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OUT OF CONTROL: THE IMPACT OF WILDFIRES ON

OUR POWER SECTOR AND THE ENVIRONMENT

TUESDAY, JANUARY 28, 2020

House of Representatives,

Subcommittee on Energy,

joint with the

Subcommittee on Environment

and Climate Change,

Committee on Energy and Commerce,

Washington, D.C.

The subcommittees met, pursuant to call, at 10:00 a.m., in Room 2123, Rayburn House Office Building, Hon. Bobby L. Rush [chairman of the Subcommittee on Energy] presiding.

Members present: Representatives Rush, DeGette, Doyle, Matsui, Sarbanes, McNerney, Tonko, Clarke, Loebsack,

Schrader, Kennedy, Ruiz, Peters, Dingell, Veasey, Kuster, Kelly, Barragan, McEachin, Blunt Rochester, Soto, O'Halleran, Pallone (Ex Officio), Walden, Upton, Shimkus, Latta, Rodgers, McKinley, Kinzinger, Griffith, Johnson, Long, Bucshon, Flores, Mullin, Hudson, Walberg, Carter, and Duncan.

Also Present: Representatives Eshoo, Cardenas, LaMalfa, and Gianforte.

Staff present: Waverly Gordon, Deputy Chief Counsel; Tiffany Guarascio, Deputy Staff Director; Omar Guzman-Toro, Policy Analyst; Zach Kahan, Outreach and Member Service Coordinator; Rick Kessler, Senior Advisor and Staff Directory, Energy and Environment; Brendan Larkin, Policy Coordinator; Jourdan Lewis, Policy Coordinator; Elysa Montfort, Press Secretary; Lino Pena-Martinez, Staff Assistant; Alivia Roberts, Press Assistant; Nikki Roy, Policy Coordinator; Medha Surampudy, Professional Staff Member; Rebecca Tomilchik, Staff Assistant; Tuley Wright, Energy and Environment Policy Advisor; William Clutterbuck, Minority Staff Assistant; Jordan Davis, Minority Senior Advisor; Tyler Greenberg, Minority Staff Assistant; Peter Kielty, Minority General Counsel; Mary Martin, Minority Chief Counsel, Energy and Environment and Climate Change; Brandon Mooney, Minority Deputy Chief Counsel, Energy; Brannon Rains, Minority

Legislative Clerk; and Peter Spencer, Minority Senior Professional Staff Member, Environment and Climate Change.

Mr. Rush. [presiding] The Subcommittee on Energy and the Subcommittee on Environment and Climate Change will now come to order.

The chair now recognizes himself for 5 minutes for the purposes of an opening statement.

Good morning again.

Today, the committee convene for a joint subcommittee hearing to conduct oversight of an issue ravaging communities and plaguing the environment. Fires often occur within the U.S. An average of 73,000 wildfires burn 7 million acres of U.S. land each and every year. Though these fires are in some cases part of the healthy ecosystem, their destruction has devastated communities both here at home and around the world.

For the Members of Congress present, there are representatives from each of these areas that have been recently hard hit by wildfires among you, including my colleagues from California, Oregon, Washington, and Colorado. I might add that we are also joined by a member of my staff who is here from Australia whose community is still feeling the impact of recent wildfires in his nation.

According to the Fourth National Climate Assessment, the annual area burned in our nation's western states alone could

increase two to six times the current areas by the middle of this century. Factors contributing to this predicted uptick include climate change, urban development, poor vegetation management, and issues related to power lines.

Last year, California experienced historically catastrophic fires resulting in a tragic loss of life and unimaginable destruction to homes and property. One-half of the causes of California's most disastrous fires are linked to electric utility infrastructure. High winds, in particular, blow nearby vegetation into power lines and aging electric infrastructure causes live wires to fall and igniting the fires. Since 2007, California regulators have permitted the use of public safety power shutoffs by electric utilities to prevent the ignition of wildfires during high-wind events. However, long-term solutions like microgrids and the hardening of our grid infrastructure are necessary considerations, as blackouts pose a risk to more and more populations and other ratepayers.

I want to thank our witnesses for their participation in today's hearing, and I look forward to identifying concrete solutions to these daunting problems.

And now, it is my distinct honor to recognize for the purposes of an opening statement my friend from the great

State of Michigan, Mr. Upton.

Mr. Upton. Well, thank you, my friend and chairman, for holding today's joint hearing to examine the impact of the recent wildfires and certainly to discuss ways to improve forest management and maintain electrical equipment to prevent fires and reduce risk to human health as well as to the environment.

There are many of us that believe there is no question that the biggest driver of the recent wildfires is decades of mismanagement of our nation's forests. Yes, climate change is, indeed, playing a role, but the evidence suggests that our direct impact to the land and the ways that we manage our forests has a lot to do with the situation that we are facing today.

So, I plan to use today's hearing to discuss what we can do to improve forest conditions, prevent sparks on electrical lines, remove brush and trees from utility corridors, and, yes, strengthen planning and preparedness at every level.

