

D I A L O G U E

# Strategizing Against the Flame: What's Next for California's Wildfires?

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*Summary*

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The 2018 wildfire season was the deadliest and most destructive on record in California, destroying thousands of structures. Gov. Gavin Newsom created a strike force to develop a comprehensive strategy to address the destabilizing effect of wildfires on the state's electric utilities. In April 2019, the strike force issued a report outlining a vision for clean energy policies to reduce the impacts of climate change on wildfire risk, and in July, the newly created Commission on Catastrophic Wildfire Cost and Recovery released its recommendations. On June 12, 2019, the Environmental Law Institute and Nossaman LLP hosted an expert panel that explored wildfire liability, the proposed regulatory components set forth by the strike force report, the viability of various wildfire mitigation strategies, cost recovery options, inverse condemnation, and potential for incorporating climate impact research into wildfire policymaking. Below, we present a transcript of the discussion, which has been edited for style, clarity, and space considerations.

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**Willis Hon** (moderator) is an Associate at Nossaman LLP.

**Lloyd Dixon** is Director of the RAND Center for Catastrophic Risk Management and Compensation and Senior Economist at RAND Corporation.

**Kathleen Harrison** is a Principal Geologist with Geosyntec Consultants.

**David Pedersen** is General Manager at the Las Virgenes Municipal Water District.

**Willis Hon:** I'm pleased to welcome you all for a topic that I believe is very timely and important. As we sit here, the California Legislature and other stakeholders and policymakers are trying to come up with solutions to address one

of the biggest issues facing us today: wildfires. The discussion today is intended to provide an overview of these current legislative and policy efforts and to highlight some of the relevant issues that impact different stakeholders.

First, I'd like to introduce the panel. Lloyd Dixon is a senior economist and the director of the Center for Catastrophic Risk Management and Compensation at the RAND Corporation, a nonprofit, nonpartisan research organization that seeks to improve policy and decision-making through research and analysis. Lloyd has written extensively on issues regarding compensation in events that cause widespread loss including wildfires, and has testified before the legislature on wildfire and insurance issues.

Kathleen Harrison is a principal geologist based in California at Geosyntec Consultants, a consulting and engineering firm that works with private- and public-sector clients to address new ventures and complex problems involving our environment, natural resources, and civil infrastructure. I invited Kathleen because immediately following her joining Geosyntec, she was immersed in around-the-clock emergency efforts following the devastating San Diego wildfires in 2007. She has extensive experience teaching classes on post-fire and erosion control and other emergency mitigation measures.

Finally, we have David Pedersen. He is the general manager of Las Virgenes Municipal Water District, which provides potable water, wastewater treatment, recycled water distribution, and biosolids composting services for customers in Agoura Hills, Calabasas, Hidden Hills, Westlake Village, and the surrounding unincorporated areas of Los Angeles County. Last November, Dave led Las Virgenes Municipal Water District through the emergency response and recovery after the Woolsey Fire in Ventura County, which burned more than 97,000 acres and destroyed more than 1,000 homes, including hundreds in the Las Virgenes service area.

We're looking forward to hearing your perspectives on these important issues, but, first, I want to provide a general overview and road map of our discussion. I'm going to provide a summary of the recent developments and

legislative efforts that people are taking to address catastrophic wildfires, to tee up what's going on for the panelists. They will drill down from high-level policy issues to the very boots-on-the-ground, everyday work of recovering from wildfires.

Lloyd is going to provide his reactions to the Wildfire Commission's report and recommendations on addressing wildfire risk.<sup>1</sup> Kathleen will provide an overview of emergency response and wildfire mitigations for municipalities and local agencies. Dave will provide an on-the-ground perspective during and after a wildfire emergency, and discuss the role of water utilities in wildfires.

Now, how did we get here? Wildfires are a current major issue due to the highly destructive wildfires that occurred in 2017 and 2018. Six of the top 10 most destructive wildfires in California history occurred in these two years.<sup>2</sup> We see names like the Camp Fire, the Tubbs Fire, the Woolsey Fire, and the Carr, Nuns, and Thomas Fires. In California today, we're starting to hear about these names—Camp, Tubbs—in the same way that people talk about hurricanes down south.

I want to take a step back and go through the efforts that have been taken to address these fires, both during and after. I'm going to start with Senate Bill 901,<sup>3</sup> which was passed by then-Gov. Jerry Brown in September 2018. This was a comprehensive bill aimed at addressing wildfire issues in California. It did a number of things, including mandating wildfire mitigation plans for the electric investor-owned utilities that include Pacific Gas and Electric Co. (PG&E), Southern California Edison, and PG&E in San Diego. It also set forth the requirements for collaboration between different agencies relating to wildfire issues. Finally, it developed a sort of cost recovery framework for recovery of wildfire costs for investor-owned utilities before the CPUC.

S.B. 901 also created the Commission on Catastrophic Wildfire Cost and Recovery. This is a Commission that was charged with taking testimony on wildfire issues and developing options for the legislature and governor to consider for socializing the costs associated with catastrophic wildfires in an equitable manner, and to establish a fund to assist in the payment of costs associated with catastrophic wildfires.

Basically, the goal was that the governor and legislature were to receive a report from the Commission by July 1, 2019. I'll get into it in a bit, but I'm happy to report that they actually voted to finalize the recommendations, which they're going to transmit later today. I'm imagining in the

next day or so you're going to be seeing a lot of headlines and a lot of reactions to this report.

After the bill passed in September 2018, shortly thereafter in November we had two really, really big wildfires. First was the Woolsey Fire in parts of Ventura in Los Angeles County. This impacted, as I mentioned earlier, nearly 100,000 acres. It was burning through southern California. This was highly destructive. Second, in northern California, was the Camp Fire that destroyed the entire town of Paradise. It is number one on the list as the most destructive wildfire ever, and it caused 85 deaths. From these two wildfires, it was abundantly clear that the protections in S.B. 901 were not sufficient.

Fast forward a few months, and we have a new governor: Governor Newsom. In his state of the state speech last February, Governor Newsom created a strike team to develop a comprehensive strategy to address wildfire reforms within 60 days.<sup>4</sup> This was a tight deadline, and the task before the team was a tall order. But they did come out with that report in April 2019.<sup>5</sup> In that report, the team presented three broad concepts for consideration.

