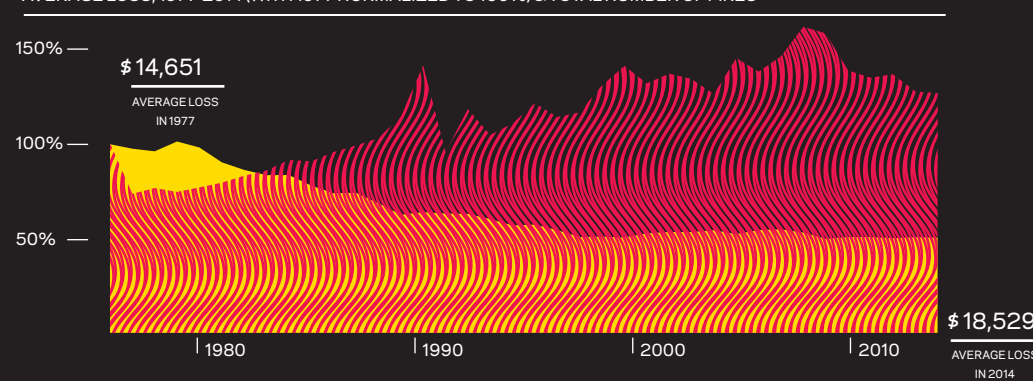
To keep fire outside of the structure, Stauffer advocates for the use of composition shingles, concrete or metal on the roof. He recommends stucco, stone, or fiber cement siding for siding.

While these materials can increase cost, Stauffer argues that widespread use actually can reduce cost.

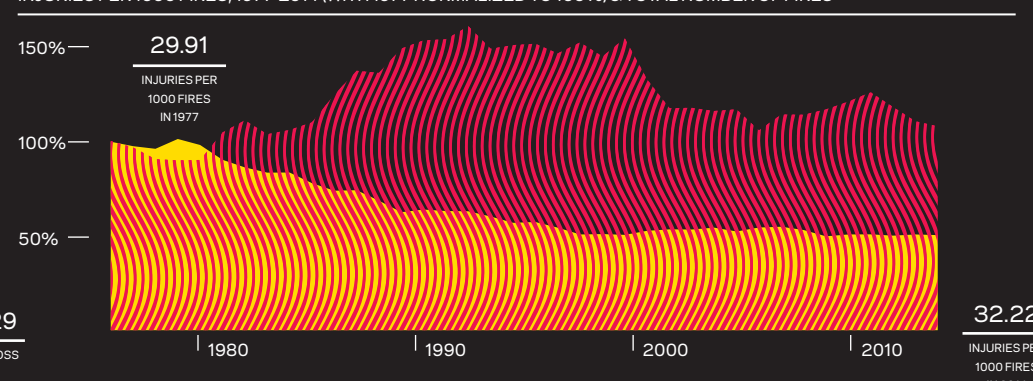
“Once those products become commodity driven, I think those things settle into a price point where it’s not even really an upgrade [as a price point],” Stauffer says.

Data Sources: National Fire Protection Association, Underwriters Laboratories, National Fire Sprinkler Association

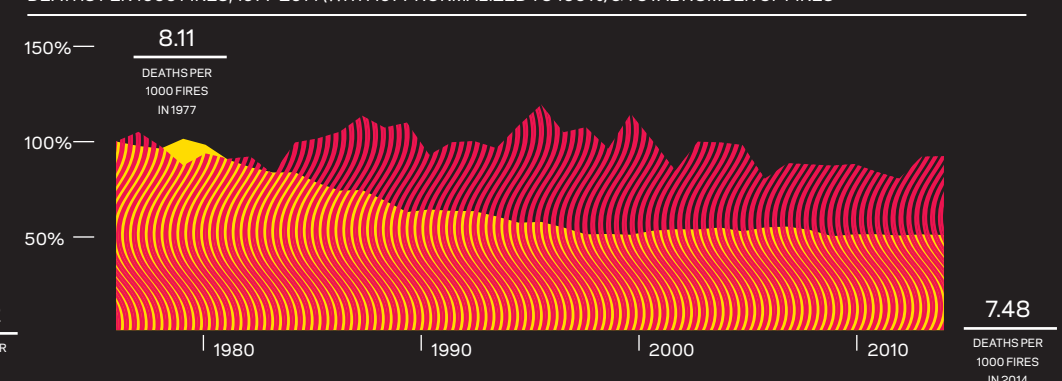
AVERAGE LOSS, 1977-2014 (WITH 1977 NORMALIZED TO 100%) & TOTAL NUMBER OF FIRES



INJURIES PER 1000 FIRES, 1977-2014 (WITH 1977 NORMALIZED TO 100%) & TOTAL NUMBER OF FIRES



DEATHS PER 1000 FIRES, 1977-2014 (WITH 1977 NORMALIZED TO 100%) & TOTAL NUMBER OF FIRES



OLDER CHAIRS RELEASE PEAK HEAT IN 15:10



MODERN CHAIRS RELEASE PEAK HEAT IN 4:20