Wildfires are not a new phenomenon. Before the pioneers settled the West, wildfires were much more widespread and they burned many more acres than they burn today. However, today's wildfires are burning hotter and with more intensity as a result of decades of fire suppression and the buildup of

brush and dead trees.

So, with population growth and urban sprawl, more people than ever before, especially in the West, are living in wilderness areas that are prone to wildfires. I look forward to hearing from our forestry experts, Dr. Collins and Dr. Davis, to expand on the trends influencing wildfires and share suggestions to improve forest conditions that can reduce the risk of fires. There are many steps that we can take immediately, including the thinning of brush, prescribed burns, and allowing some wildfires to run their course naturally.

But, as we know from some of our prior hearings on wildfires, these issues are particularly acute in California and Oregon, which have both suffered devastating wildfires in recent years. So, I look forward to hearing from Mr. Johnson and Mr. Markham about what utilities can do to manage hazardous trees on their rights-of-way and maintain their equipment to prevent sparks.

I am also interested to learn more about how utilities can improve preparation with more accurate forecasting, more proactive maintenance and tree clearing, more sensors and automated equipment to improve visibility on their systems. There is a big role for technology here. So, we need to be

thinking about how do we innovate and drive these new ideas into practice.

Members of this committee are also interested to gather lessons learned on the regulatory side, especially at the state level. If there are permitting challenges that prevent utilities from clearing hazardous trees, we need to address them. Much of the focus of today's hearing will certainly be on California and the challenges that they are experiencing with their electric utilities.

While the fires themselves are devastating, millions of residents in California also have been suffering through these public safety power shutoffs in an attempt to prevent wildfires from being started by electrical equipment during strong winds and dry weather. These blackouts have resulted in cascading effects, causing widespread interruptions affecting public safety, health care, transportation, and other government services.

These proactive blackouts are simply not sustainable. It is crazy to think about living in a modern society where one must constantly worry about whether the lights are on or whether they can come back on, whether the freezer defrosts, let alone worry about whether 911 is going to work in an emergency.

The bottom line is that we need to make sure that our utilities and government regulators are taking an all-hazards approach. Now more than ever, we should be focused on grid reliability and resilience. I believe that we should treat wildfires like severe weather and cyberattacks. We need to be more focused on those threats and make sure that we have the tools in place across the board to protect, respond, and recover from wildfires wherever they might occur.

With that, I look forward to today's testimony and continuing the conversation with colleagues on both sides about some legislative solutions. I would note that we have got a number of bills that address grid reliability and pipeline security, which would strengthen the Department of Energy's ability to respond to natural disasters like wildfires. So, let's get these bills to the floor soon. They are but one of the many steps that we need to take.

With that, I yield back.

Mr. Rush. The gentleman yields back. The chair now recognizes Mr. Tonko, who is the chairman of the Subcommittee on Environment and Climate Change. Mr. Tonko is recognized for 5 minutes.

Mr. Tonko. Thank you, Chairman Rush, and thank you to our witnesses for being here this morning.

In recent years, we, unfortunately, have become accustomed to the destructive power of wildfires. The growing number of these disasters poses significant health, ecological, and fiscal risks. We know the consequences of these fires can be devastating. But simply quenching them without addressing their root cause is incomplete and irresponsible.

These dramatic increases in wildfires are a symptom of an ailing planet, and climate change is contributing to the growing severity of these fires. Across the country, climate change is raising temperatures, exacerbating drought, drying soil, and killing trees. These conditions prime the landscape for long, dangerous burns.

In previous hearings, we have heard that our forests capture and store significant amounts of carbon, which can reduce climate pollution and help meet emissions reduction goals. Wildfires reverse that benefit. Not only do fires generate harmful air pollution and smoke, causing tremendous public health challenges, they are turning forests, potential climate solutions as carbon sinks, into sources of emissions. Simply put, climate change is worsening fires, which cause more climate damage.

We also know that our wildfire response requires greater

resilience, adaptation, and planning. This is especially true in the context of the power sector. Today, we will seek to understand what is necessary to design and operate an electricity system that is more resilient and acknowledges that fire poses a risk to, and can be caused by, our energy infrastructure.

I hope we will hear more about the strategies being proposed to ensure high-risk areas can continue to have both safe and reliable service and we are enabling the investments in grid modernization and management necessary to, indeed, harden our systems.

With that, I will yield 1 minute of my remaining time to Mr. Cardenas.

Mr. Cardenas. Thank you, Chairman Tonko.

First, I want to take a moment to thank the thousands of firefighters and first responders throughout California and across the country who are on the front lines risking their lives to protect us from these devastating fires.

These fires are all too common in my district and across the State and across the country. It is alarming how wildfires have grown in intensity, frequency, and ferocity in recent years. A big wildfire in California used to be maybe tens of thousands of acres maybe or 100,000. Now we are

talking a million acres or more. These wildfires threaten American lives, homes, property, business. From January to October in 2019, we had over 40,000 wildfires that burned over 4.4 million acres.