The first was the creation of a liquidity-only fund to bridge the gap between the utility payout of liabilities and the recovery of those costs by the utility. The second, and probably one of the most controversial issues, was the changing of the strict liability standard under the doctrine of inverse condemnation to a fault-based standard. The third concept was to establish a wildfire fund with revised cost recovery standards to spread wildfire costs more broadly among stakeholders. At the end of that speech, the governor called for the legislature to pass legislation before the summer recess. We'll look forward to hearing whether the legislature actually does anything.<sup>6</sup>

As that was going on, the Commission that was created by S.B. 901 met four times. It's made up of the chair, Carla Peterman, formerly of the CPUC; former Insurance Commissioner Dave Jones; attorney Michael Kahn; Assemblymember Pedro Nava; and Prof. Michael Wara at Stanford University. They held meetings across the state, in Redding, Sacramento, Santa Rosa, and Ventura—all areas that are either directly impacted or right next to areas impacted by wildfire in the past two years. As I mentioned, you'll be seeing the release of this final report today.

The draft report offered 20 recommendations to the legislature and the governor. I'm not going to get into that much detail, as Lloyd is going to be covering some of them

1. COMMISSION ON CATASTROPHIC WILDFIRE COST AND RECOVERY, DRAFT EXECUTIVE SUMMARY, available at [http://opr.ca.gov/meetings/wildfire-commission/2019-06-07/docs/20190607-Item\\_7\\_Wildfire\\_Commission\\_Executive\\_Summary\\_Discussion\\_Draft.pdf](http://opr.ca.gov/meetings/wildfire-commission/2019-06-07/docs/20190607-Item_7_Wildfire_Commission_Executive_Summary_Discussion_Draft.pdf).

2. CALIFORNIA DEPARTMENT OF FORESTRY & FIRE PROTECTION, TOP 20 MOST DESTRUCTIVE CALIFORNIA WILDFIRES (2019), available at [https://www.fire.ca.gov/media/5511/top20\\_destruction.pdf](https://www.fire.ca.gov/media/5511/top20_destruction.pdf).

3. S. B. 901, ch. 626 (Cal. 2018), available at [https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill\\_id=201720180SB901](https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180SB901).

4. Gavin Newsom, Governor of California, State of the State Address (Feb. 12, 2019), available at <https://www.gov.ca.gov/2019/02/12/state-of-the-state-address/>.

5. OFFICE OF THE GOVERNOR, WILDFIRES AND CLIMATE CHANGE: CALIFORNIA'S ENERGY FUTURE (2019), available at <https://www.gov.ca.gov/wp-content/uploads/2019/04/Wildfires-and-Climate-Change-California%E2%80%99s-Energy-Future.pdf>.

6. On July 12, 2019, the California Legislature passed Assembly Bill 1054, which established a wildfire liability fund and changed the cost recovery standard for wildfire costs before the CPUC. Assemb. B. 1054, ch. 79 (Cal. 2019), available at [https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill\\_id=2019202000AB1054](https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=2019202000AB1054).

as well, but I want to give you highlights on the ones that stand out to me.

Recommendation 1 is to replace the current strict liability application of inverse condemnation for electric and water utilities with a fault-based negligence standard. This is by far the most controversial issue here. Inverse condemnation comes out of the California Constitution.<sup>7</sup> Whenever a public improvement is found to be a substantial cause of damage to private property, then that damage requires just compensation.

So, the application of this standard is very controversial because it applies a strict liability standard. That means even if the damage was not foreseeable, even if there is no fault on the part of the utility causing the wildfire, they're going to be held liable for any damage that would happen. Recommendation 1 is to change that standard to a fault-based negligence standard.

But already there's been pushback from both the governor and the leaders of the legislature to kind of slow down on this recommendation. It seems like they're a bit reluctant to move on it. So, we'll see whether or not that actually happens. A couple weeks ago, Moody's Investors analyst report<sup>8</sup> released a statement that a change to this inverse condemnation standard would probably be the most impactful on the credit ratings of the electric utility.

Recommendation 2 is to change and clarify the "prudent manager" standard for the utilities when they try to recover costs for the CPUC. Recommendation 3 has to do with establishing an Electric Utility Wildfire Board. Basically, they want to consolidate the governance relating to wildfire into one entity instead of having 50-odd entities talking about this issue.

Recommendations 4 and 5 relate to insurance and the creation of a wildfire victims fund. Basically, they want to create this fund, but of course there is the question of how this will be funded and how it will pay out. A lot of the meat of the discussion today has to do with how to implement that.

Recommendations 6 through 15 relate to insurance. They range from preserving the risk-based approach to pricing insurance in this space, expanding the Fair Access to Insurance Requirements Plan and the Insurance Guarantee Association, and making it clear what the risks underwriting models are related to fires. There's also a lot of data-gathering relating to home fire risk reduction and community risk reduction standards. A proposal is to require insurers to calculate and provide a replacement housing estimate in writing to insureds annually. I don't know how many of you own a home, but for those of you who do, when was the last time you've gotten a replacement housing estimate?

Recommendations 16 through 20 have to do with the reduction of wildfire risk. There are some governance recommendations and more general recommendations to invest more in wildfire prevention and mitigation efforts. I think one of the other controversial issues here has to do with building in the wildland-urban interface. A lot of these homes are built in fire-prone areas.

One of the recommendations that stands out to me from the Commission is the proposal of a development fee for new construction in the wildland-urban interface. This kind of makes it really hard to build in these areas. That's perhaps what the Commission is intending.

**Lloyd Dixon:** I'm going to analyze the Commission's recommendations on utility liability and the funding mechanism that they conceived of. As Willis said, there were basically three areas of the Commission's recommendations. This is the first area.

You can think of the Commission's recommendations as combining choices from each of three different areas. First is on utility liability. The options are the current strict liability standard, a negligence standard, and also the Commission talks a little bit about putting a cap on the amount of payouts that the utility will be responsible for. Then there's the utility cost recovery mechanism. Currently, the system requires the utility to show whether its behavior was prudent before it can recover a cost from ratepayers. The Commission considers options to change that to a presumption of prudence and modify the factors that the CPUC will consider in that "prudency determination." The final component is a compensation fund. There are discussions about setting up a victim's fund and also a separate liquidity fund.

First, I'll talk about the status quo, which is strict liability with no fund. Then, I'll turn to the Commission's second choice, which is maintaining the strict liability regime but with a victim's compensation fund or a wildfire victims fund. Then, I'll talk a bit about the Commission's first choice, which is a negligence standard with a wildfire victims fund. I think, as Willis said, the Commission prefers negligence, but they spend most of their time talking about a victims fund coupled with strict liability. I think this is in part due to recognition that changing the liability standard is not very easy.

Let's talk about the status quo. The utility is strictly liable. One of the downsides of this approach is that it ignores the contributions of homeowners, city planners, and others to wildfire risk. Usually, you want to have a liability system that parcels out responsibility and doesn't put it all on one party—except in very extreme circumstances perhaps when that party is the least-cost avoider and can reduce the risk in the best way. But in this case, many people and many different types of stakeholders are responsible for wildfire risk. The current system of strict liability, I think, falls short in not allocating responsibility more broadly.

Under the claiming process in the current system, insurers can recover payments through subrogation. The insurer

7. CAL. CONST. art. I, §19 ("Private property may be taken or damaged for a public use and only when just compensation, ascertained by a jury unless waived, has first been paid to, or into court for, the owner.").

8. Moody's Investor Services, *Electric Utilities—US: Limiting Utility Liabilities Looms Large After Release of SB 901 Commission Draft Report* (June 4, 2019).

ers cover their claim payments to homeowners who suffer losses by going to the utilities through the subrogation process. Uninsured homeowners can directly pursue recovery from the utility. That process is slow. There's a general sense that these subrogation claims that the insurers bring settle for about 50 cents on the dollar. We'll come back to that point in a minute.

As far as cost recovery is concerned, the utilities then can recover their costs—the payments they make to the different parties for wildfire losses—from the ratepayers if the CPUC determines that their behavior is prudent. Prudence is a different concept from negligence. Negligence is something that the courts decide. Prudence is something that the CPUC decides. Under the current system, utilities must prove by a preponderance of the evidence that their behavior was prudent, but “prudence” is not well-defined. Utilities fear that they'll be able to recover only a small amount of their outlays from ratepayers. For example, you have a situation where PG&E has filed for bankruptcy in California.

Then, think about who ends up paying under the current system. What you have is that utility ratepayers are then responsible for that part of the loss where the utility's behavior is determined prudent and the rest is allocated to utility shareholders. In deliberations by the Commission, there's always a big distinction between the shareholders and the ratepayers. In my view, however, the distinction is a little blurry because the shareholders are going to need a rate of recovery that's commensurate with the risk. Where are they going to get that rate of recovery from? That's from the ratepayers. So, there's kind of a blurry distinction there between who's bearing these costs.

Now, I'll look at the Commission's second choice, which is to keep strict liability but do something about the funding situation that's creating these large problems for the utilities. So, what would be the features of this? There'd be a victims' compensation fund that would be set up—a wildfire victims fund. And, basically, claimants—this could be insurers, people without insurance, and others—would bring their claims to the wildfire fund rather than to the utility. This fund would only be available for larger utility-caused wildfires.

In the Commission's write-up, one area that I think is vague is whether claimants would be required to go to this fund. Often, when you set up compensation funds, they're voluntary. People can go to the fund and if they don't like the fund's offer, they can go to the tort system or the court system in some way. I don't think the Commission was clear on that, although I think the intent probably was that people would be required to go to this fund. An appeals process or what would happen if people weren't satisfied with the award from the fund was left open and would have to be worked out.

Importantly, the Commission thought the claims will be paid at values approximating the settlement value had the fund not existed. So, this gets back to, in current subrogation claims, kind of the rule of thumb that they settle.

There's really not available evidence on this because the settlements are confidential, but anecdotal information suggests that they settle for about 50 cents on the dollar. The Commission thought it would be appropriate for that to guide the fund settlement offers. That was intended to keep fund costs down, as well as to reduce property owner incentives to underinsure or not insure. If this fund were readily available, it might make people less willing to pay high insurance costs in wildfire areas.

What are the challenges I see with going with the type of structure that's been proposed by the Commission? First, it's not clear if there's any real legal mechanism for reducing claims to their settlement value. Also, think about how you're going to figure out 15 years from now what the settlement value would have been had the fund not existed. I think that's going to create issues.

The fund would also have to do a fair amount of work to assess claims. For someone who is uninsured, for example, who didn't go through an insurer, the fund would have to have a mechanism to value the claim and determine what the loss was. So, that requires some administrative structure for that fund to operate.

Also, another issue that would have to be addressed would be how much reduction in the claim value is sufficient to discourage either underinsurance or lack of insurance. The Commission proposed that those who were uninsured and go to the fund would receive a flat settlement of \$10,000. But where does that number come from? And would they then have recourse to pursue another cause of action if they weren't satisfied with that?

Now, let's talk about the financial structure of the fund. This fund would pay in excess of the utility's insurance. The fund would pay a maximum amount per incident per utility per year, so there would be sort of an overall cap on the fund. The fund could buy insurance and utilize other risk-transfer mechanisms similar to the California Earthquake Authority's authority to buy reinsurance.

In the Commission's view, the fund should be financed in equal shares by utility ratepayers, utility shareholders, and insurance policyholders. The insurance policyholders, which would be homeowners across the state, would have some kind of fee on their insurance policies that would then provide the dollars for the fund.

In the current system, in this proposal, the utility would be required to pay when their behavior was not prudent. So, what would that look like? When the utility was not prudent, utility shareholders would repay the fund up to a certain cap. This is where that cap comes in. That cap is there to protect utilities from bankruptcy. Any monies above that cap would then be paid by the utility ratepayers and insurance policyholders.

That's a summary of what was in the Commission's proposal. So, what are some of my observations on this funding approach? As I said before, there's this distinction between the ratepayers and the shareholders for utilities. But I think that distinction is a little fuzzy over the long run.

Importantly, from an economist's point of view, the insurance policyholders' and utility ratepayers' contributions to the fund are not risk-based in the Commission's proposal. By that I mean that people in higher risk wildfire areas don't pay more.

Currently, given the way insurance markets work, insurance rates are higher in areas with higher wildfire risk. The Commission mentioned the possibility that the insurer assessments needed to finance the fund could be risk-based, but then it rejected the idea. I think there was a lot of debate in the Commission regarding whether we should broadly socialize the costs of wildfires or have more risk-based funding where those people who create the most risk or who are subject to the most risk pay more.