As we hold this hearing, Australia burns. Raging fires have swept across Australia, devastating land, property, and wildlife, and more than 30 people have been killed, over a billion animals have died, and more than 3,000 homes have been burned down.

Ladies and gentlemen, we can do more, and one of the biggest contributors to this phenomenon is human activity.

I yield back to Mr. Tonko.

Mr. Tonko. I now yield the remainder of my time to the gentleman from California, Mr. McNerney.

Mr. McNerney. I thank the chair.

I requested today's hearings in part because our current energy infrastructure in this country is not adequate to today's challenge. Our energy grid serves as the backbone of our economy, touching every aspect of our lives. A reliable grid system is also crucial for our national security and for a clean energy future.

Over the past few decades, a combination of actions at the federal and state levels have rendered our energy grid

ill-prepared to withstand the physical impact of wildfires and other modern risks. This poses a major challenge, as wildfires and other extreme weather events are expected to continue to increase in severity due to climate change.

But in order to secure utility wildfire resilience and encourage grid modernization, we, first, need to understand if and when infrastructure investment began to taper off and why. I also want to get a clear picture of what the federal government can and should do to prevent wildfires, including increasing investment in energy infrastructure and in the development of resilience and fire-preventing standards at the state levels.

I thank the witnesses for attending, and I yield back to the chair.

Mr. Tonko. And with that, Mr. Chair, I yield back the remainder of my time.

Mr. Rush. The gentleman yields back. The chair now recognizes the gentleman from Illinois, Mr. Shimkus, and the ranking member of the Subcommittee on Environment and Climate Change.

Mr. Shimkus. Thank you, Mr. Chairman.

Today's hearing will review the risk and harms of wildfires and what may be done to address the risk. General

focus concerns the role of the electric power structure, which has been linked to destructive fires, especially in California in the recent years. Orienting our focus around the power sector should be useful for the subcommittees, both from energy and environment policy perspectives. It should help inform a better understanding of what it takes to reduce wildfire risk and improve the resiliency when wildfire risks are especially high, as has been the case in California and the Pacific Northwest for a number of years now.

It also will help us focus on the future risk in a practical way. When we talk about addressing long-term climate risk, for example, a big part of the discussion must involve what is needed to provide for adaptive capacity of communities to reduce, respond, and recover from impacts of those risks.

Part of the capacity involves ensuring the economic wherewithal of communities to respond to risk. Another part involves ensuring effective information and permitting for timely decisions that enable cost-effective, resilient infrastructure. Overall, adaptive capacity is about flexibility to respond to risks, whatever they may be. I understand, for example, that one of the benefits of PG&E's exercise in the communications and outreach during the power

outages has been to better prepare the communication and response for catastrophic events like earthquakes.

During the 115th Congress, I chaired two subcommittee hearings on wildfires. We examined the air quality impacts of wildfires with a focus on stakeholder perspectives. We also examined the mitigation and management strategies for reducing air quality risk from wildfire smoke. Generally, these strategies involve efforts to reduce the intensity and frequency of wildfires that threaten communities. The strategies also involve managing the inevitable smoke impacts, whether from wildfires or from what is known as prescribed burning. And they involve ensuring that effective actions are credited appropriately in air quality planning, air quality monitoring, and compliance activities, so states and localities are not punished for taking action that will improve public health.

The EPA has issued guidance over the past year aiming to reduce penalties for prescribed burns and wildfires. This process requires significant coordination, planning, and approvals. More may be done in terms of the agency recognizing large regional fire events that impact multiple states. It is bad enough for communities to experience choking wildfire smoke, but for states to be further

penalized for these exceptional events does not make sense.

Today's hearing should provide additional perspective to help understand the importance of these strategies to the larger goal of reducing the harmful impacts of wildfires. Additional information on the value of preventative measures such as prescribed burns, mechanical thinning, and related practices would be useful today.

Two of our witnesses today, Dr. Brandon Collins and Dr. Anthony Davis, can talk about the value of these practices from their field work in California and the Pacific Northwest. And we welcome you here.

During the past two wildfire hearings, we learned about the experience in the Eastern United States which has a long culture of more active fire management than in the West. There are many reasons for this, some involving topography and other unique factors of the West, but the underlying fact is that more can be done today to reduce the risk.

It will be useful to examine the measures most necessary to respond to recover from wildfire events. For electric providers, the most pressing issues concern restoration of power or ensuring communities have the electricity when they need it most, and increasing their technological ability to ensure reliability during hazard events.

For federal and state policymakers, there is also a need to ensure forests recover and are resilient to inevitable fire events and other hazards. Having basic facts on this can go a long way to improving our energy, environment, and public health policies.

Let me welcome the panelists. I look forward to understanding the challenges and opportunities you face and what we can do to ensure our policies accommodate what is necessary to reduce the risk and ensure adaptive capacity of communities going forward.

With that, Mr. Chairman, I yield back my time and I thank you.