There's also no mention of linking the utility ratepayer assessment to risk—for example, by requiring utility customer in higher-risk wildfire areas more. That seems to be, from my perspective, an important thing to do.

Finally, there is a proposed cap on utilities' liability that would shield utilities from bankruptcy. And you have to ask to what extent this cap would dilute utility incentives to reduce risk.

So, that was the Commission's second-choice proposal. Now, let's turn to the Commission's first choice as well as another option that I think should be considered but that the Commission didn't explicitly address.

The Commission's first choice is to move to a negligence standard. Once you move to a negligence standard, there are two options: (1) you still have a fund, a wildfire victims fund; and (2) you have negligence but no wildfire victims fund. If you have a negligence standard with a fund, then utility shareholders would be liable for the part for which they were negligent. Here, I'm going to equate prudence with negligence to simplify things. The second option doesn't seem to have been explicitly considered by the Commission.

With the first option, the utility shareholders would be liable for the part for which it was determined they were not prudent. Then, if you had a fund similar to the one we've already talked about, it would be funded in equal shares by those three groups: the ratepayers, the utility shareholders, and the insurance policyholders.

If you moved to a negligence standard without setting up a fund, what would happen? You would have utility shareholders responsible for losses due to utility negligence, and insurance policyholders would bear the other losses. You're not changing the overall amount of loss with this approach. But insurers would no longer be able to subrogate, and therefore the insurers, through their premiums, would in effect be the ones who would be picking up that part of the overall cost.

What are some observations on the negligence standard? First, if you have a negligence standard with a fund, what does that do? It allows the insurers to continue subrogating. In the long run what happens is the insurers will declare the recoveries in their rate filings with the California Department of Insurance. Then, the insurance rates

adjust downward appropriately for those recoveries. I also think that with this approach, the fund you need is similar in size to the fund we talked about for strict liability because the fund is basically doing the same thing.

If you went with the negligence standard without a fund, that approach is simpler. Setting up this fund is administratively complex. You've got to hire staff, you've got to come up with all the regulations, and there are costs associated with designing and running an appeals process and that kind of thing. This approach provides incentives to both homeowners and utilities to reduce risk because it allocates loss to both utilities and homeowners depending on whether the utility is negligent. You could, if you needed to, separately put a cap on the shareholder liability if desired.

One implication of a negligence standard is that it reduces insurer subrogation. This is an important issue for insurers because that would mean that insurance rates would increase. My view is that either liability standard, when combined with the appropriate funding mechanism—either strict liability with a fund or negligence with a fund or with no fund—can be designed in a way that would achieve a reasonable outcome. The cost and the distribution of the cost will be different under the different liability regimes.

When I made some comments to the Commission up in Ventura several weeks ago, the main point I was trying to get across was that, regardless of the way you go from a social point of view, it seems to make sense to have both utility rates and surcharges for insurance policyholders vary with the wildfire risk so that you have a risk-based approach of funding as opposed to just broadly spreading the risk across the whole state, because we know the latter can produce bad incentives. We have examples like the National Flood Insurance Program and wind insurance in Florida where it just doesn't work out so well if your approach is to move away from a risk-based funding approach.

**Kathleen Harrison:** I'm going to present on post-fire hazard assessments, focusing more on identifying and mitigating the risk to structures that were not damaged in wildfires.

I will touch on identifying the hazards associated with after a fire, what's at risk, and then go through some of the steps for identifying and prioritizing those risks. I'll then discuss some of the planning opportunities that communities, municipalities, and agencies should be thinking about since fires are really a way of life at this point in the West.

Wildfires significantly change the environment through vegetation loss. This creates hazards such as increased runoff that can result in flooding; increased erosion rates that can cause debris flows; water quality issues due to the pollutants associated with elevated sediment loads or just the materials themselves that burned and are transported in runoff; or even rockfall and debris flows.

The science behind why this happens is that by removing that vegetation, it really changes the runoff or the hydrologic regime, and that's directly related to the burn severity, as well as chemical changes to the soil that result from the heating of the ground. Additionally, there are other factors such as the topography, the steepness of the slopes, and the existing conditions that are independent of the fire, such as erodible soils or geologic conditions that are sensitive to debris flows or landslides anyway. Then, finally, there are climatic changes such as atmospheric river conditions, or even normal rainfall that after a fire event can significantly cause negative effects.

Burns are ranked or categorized typically as low severity, moderate severity, and high severity. There are characteristics that go along with each one of these. A low-severity fire typically would be a moderate burn affecting the leaf litter or the duff, with some vegetation loss. Moderate severity is oftentimes identified by a black ash, and the leaf litter or the duff layer that covers the ground surface is usually removed in the fire. In a severe fire condition, there is almost full vegetation loss and a lot of white ash.

When wildfires go through an area, there is a lot of heat generated when it burns all the grasses and vegetation that are oftentimes referred to as the fuels. When the vegetation burns, it creates an almost organic vapor that goes into the soil, creates a coating around the soil particles, and gets into the interstitial spaces in between the soil causing almost a water repellency. What happens then is when there's runoff, there's a lot less infiltration of the water going into the soil and a lot more runoff going downslope. In general, the higher the burn severity, the more runoff that will occur, with the exception of sometimes extremely hot fires between 280° and 400°C; oftentimes those conditions will not occur because the heat level will actually burn the chemicals and destroy those chemicals that form the water-repellent or hydrophobic condition.

In comparing the runoff characteristics of a burned and an unburned watershed, in general, we find that the vegetative overgrowth, like the canopies, the underbrush, and the duff layer, tends to intercept and really minimize runoff in low, moderate storm events like a two-year event. But once that protective vegetative cover is removed, that same storm event can cause significant increases in the runoff and erosion that leave that slope. Then we see the same pattern with the amount of sediment that's transported downslope. You remove that protective vegetative cover with the root system and the canopy it's protecting, that's helping to hold that soil in place, and that's what really drives a lot of this increased sediment load and debris flow.

Usually, the recovery of watersheds is directly related to the severity of the burn. Typically, what we see is that with a low-severity burn we get a recovery rate of one to three years. With a moderate-severity burn, it can take between five and seven years. Once it becomes a severe burn, a highly burned area, then it can take 10 to 15 or more years to recover.

Because recovery is directly related to revegetation, you can get increased sediment loads several years after a fire occurs. Oftentimes, we see a lot of sediment coming out of these burned watersheds even in the second year after a fire event.

When we do post-fire hazard assessments, we look at identifying what's at risk. Typically, it is the homes that didn't burn that are located at the base of those slopes or right at the wildland-urban interface. We also look at structures such as roads and stormwater conveyance structures that traverse through the burned areas or are located down the gradient of the burn. What we've seen in a lot of the more recent fires is that the watersheds around reservoirs have been damaged and contribute a lot of pollutants and sediment loads into reservoirs.

Also, we're seeing a lot of damage with the utility infrastructure itself. For example, San Diego Gas and Electric has undertaken a big program of replacing their wood poles with steel. In addition to direct damage as a result of fire, there's the secondary effects of increased runoff that can undermine the foundations of some of these utility structures.

In doing the post-fire hazard assessment, because of the limited resources associated with this, it's really key to prioritize the risk and to focus the attention on the risk that can cause the greatest impact. We go through a series of steps when we do a post-fire assessment. Usually, this involves reconnaissance, looking at really assessing the burned area, using available resources such as burned area emergency response reports or files that include U.S. Geological Survey reports that identify where erodible soils are. There is a lot of available information we can use that helps us prioritize high-risk areas. Then we conduct the surveys, identify the structures or the infrastructure that's at risk, and prepare mitigation plans that are often referred to as damage survey reports.

It's really important to recognize that, especially with these fires that cover tens to hundreds of thousands of acres, not all the burned area represents a risk to human health or safety. But in order to determine that, we oftentimes utilize aerial reconnaissance. This enables us to look high up in the watershed because structures that are at risk are sometimes even outside of the fire area. But the watershed area up above them is really where the source of the runoff and erosion is coming from.

For on-the-ground assessments, we put together teams that often include a hydrologist, geologists, and soil scientists. We work very closely with municipalities and agencies to start identifying where these risks are and identifying the structures that are at risk.

As part of that, we always try to identify infrastructure that's at immediate risk, things that you don't necessarily want to wait to get federal funding to help pay for. So, we'll work with public utilities like road crews to identify stormwater conveyance systems or any structure that would cause flooding or safety issues to the public if it's not immediately dealt with.

In selecting best management practices (BMPs), what we typically do for post-fire work is identify BMPs that are readily available, in part because there's a limited time that you can install them. Oftentimes, just from a safety impact and also from a funding standpoint, the BMPs need to be installed within a certain window of time. Also, we aim for BMPs that are easy to employ because they are typically installed by crews of people that don't have a lot of experience with them. You want BMPs that are cost effective and will last at least one or two rainy seasons.

Once we've done our assessments, we put together these mitigation plans or damage survey reports that identify our recommendations from BMPs to things that can help them mitigate the risk that we've identified. In a lot of the work I've done, I've worked with the Natural Resources Conservation Service (NRCS), which has a program that provides funding. We'll get together with NRCS and actually walk with them to each one of the sites where we've identified a need for mitigation. And often, there's negotiation back and forth to get their concurrence that they're going to fund this approach. As part of this, we always identify the quantities of materials because as part of getting funding for post-fire mitigation, it's really important to document the labor hours and all the materials that are used.

Once we are ready to implement the BMPs, it's very critical to train the staff that is going to implement them because if the BMPs are not installed correctly, they will not be effective. For crews, we typically work with the California Conservation Corps or the California Department of Forestry and Fire Protection (Cal Fire), which has correctional groups that are really amazing. We worked with them on the Lilac Fire.

A typical BMP is hydraulic mulch. It's kind of a paper wood pulp mulch with a guar that is almost like a glue. It's sprayed on and is very effective in helping hold the soil in place. We also use diversion berms because oftentimes what we're concerned about is run-on and we really want to divert that run-on around structures. Or we put check structures and drainages that help collect the sediment from being transported downstream. We use K-rails along the roads.

What's really critical after the BMPs are installed is making sure to monitor them to determine if they are effective. Are they working the way that you planned? Is vegetation recovering at the rate that you would expect? Is there maintenance needed? Also, are there longer-term water quality issues that need to be addressed? Then, as well as part of all this is working with the funding agencies and helping to support municipalities by getting them information so they can get the funding that they need.

For example, there was hydraulic mulch applied about eight months to a year after a fire, and it's still in place. We're looking at how much vegetation is becoming reestablished. Then, during pre-storm events or during storm events, diversion berms can be really effective. In one instance, it diverted a lot of runoff that was coming down a steep canyon around a home. Sometimes, there

are unintended consequences. For instance, we installed gravel bag berms around a storm drain with the idea to keep the sediment out of the watershed, but it caused secondary impacts of flooding. Sometimes, these things create a dynamic situation.

An example of when the hydraulic mulch did what it was meant to do was when we put about a 100-, 150-foot band of mulch on a hillside that had a large rain event. When we came back, it looked almost like a lava flow, but what was happening was that the sediment was coming from above where the hydraulic mulch reached. On the bottom of the hill there was a berm, so the sequence of treatments is what we call a treatment train. This was a very effective mechanism. After big events, we go out looking for evidence of big boulders and lots of debris coming down onto the road that can cause safety hazards. Then there is the need for ongoing maintenance for BMPs to keep them effective.

Finally, a lot of these BMPs can become a source of the problem themselves, like sandbags. We've really, as much as we can, gotten away from using sandbags. They're very effective in the short term, but they degrade over time and become a real source of sediment. So, we use them sparingly because oftentimes there isn't much funding or manpower available to go in and do maintenance after-the-fact.

We also look at water quality impacts by monitoring water quality at reservoirs. For example, Geosyntec assisted with a project after the Thomas Fire when the emergency debris management was placed on Goleta Beach. They were finding a lot of increased bacteria and beach closures, and we wanted to identify if the debris was a source of that. Through water quality testing, we identified that it was not, which really helped them with their public community outreach.

Planning ahead, I think we've realized that there is really no longer a fire season—it's really year-round—so communities and agencies need to be prepared to work year-round on this. Timing is critical. Oftentimes, the fires happen later in the summer, right before the rainy season, so it's critical to have a plan in place and to have contracts in place for vendors, such as vendors that will provide your BMPs and your hydraulic mulch. Also, it's important in fire-prone areas to identify ahead of time where there is a reasonable staging area, where the water sources are. You want to have a plan so you're ready to act right away.