Mr. Rush. The gentleman yields back. The chair now recognizes Mr. Pallone, the chairman of the full committee, for the purposes of an opening statement. Mr. Pallone is recognized for 5 minutes.

The Chairman. Thank you, Chairman Rush.

This is an important hearing today. And as we examine the impact of wildfires on our energy infrastructure and the environment, wildfires are becoming more frequent and more dangerous and more destructive due to the impacts of climate change. And it is not only the United States that is affected by these fires. Catastrophic wildfires continue to

rage in Australia, which has been the focus of media attention, and that claims lives and property and decimates unique wildlife and habitats. And the costs of these events are tremendous and they continue to rise.

Mr. Chairman, I just wanted, if I could, to ask unanimous consent to enter into the record an article in my local newspaper talking about how the types of wildfires that have raged in Australia could very well happen in my home State of New Jersey in the Pinelands, which is an area that in many ways has a similar phenomena to the brush that has caught fire in Australia.

And fire is, and has been, a part of the life cycle of many ecosystems, but inadequate management coupled with the expansion of communities and infrastructures in the fire-prone areas has increased fire risk. Failure to address these risks is contributing to more wildfires getting started, and when they do start, climate change, and the extended droughts and high temperatures associated with it, results in fires that burn hotter over more extensive areas.

Since the seventies, the average annual number of large wildfires in the Western United States has tripled and the area burned six times greater. Last year, nearly 50,000 wildfires burned nearly 4.6 million acres throughout the

United States, and these wildfires are particularly destructive in the Western States. And California has borne the brunt of the damage and devastation over the last several years.

While climate change is making wildfires more severe and more frequent, most wildfires in the United States are caused by human activity. The 2018 Camp Fire in California was the deadliest wildfire in nearly a century. It was started by transmission lines owned by PG&E. Clearly, electric utilities have to do more to ensure their systems are modernized and maintained to prevent sparking fires, and the safety of the communities they serve depends upon responsible equipment management and maintenance. And when more drastic preventive measures must be taken, such as the planned power shutoffs that affected millions of PG&E customers last year, utilities must minimize the impact on customers in areas without power.

We have to reduce fire risks associated with infrastructure located in fire-prone areas. We have to do a better job of habitat management, and we must address climate change to avoid ever-worsening droughts and elevated temperatures that intensify fires once they start.

This is critical because the Fourth National Climate

Assessment projects that the frequency of wildfires could increase by 25 percent and the number of very large fires could triple if we don't act. The devastation and suffering caused by wildfires can only be curtailed by moving forward with an array of policies to accomplish these goals. There is no singular solution to the problem.

I would like to yield now at least a minute to Representative Matsui, and if time remains after that, to Mr. Peters. And so, I yield now to Ms. Matsui.

Ms. Matsui. Thank you, Mr. Chairman.

I want to say, while the most recent and devastating wildfires have not occurred in my district, but above and around my district, we are getting the downwind effects of this devastation. Therefore, I want to highlight the risk my constituents face because of wildfire smoke containing harmful chemicals, like carbon monoxide, nitrogen dioxide, and dangerous levels of particulate matter.

Today's hearing can bring much-needed attention to this issue. It is our responsibility to press policy and industry experts for answers to difficult questions about public health and safety, grid reliability, and in the face of rapidly-changing climate, how utilities are accounting for worsening natural disasters. We must take this opportunity

today to demand accountability and push for answers as to how we can avoid past mistakes and plan for a safer future for our constituents.

I look forward to hearing from our witnesses and constituents, and I yield the rest of the time to Mr. Peters.

Mr. Peters. Thank you, Ms. Matsui and Mr. Pallone.

There is a vicious feedback loop that exists between wildfires and climate change. So, you have these longer periods of drought caused by climate change that dry out trees and vegetation. That leads to more frequent, unpredictable, and intense wildfires. And then, that, in turn, leads to the release of heat-trapping carbon dioxide and black carbon back into the atmosphere, which perpetuates the cycle. And burned-out forests accelerate that cycle, as forests lose almost all their capacity to sequester carbon.

So, I want to know what Congress needs to do about this. And it is tempting to focus on the points of ignition, but what we see is, whether this is caused by a power line -- and our electric utilities have to do better -- or whether it is caused by a cigarette, the reason these fires are so intense has to do with climate change. And I hope today's hearing will illuminate how we should respond to that as Congress.

And I appreciate the time and yield back.

Mr. Rush. The gentleman yields back.

The subcommittees have a unanimous consent request from the full committee chairman. Are there any objections? Seeing no objections, so ordered.

The chair now recognizes Mr. Walden, who is the ranking member of the full committee, for the purposes of his opening statement. Mr. Walden, you are recognized for 5 minutes.

Mr. Walden. Well, thank you very much, Chairman Rush. We appreciate you and others holding this hearing jointly between the two subcommittees.

I want to welcome Dr. Davis from Oregon State University, School of Forestry, and Dave Markham especially from central Oregon. And we will talk more about them coming up. We are glad you and the other panelists are here today.

This is really an important topic, an important topic for those of us in the West. It is the third hearing. When I chaired this committee, we had two hearings on air quality and the effects of wildfire smoke on human health conditions. So, I am really appreciative of the fact that we are continuing this sequence of hearings.

When we last held a hearing on this topic in September of 2018, my home State of Oregon, for the second year in a row, was battling near-record wildfires. Communities in the

district, my district, experienced some of the worse air quality in the world -- in the world -- while also suffering significant economic impact as tourists went elsewhere. Oregonians told me those with breathing disorders actually had to leave the State, go over to the Oregon coast, go somewhere else, to find air that they could breathe. Just two months after the hearing, California, tragically, suffered the fatal Camp Fire, devastating the town of Paradise.

In the wake of that and other harmful events, California and Oregon have moved toward requiring utilities to strengthen emergency plans, including de-energizing lines in areas of high risk. My home town, serviced by PacifiCorp, was told this year we would be in that zone. If there is a problem, they will de-energize our entire town.

This last year, we witnessed how this risk-reduction practice put 2 million people in the dark just as windstorms were threatening new wildfires. The news reports suggest this may become the norm in coming years. But we also know this strategy is not without negative consequences, especially for people who have special medical needs that may require electricity without interruption. Just think about that; somewhere along the way, your power goes down in your

entire community and you are left trying to figure out how to breathe.

Meanwhile, government red tape continues to stand in the way of common-sense hazard tree removal or grid safety improvements and utility rights-of-way. This is a fact. This is a fact. In fact, I have got a slide, if we could put it up on the screen here, Dave Markham of Central Electric Cooperative in Redmond provided for me. Central Electric's service territory is 56 percent on federal land. This is partially a federal land management problem, and I know he will speak to these challenges later. But he gave me this photo. It is behind us. I don't know if we can put it on the side screens or not.

Last April, Central Electric applied to move this power pole -- you see it in the distance, an aged power pole -- 20 feet, 20 feet, so they could mitigate against the threat of wildfire. That was in April. The new location would be safer, it would be more accessible. The Forest Service didn't get around to that application until October, seven months later. By then, it was too late in the work year to go move one pole -- one pole.

This is why we have got to reform the federal rules and laws that prevent utilities from doing what they know needs

to be done to protect our great national forests and the communities around them. Delays in this sort of maintenance efforts can have deadly consequences, especially when combined with our poorly-managed federal forests that, frankly, are overstocked and waiting to burn.

While climate change plays a role -- and it does, and it has extended the fire season in the West by upwards of 30 days, according to some researchers -- the evidence remains overwhelming that increasingly-intense fire seasons are also driven by the way we have managed or mismanaged or not managed our federal forestlands. They are overstocked with trees.

For example, OSU Forestry Professor John Bailey testified before this committee two years ago that tree stand densities in the driest areas of my district would naturally be as low as 20 trees per acre. That is what Nature had planned. That is how it used to be. Then, we suppressed fire. We did all these other things. Those forests today have upwards of a thousand trees per acre, not 20 as Nature intended, but because man has interfered, we have upwards of a thousand. Think about that for a minute. And so, when fire strikes, that excess ends up as smoke and carbon in our atmosphere.

We know the Forest Service and EPA have data that, in 2015, in my State of Oregon, we burned 685,000 acres. That emitted the equivalent of emissions for 3 million cars or three and a half coal plants. Nationwide, since 2015, we have burned 39 million acres in the United States, following the same pattern that would be emissions roughly equivalent to 170 million cars or nearly 200 power plants.

Taking sensible steps to improve NEPA and increase the pace and scale of forest management activities, and thin our forests, and then, go back and keep thinning them -- it is not a once and done -- would be a win for climate; it would be a win for our communities, and it would be a win for public safety.

A 2014 study by the U.S. Forest Service, Sierra Nevada Conservancy, and Nature Conservancy found that fuel treatment projects can reduce the size and intensity of fire between 30 and 76 percent. That treatment also helps reduce carbon emissions from these fires by up to 85 percent. We need to do more active management. We have legislation to do that.

And I would also love to hear in the end from our scientists about the emissions that come from post-fire debris, because I am told by some in the Forest Service that can be upwards of 75 percent of the carbon emissions come

from the decay of the debris that is left after a fire and not cleaned up.

Mr. Chairman, you have been most generous. My time has expired, and I yield back.

Mr. Rush. The gentleman yields back.

The chair would like to remind members that, pursuant to committee rules, all members' written opening statements shall be made part of the record.

Now I would like to welcome our witnesses for today's hearing. Our witnesses are Mr. William Johnson, who is CEO and President of PG&E Corporation; Mr. John MacWilliams, Senior Fellow, the Center on Global Energy Policy at Columbia University; Dr. Anthony Davis, the Interim Dean of College of Forestry at Oregon State University; Dr. Brandon Collins, Research Scientist, the Center for Fire Research and Outreach, Berkeley Forests, University of California at Berkeley, and Dr. David Markham, President and CEO of the Central Electric Cooperative, Incorporated.