Also, once a fire occurs, a warning system needs to be in place. With a lot of these communities, these demographics, they're older folks. They're not tied to their cell phones, so you need to be aware of how you get evacuation notices to those communities. You need to make sure you understand your evacuation routes and that there aren't locked gates that people can't get out of.

As for lessons learned, we've identified that it's really important not to scrimp on resources. I know that funding is very tight, but because of the timing and the emergency nature of debris flows, erosion, and flooding after a fire, it's really critical that municipalities put adequate resources on

the source of problems to address them right away because it doesn't really cost less to stretch it out. It's better to do it on a short time frame. It's important to get your right of entries very early in the process, and then, also, to recognize that federal funding will likely not cover everything that needs to be done. As a municipality or an agency, I think it's good to identify upfront what resources you have and what you're willing to do to implement BMPs that may not receive federal funding.

**David Pedersen:** I'm going to share a bit about the Las Virgenes Municipal Water District's perspective with respect to wildfires. We are an agency that experienced one of California's worst wildfires last year, so this is all fresh in our minds. I'll share with you two things: my thoughts on considering utilities in the sense of application of liability for catastrophic risk, and then more about the operational realities of a water agency or utility in general in responding to a major disaster like wildfire.

We're a public water utility. One of the really important takeaways here when you're looking at liability and catastrophic risk is that "utility" is just a really, really broad term, and we need to be talking about that term in a more discreet way. When you look at utilities, you have utilities that are investor-owned utilities, and most of the focus that we've heard talked about is on investor-owned utilities. But we also have publicly owned utilities. There's a big difference there in terms of how they function and how risk is assigned.

A lot of the focus with regard to investor-owned utilities and shareholders versus ratepayers is really a different discussion when you have a publicly owned utility like mine. So, my ratepayers and my shareholders are the same. There is no difference. When you assign risk, you're assigning risk to both of them. In the case of an investor-owned utility, there's perhaps a lot less sympathy for the shareholders. There's a focus on being sure that the shareholders are assigned their proper share of risk. I think that's important to keep in mind.

The other thing when we talk about utilities is that I would consider utilities in a different category not only by how they're owned—investor-owned and public—but also by type of utilities. There are utilities that historically have been associated with triggering wildfire, and there are those that are involved in the response to wildfire. I think it's really important to make that distinction. Water utilities are generally not utilities that have been associated with causing wildfires or triggering wildfires. We're involved in responding. We're first responders to wildfires. In my mind, there's a big difference when you consider liability between those two.

Our part of the county is in the westernmost portion of the county. We serve the communities of Calabasas, Agoura Hills, Westlake Village, Hidden Hills, and a large part of the unincorporated county area, mostly the Santa Monica Mountains. We have a pretty large service area geographically, but not a really huge population. We are

a water agency, a wastewater agency, and we do biosolids composting as well.

What is the purpose of a public water system or a water system in any sense? How is it meant to function and what is it designed to do? Water systems, speaking broadly, perform two major functions. The one that we're most familiar with is domestic purposes. We use water for drinking, cooking, bathing, and sanitation.

The other purpose is fire protection. I would say this is probably the most misunderstood part of the function of a public water system. The fire protection purpose of a public water system is to protect structures and life. The fire protection capacities of a water system, when you design a water system, are based on providing protection for a single structure fire of the largest structure served by the utility. It is not meant in any way to fight a wildfire scenario where you have hundreds of structures that are burning at the same time. The water system is not designed for that, it's not intended for that, and it cannot do that.

There will be those who will argue that the water system should do that, and there's no doubt that we place demands on our water systems to do everything possible that they can to reduce property loss. But the bottom line is that the water system is not designed to fight hundreds of fully engaged structures at the same time. If you were to design a water system that did that, you would have gigantic pumps, gigantic pipes, and gigantic tanks. It would not be economical to do that. So, I think it's important to understand that purpose.

When we think about that, though, it's important to know that what we do during a wildfire is use the public water system to its fullest capabilities and beyond. The water system is used to every extent to try to protect life and property. We support that as utility workers, to try to put it through its full use. What we do is stretch the water utility well beyond any intent that it was ever designed for to try to provide the maximum benefits to the community.

The Woolsey Fire started near the Santa Susana Field Lab. It was at 2:24 p.m. on November 8, 2018. I remember that day really well. I was in a meeting and the fire started. The Santa Susana Field Lab is in a very unpopulated area. Nobody lives in that canyon, the Woolsey Canyon. It's a wildland area that is not near any homes.

So, when the fire started, it was not threatening any structures. Very quickly, this fire escalated, ultimately leading to the evacuation of about 300,000 people, the entire service area of our utility. Also, I think another thing that's misunderstood about a water system, and water in general, is that water does not put out wildfires. Water systems and the public water system do not extinguish a wildfire. Wildfires are put out by firefighters with water, right? Well, I'm not a firefighter, but wildfires are generally put out by other means. The structures and the people are protected by the water system, but there are a couple ways that wildfires are extinguished or ultimately burn out.

First is the lack of fuel; the fire burns out and burns all the fuel. Then, there is a change in weather conditions

where humidity, temperature, and wind change in a favorable way so that firefighters can get control of a fire or when a fire reaches a natural firebreak. In the case of the Woolsey Fire, the natural firebreak was the Pacific Ocean. One of the firebreaks that we normally rely on is a freeway; the freeway did not stop this fire. In fact, the fire jumped the 101 Freeway. That happened at 4:30 the following morning.

We lost power to our entire service area early that same morning. This is an important thing because water and power go hand-in-hand. We need power to move water and operate a water system. It's really important that we have power. What this means is that we need backup power. So, one of the lessons learned is that having backup power is really, really important for being prepared for a wildfire.

Ultimately, about 100,000 acres and 1,600 structures were burned, and there were three fatalities. It's really fortunate, compared to the Camp Fire, that there was very little loss of life in this fire. A 100% containment was achieved on November 21, so it was quite a long time before it was completely contained.

The fire burned two-thirds of our district of land area. The point of origin was in the north, and then the fire burned to the southwest initially. Then it moved as the wind shifted, burning to the southeast, and then ultimately to the south and to the coast. Then it burned both to the west and the east at the same time.