I want to thank each of you for joining us today. We look forward to your testimony.

But, before we begin, I would like to explain the lighting system. In front of you is a series of lights. The light will initially be green. The light will turn yellow

when you have 1 minute remaining. Please begin to wrap up your testimony at that point. The light will turn red when your time expires. Thank you very much.

Mr. Johnson, you are recognized now for 5 minutes.

?STATEMENTS OF WILLIAM JOHNSON, CEO AND PRESIDENT, PG&E CORPORATION; JOHN MACWILLIAMS, SENIOR FELLOW, CENTER ON GLOBAL ENERGY POLICY, COLUMBIA UNIVERSITY; ANTHONY S. DAVIS, INTERIM DEAN, COLLEGE OF FORESTRY, OREGON STATE UNIVERSITY; BRANDON M. COLLINS, RESEARCH SCIENTIST, CENTER FOR FIRE RESEARCH AND OUTREACH, BERKELEY FORESTS, UNIVERSITY OF CALIFORNIA, BERKELEY, AND DAVID MARKHAM, PRESIDENT AND CEO, CENTRAL ELECTRIC COOPERATIVE, INCORPORATED

?STATEMENT OF WILLIAM JOHNSON

Mr. Johnson. Good morning. Thank you, Mr. Chair.

I am Bill Johnson, the CEO and President of PG&E Corporation.

I appreciate the committee's interest in wildfire impacts and resilience and commend the California delegation for their engagement on this topic, because California is, indeed, ground zero for these issues, having had the State's most destructive and deadly wildfires in its history in 2017 and 2018. And PG&E equipment played a significant role in several of these fatal fires, for which we are deeply sorry. And we are taking action to help those communities rebuild and recover and to prevent events like this from ever happening again.

But, as we have heard this morning, this is not an issue limited to California. It is an issue across this nation, and recent events in Australia indicate it is a global problem.

PG&E is addressing the wildfire challenge comprehensively and increasing the resilience of our system. We are intensely focused on safety for our customers, our communities, our workforce, and providing our customers with the reliable, affordable, and clean energy they expect and deserve. But we also know this: climate change will continue to increase the intensity of the environmental conditions contributing to wildfire and other risks.

Just seven years ago, about 15 percent of PG&E's service area was designated as having an elevated fire risk. Today, that number is over 50 percent and is growing. In other words, the risk has more than tripled in under a decade.

In response, and through utilizing best practices and lessons learned from our peers like San Diego Gas & Electric and Southern California Edison, PG&E is implementing a comprehensive wildfire safety plan that addresses ignition risk drivers and the consequences of those ignitions from electric infrastructure.

Last year, we inspected every element of our electric

system within the high fire threat districts, examining almost 25 million components in only four months, and repaired any safety conditions we found on a priority basis. We are bolstering situational awareness and emergency response by deploying weather stations, high-definition cameras, as well as using satellite data and modeling techniques to predict wildfire spread and behavior. We are hardening our system in the areas where the fire threat is highest by installing stronger and more resilient poles and covered power lines, as well as undergrounding. And we are increasing vegetation management in high-risk areas, incorporating analytical and predictive capabilities, and expanding the scope and intrusiveness of our inspection process.

But we are also turning off power for safety during severe wind events, which has significant impacts for vulnerable customers, critical infrastructure, and first responders. Now this plan is working in reducing the risk of catastrophic fires. Last year, there was no loss of life from PG&E electric infrastructure due to fire.

But shutting off power is not the way we want to serve our customers. It creates its own set of safety risks and customer impacts. So, before the next wildfire season

begins, we will improve the execution of these events, narrow their scope, and shorten their duration. We are deploying customer-centric solutions such as microgrids and resilient zones to mitigate the impact of the power shutoffs. And ultimately, all of these efforts will increase grid resilience to any hazard.

As we go about this work, we will continue to seek and collaborate with external partners, including those at the federal level. We believe that Congress can help reduce the wildfire threat and increase overall grid and climate resilience through actions that include enacting a market-based, economywide climate policy that encourages innovation in both carbon mitigation and adaptation technologies; by directing the Energy Department to develop a framework and process for cost-benefit analyses of resilience investments; by increasing eligibility and funding for energy assistance and community resilience programs to offset cost to low-income customers, and support research and development of new technologies and forward-looking climate data.

Specific to addressing the wildfire threat, we believe the federal government should continue its efforts to fund forest management and fire suppression activities; implement the forest and vegetation management legislation advanced by

Congressmen Schrader and LaMalfa; ensure access to federal lands for prevention and response; incentivize pre-disaster mitigation planning and build greater resilience for our infrastructure in communities, and authorize federal agencies to share satellite data for wildfire detection.

PG&E is urgently addressing the wildfire threat and increasing the resilience of our systems. We appreciate Congress' partnership in that effort.

Thank you.

[The prepared statement of Mr. Johnson follows:]

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Mr. Rush. I want to thank you.

The chair now recognizes Mr. John MacWilliams for 5 minutes for the purposes of an opening statement.

?STATEMENT OF JOHN MACWILLIAMS

Mr. MacWilliams. Thank you, Chairman Rush and Chairman Tonko, Ranking Members Upton and Shimkus, for the invitation to testify today.

I am John MacWilliams. I am a Senior Fellow at Columbia University's Center on Global Energy Policy.

The California wildfires and resulting bankruptcy of one of the nation's leading utilities are important as a case study for how we are going to appropriately allocate the inevitable, enormous, and increasing costs of climate change to our nation's critical infrastructure among numerous stakeholders, including ratepayers, investors, and federal and state taxpayers.

In August 2019, the Center on Global Energy Policy published a research paper, "PG&E: Market and Policy Perspectives on the First Climate Change Bankruptcy". In that paper, my coauthors, Sarah La Monaca and James Kobus, who are here with me today, and I noted that climate change played a material role in the wildfires and PG&E's subsequent bankruptcy. And this is because climate change has created conditions in California and elsewhere that make fires more intense, more damaging, and more likely to occur.

Now the scientific literature almost universally projects significant climate change-driven increases in wildfire activity and intensity across the United States. The U.S. Government's Fourth National Climate Assessment notes that, "by the middle of this century, the annual area burned in the Western United States could increase from two to six times from the present".

Wildfires pose a major threat to reliable electricity service, and while the fires themselves can disrupt electricity service, a new and emerging trend has further underscored this problem, which has been discussed, preventative power shutoffs that have affected millions of customers. These events highlight the escalating costs and the difficulty of providing reliable electricity service in a country that is rapidly becoming more vulnerable to the negative effects of climate change. The bottom line is that, if customers are going to continue to demand the near 100 percent reliability of electric service that they have become accustomed to, large infrastructure investment will be required to modernize the grid to make it more resilient.

We have seen the potential damages from wildfires may be large enough to threaten the financial viability of the utilities, but, in any event, they will materially increase

the cost to utility sector stakeholders, drive up electricity rates, and importantly, crowd out essential investment in renewable energy and grid upgrades.

So, what should the federal government do? First and foremost, Congress should focus on the broad impact of climate change and the effect it is going to have, is having on our environment, our people, and on our economy. And the California wildfires are just a vivid example of the devastation that climate change will increasingly bring. We are encouraged by the efforts of this committee to bring together public and private sector leaders to address climate change and U.S. greenhouse gas emissions, including the CLEAN Future Act Framework.

Second, challenges of this magnitude can't be solved without large amounts of private sector investment, and Congress should examine ways to encourage such capital flows. One mechanism that my former colleagues at the Department of Energy and I have advocated in the past is the creation of a national infrastructure bank. Given the magnitude of these challenges, I would strongly encourage Congress to take a fresh look at this possibility. The recent proposal to create a National Climate Bank is a positive step in this direction.

Third, FERC could incentivize greater fire prevention and grid hardening. It has utilized specialized profit incentives and accelerated cost recovery mechanisms in the past, and such mechanisms could be used to provide incentives for utility companies to prioritize resiliency and fire prevention.

And finally, Congress should support increased research, development, demonstration, and deployment funding for wildfire prevention methods and technologies. The Department of Energy and its 17 National Labs provide enormous technical capabilities. From my work as a senior advisor to Lawrence Livermore National Lab, I am very aware of the great work that they and the other Bay Area labs are doing. Promising research is being conducted on sensor technology, high altitude wind forecasting, high-performance computing for fire simulation and prediction. And other National Labs, including Idaho National Lab and National Renewable Energy Lab in Colorado, have valuable expertise to contribute and experience. INL was evacuated last summer when it was threatened by a wildfire.

In conclusion, I would like to thank you for holding this hearing, Mr. Chairman. The California wildfires should be a call for action regarding the adverse impacts of climate

change. And as tragic as these events have been, one only needs to look at Australia to see the potential for even greater devastation to come.

Thank you, and I would be pleased to take your questions.

[The prepared statement of Mr. MacWilliams follows:]

********** INSERT 2 **********

Mr. Rush. Thank you, Mr. MacWilliams.

Dr. Davis, you are recognize for 5 minutes for an opening statement.

?STATEMENT OF ANTHONY S. DAVIS

Mr. Davis. Chairman Rush and Chairman Tonko, Ranking Member Upton and Ranking Member Shimkus, thank you for the opportunity to testify today on the issue of wildfire in our western landscapes. I would also like to thank Representatives Schrader and Walden from Oregon for their attention to this issue.

I am Anthony Dean, Interim Dean of the College of Forestry at Oregon State University.

Our society invests more time, energy, and resources fighting fires than we do taking proactive steps to reduce wildfire severity and foster the resiliency of our forests and communities. Past management, current climate, and shifts in land use have left us with a landscape that has more trees and more contiguous forested areas inhabited by people than ever before. To respond, we must apply our evolving knowledge of fire behavior and forest management to deal with the new fire reality.