In terms of the operational response for a utility, one of the key things is that all of us have emergency response procedures. I mentioned before that, as a water utility, we are first responders. We are not fire and police, so I would say we are first responders, sort of behind them, but we have an emergency response function. All of us are disaster service workers, so when we take our jobs we swear an oath that we will follow certain protocols and respond and report in the event of an emergency.

We were very fortunate in that we activated our emergency operations center (EOC) at about 4:00 p.m. on November 8. Recall that the fire started about 2:30 p.m. and was nowhere near any inhabited areas. We have an incident command center, a lot like fire but on a much smaller scale. We have different officers in there: an incident commander, a logistics officer, a communications officer, and so on. We very early on called for mutual aid.

Disasters frequently attack your own resources, so when you have a disaster, you very quickly need additional resources. We made the decision to ask for help before we actually needed it and called for emergency generators for backup power. We also called for additional water. We were concerned about running out of water because of the number of firefighters. We had hundreds of fire engines, from as far as San Diego and Fresno.

We set up some basic emergency response priorities such as restoring and maintaining water and wastewater system operations; isolating mainline leaks; isolating customer-side leaks; assessing and documenting damages; preparing an inventory of affected customers; and communicating the plan. With respect to operations, particularly the water sys-

tem where damages were occurring—we were having challenges with pipe breaks—we worked on restoring pumping where we lost power. Also on the wastewater side, we had to repair the leaks where we had sewer leaks. Then on the communication side, we had to issue a customer advisory because we had some low pressure. We issued a boil water notice, which is something that happens when you have substantially lower than normal pressure and there's a risk of contaminants entering the water system.

And then we repaired, as I mentioned, the water main leaks. We fueled our generators and shut off water services to about 350 homes that were destroyed. When a home burns, the pipeline that's supplying water to that home is just blasting water out, sort of like a strong garden hose. So, about 30 to 40 gallons of water is just blasting at every single one of those homes every minute. If you have 350 of those, you can imagine that you're going to lose all of your water very quickly, so it's important to get all of those turned off.

What's interesting when you look at the folks in the EOC is that there are people in uniforms, but there are also people in their normal civilian clothes. We had everybody responding, from accountants to payroll, field operators, and even management folks. This was truly an entire organizational response. There was no sort of discerning between position or responsibility. Everybody was there to help and nobody really followed their functional responsibility. Everybody pitched in and did what needed to be done.

In terms of our damages, the composting facility partially burned. What's interesting here is that unfortunately the fire department has to make really difficult choices in terms of what they can respond to and what they can't. Their number one priority is life safety, so they respond to facilities where life safety is at risk first. There were no people at this facility, so it was not a priority to protect it, and it suffered some fire damage. Our Westlake Filtration Plant—a water treatment plant that processes water—also suffered some fire damage.

There are hazardous conditions that we face as utility workers and again as first responders. For example, normally when you come across a downed power line, there's police there that have cordoned off the area and they're telling you to stop. That's not the case at all during an emergency like this. Our people would pull up and come across a downed power line where the power pole would be on fire, still burning, and there would be live wires exposed. So, there were lots of hazards that presented dangerous conditions for our employees.

With all of the destruction, I will say that there's a very emotional impact. I did not lose my home in the fire, but I saw people who did. I talked to them and we interacted with them. There's really a strong emotional impact of that that lives on long after the incident.

In terms of lessons learned, I want to highlight a couple of important things. First, activate early and apologize later if necessary. Nobody wants to overreact to an incident,

especially your operational and field people. People like to maintain their calm, cool, and collected attitude. They don't want to be the person who freaked out. But I would urge people to freak out. It's okay. If you call in people and you make a mistake, the worst thing is that you apologize. Water agency people, and I would say utility people, are first responders. I think that is not always recognized. I think that carries some additional responsibilities in terms of safety and risk that they're placed under.

We set up 12-hour shifts and sent people home to rest. When you have an emergency, everybody wants to help at the beginning; everybody is eager to be part of the initial response. But it's really important that you send people home to get rest so they can come in and relieve you.

There's chaos. You have to be comfortable with chaos. This is really a management process. You're managing chaos, but the chaos is normal. It's going to happen in emergencies. You want to try to organize yourself a little bit. Look for help before you need it; if you wait until you need help and ask for it, it's too late already. It takes time. Documentation, as Kathleen mentioned, is really important for Federal Emergency Management Agency (FEMA) reimbursement.

Emergency generators are very, very important. Emergency generators, in my mind, are sort of the gold currency of disaster for a water utility. That's what keeps your pumps running. Send a representative to the fire incident command. When they get there, normally what will happen is the fire department says, thank you, we don't need you. And then the response really needs to be, I appreciate it, but actually I need you so that's why I'm here. So, you send your representative to incident command. The job is to sit in your truck for eight, twelve hours, and when one of your critical facilities is threatened that needs help, you go in to talk to the liaison officer. You let them know there's a critical facility that's about to be destroyed. We need your help. We need you to protect it for these reasons. Then, you explain it to them, and the incident command will respond, assuming you make a good case for that.

Don't underestimate the importance of your facilities because everybody's facilities are important, and you need to make your case, and you need to explain why. When your water system facilities are destroyed or damaged, it impacts the ability of firefighters to do their job. So, we need to tell them. We need incident command to know that their firefighters that are on the ground will not be able to protect homes if our water system is damaged, destroyed, and can't function.

Issuing the public notices and updates without delay is an uncomfortable thing, but as I mentioned before we are going to be taxing our utilities to the extent that they have never been taxed before. There will be weaknesses that will be found in the utilities and they won't always perform as you had hoped them to, but we need to be willing and comfortable with putting out the public notices and updates regardless of the concerns of what the ramifications would be.

I think this gets back to the catastrophic loss. It's important that we be comfortable as utilities communicating with the public about the condition of their utility. And that we do not have to be concerned about the liability of sharing that information when it happens because that information is important. People need to know and we need to be able to have some protection in openly sharing information that's valuable to the first responders and to the community.

Lastly, emergency response is a sprint with adrenaline. Disaster recovery is a long, long marathon that goes on for a long period of time—a year or several years.

**Willis Hon:** Thank you all for your interesting perspectives, and especially Dave for sharing your personal story with the Woolsey Fire. I want to open it up to questions from the audience.

I can kick it off. There have been a lot of changes in the law for the previous year in S.B. 901, and you've talked a lot about what goes on during the wildfire and post-relief afterwards. What is your top recommended change for addressing those issues during a wildfire or after a wildfire?

**David Pedersen:** I think this is a challenging question. My opinion is that there is not one thing and that this is really a combination of policy issues that need to be discussed, but I think really important is the land use issue, and land use planning and building in the wildland-urban interface. My service area is almost entirely in the wildland-urban interface, so it is a very, very high fire risk area. I think some thought needs to go into that and building standards, building codes, and land use planning in terms of where we site our communities. And then if we do site communities in very high fire risk areas, what do we do in advance to protect those communities?

It's a complex issue. It's a challenging issue especially with the housing crisis in California. People want to live in these areas. They're attractive. It's beautiful to live in the Santa Monica Mountains. But also when you make the choice to do that, you're living in an area where fire is probably one of the biggest risks. So, I think that's important.

The other thing is that there are a lot of things that can be done to protect homes from fire, such as the BMPs that Kathleen talked about: defensible space; brush clearance; building standards in terms of building fire-resistant homes, especially in terms of the roofing when you look at wind-driven fires; and so on. I think it's really a combination of actions. There's not one silver bullet that will solve the problem.

**Kathleen Harrison:** I would like to add that so much of the focus is on preventing the fires and on firefighting, which is obviously incredibly critical. But there are those secondary impacts; oftentimes what we've been seeing in recent fires is an insufficient amount of funding available for that and actually a kind of reticence on some of the funding agencies. What I'm finding over the years is that

we're getting more and more pushback on implementing BMPs. They have a formula. They look at the value of the structure and the cost of the BMP. That goes into this equation of what they will fund.

I think fires are such an emotional issue in terms of how they affect a community that making sure there is federal or state funding available to address these secondary impacts is really critical because there are impacts afterwards. It's not just the people that are affected that lose their homes, but then later on as well. I think it's really critical to keep that as part of this discussion.

**Willis Hon:** We have a question from the audience. In terms of the Commission report and the California Governor's Office of Emergency Services' (Cal OES') strike force report, what sorts of proposals are out there to coordinate the sort of "alphabet soup" that agencies deal with during wildfire emergencies and to put it before a single entity?

The primary recommendation in the Commission report proposes coordinating the different safety protocols and cost recovery before a single entity. Currently, it's for electric utilities, like PG&E and Southern California Edison. They're dealing with the safety enforcement issues before the CPUC. They're dealing with the emergency response requirements for the Cal OES report. They're dealing with the coordination of fire response for Cal Fire.

The concern there is that everyone is spread too thin and no one knows what the other person is doing. So, the proposal that the Commission has put together is to form that single entity. The idea is to put all the wildfire expertise into a single agency.

We'll see whether or not that is an effective proposal. There is a precedent for a complete overhaul following a disaster or following a huge crisis for consolidating things. For example, at the federal level after 9/11, they created an entire branch of government that's part of Homeland Security where they brought together into a single place all those separate functions that were previously spread out among the different agencies.

So, it's localizing this on a state level. I think it's indisputable that wildfires are currently one of the biggest issues in the state. With the impetus of the 2017 and 2018 fires, I think the argument is out there for bringing all those functions together in a single new agency perhaps. That might be one of the proposals that the legislature takes up.

**Kathleen Harrison:** I think it's really needed because there's a lot of confusion as to who's responsible for what and what agency to go to for funding.

**David Pedersen:** I think no doubt there's room for improvement here. But I think FEMA and Cal OES have come a long, long way and are really doing an excellent job. I worked on some of the recovery from the Northridge earthquake. Comparing the responses, there's an enormous difference. Both the federal and state agencies have really

come a long way in terms of efficiency and responsiveness to the folks affected by wildfires or other natural disasters like an earthquake.

They've come a long ways and perhaps there are opportunities for improvement, but we've been really impressed with FEMA and Cal OES. One of the areas we're focusing on is disaster mitigation and preparing local hazard mitigation programs. There's funding programs through FEMA for hazard mitigation. It's actually been helpful in trying to identify those and looking to the next disaster to head it off and try to mitigate some of the effects.

**Willis Hon:** There is another question. What steps could you take to prepare for a disaster?

**David Pedersen:** I have a couple of thoughts. Power, in my opinion, for the water system is one of our weaknesses. Traditionally, as a water utility, we've always recognized the importance of having backup power because of the connection I mentioned between water and power. But we have not looked at it in the way that we need to now. I would argue that water utilities need to invest in backup power like we have never before.

We are doing that right now and reviewing all of our facilities. Mostly, what I'm talking about are pumping facilities that move water. At every single critical facility, even some that previously might not have been considered critical, we're investing in backup power, either through a stationary generator that's placed on that site or through a mobile portable unit.

The other thing is aging infrastructure. When you place it under significant demand, it's stressed. When you're moving large, large amounts of water through aging pipelines, the flow of water has a tendency to find the weak links. So, the weak links become exposed. We find leaks and breaks that damage roads and prevent access. So, I think as a utility we also need to invest in our aging infrastructure and begin to update and modernize it.

**Willis Hon:** We have a final question. Due to the financial constraints given everything, basically, is there a way to prioritize the different environmental techniques that you're using in prevention of wildfires and recovery after wildfires?

**Kathleen Harrison:** From a perspective of recovery afterwards, which is what I focus on, I think we're getting better at prioritizing risk and really understanding what constitutes a risk. It's always interesting, oftentimes when you first go out and start your assessment, everything you see immediately is at high risk. And then by the end of it, after several days, you start putting things more into perspective.

In terms of what we can do, I think there needs to be a lot more collaboration in terms of learning from each other and working collaboratively to come up with methods.

It really gets back to the whole fundamental issue: land use planning in terms of where structures are placed. It's amazing after a fire how many homes we identified that are placed right at the bottom of drainage or a canyon. We had homeowners, because there was so much brush, who didn't even realize that their homes were placed at the bottom of a canyon. So, I think a lot of it is fundamentally getting back to better land use planning in terms of where structures are built in the first place.

**Lloyd Dixon:** To add to that, in order to make that happen, I think you need to create the right incentives for local land use authorities to do that, which comes down to internalizing the cost of the decisions they make. Currently, in California, if you want to build a new subdivision, you need to show that there's enough water for the subdivision. We should think about similar things for the costs of wildfire response in order to provide some real incentives for local authorities to avoid high wildfire risk areas.