The economic and social impact of wildfire is staggering when one includes post-fire costs such as health care, loss of business revenue and property, and too often, the loss of human life. And perhaps the highest risk comes in the form

of drinking water. Many cities benefit from water filtration that our forest systems provide every day, and wildfire places a risk on our water systems, globally valued at more than $4 trillion per year.

In addition to watersheds, another key area of risk is smoke. Recent levels of wildfire smoke in the Pacific Northwest have been unprecedented, regularly resulting in conditions that would have been classified as non-attainment under Clean Air Act standards. Wildfire smoke differentially affects vulnerable groups such as those with preexisting respiratory and cardiac conditions, the elderly, the young, and pregnant women. Smoke impacts may be greater among poorer populations due to exposure as a result of lack of access to indoor environments with air filtration systems. And beyond individual impacts, wildfire smoke significantly affects all segments of the outdoor economy, threatening small businesses that already operate on thin margins.

To address this complex fire challenge and its impacts, we must first better understand fire. An important consideration is that wildfires are not new and that they are necessary. They renew numerous ecological processes while also regulating and reducing the total amount of fuel available for burning.

Looking back, the history of fire on our landscape offers important lessons towards addressing future fire behavior, from how indigenous peoples used fire as a management tool to the natural frequency and intensity of wildfire burning.

We must also consider our past success in fire suppression and the impact year after year of effective fire control. This success has led to an increase in continuous biomass available to burn across the forest landscape, which is a prime contributor to our current challenge.

Looking forward, managed fire and effective treatments on our landscapes will be critical in addressing wildfire and its impacts, but the scale of the problem does not allow us to simply cut our way out of this challenge. We can prioritize fire resilience and preparedness in important areas such as critical watersheds in population centers, but this will not address the presence of smoke in communities.

As we look for solutions, we must also recognize two issues. Climate is a primary driver, and people choose to live in fire-prone areas. Changing climate drives us towards novel conditions that require research and corresponding adaptive measures. Fire severity and total area burn is largely determined by a combination of climate, weather,

topography, and fuels. And compounding this, more people live in the wildland-urban interface than ever before, presenting not only a greater human area needing protection, but also more potential sources of ignition. In Oregon in 2018, two-thirds of fires were started by humans.

To take action, we must work to demystify public perceptions of some of the elements around fire in Western systems. Fire will never be eliminated from Western forests. It is part of our future and it is an important part of the ecology of our forests. But, with a better informed public, a commitment among scientists, policymakers, and practitioners to collaborate across administrative and geographic boundaries, and consideration of both fire history and novel climate conditions, we can develop solutions. Failing to act now will only increase the cost and lengthen the time before we see a meaningful change.

Thank you again for the opportunity to offer this testimony. I look forward to answering any questions you may have.

[The prepared statement of Mr. Davis follows:]

********** INSERT 3 **********

Mr. Rush. Thank you, Dr. Davis.

And now, the chair recognizes Dr. Collins for 5 minutes for the purpose of an opening statement.

?STATEMENT OF BRANDON M. COLLINS

Mr. Collins. So, thank you to the chairpersons and all of the members, frankly, of the subcommittees. This is an important issue, obviously, to many people and we come at it from different angles.

From my perspective as a scientist, I think that this is the ultimate goal of research, is to inform this type of process and, also, give information to the forest managers. So, this is a true honor for me to be here. Thank you.

So, I am going to echo some of the comments that have been said before. I will try to do it quickly, but, then, get to some of the punch lines that I have to offer.

Fire has been a part of Western forests for millennia, and I think we have come to realize that excluding it, it is not going to happen. It is impossible. So, the next question is how to sort of work with fire.

One perspective could be that wildfires that are happening now or that have been happening over the last several years are just simply the return of a naturally consistent process that we have kept out for so long. The problem is that the effects of these fires are not natural at all. And when I talk about effects, I think so many people

emphasize the size of wildfires, that they have grown twofold, fivefold, whatever, but it is not that. The size isn't really the issue. It is the size of the patches with nearly complete or complete tree mortality. Those patches right now are probably on the order of five to ten times bigger than what they were historically.

And as a result, our forests are not adapted to that. The tree species cannot regenerate naturally following that type of disturbance, as we call it in ecology. So, I think that is the one thing to focus on, is the size of large patches and how we can reduce that.

And let me say quickly, too, some of the cascading effects of the sizes of these patches. One is, obviously, the really delayed, if at all, the lack of regeneration from trees. But you can think about the effects on habitat, the effects on carbon sequestration when you shift from a tree-dominated area to a shrub-dominated area.

So, we have talked about what some of the drivers of this are, and I think there is sort of a debate as to climate versus forest management. My perspective -- and it is supported by a lot of data -- is that it is forest conditions that are the primary driver, with climate being sort of an exacerbating effect. If you think about what climate does,

it really opens the window of opportunity for fires to spread, and spread beyond our capacity to put them out. We are very, very good at putting fires out. We can put out 90-95 percent of all ignitions. It is the ones that are burning on those warmer, windier days that exceed our capacity to put them out, and those are the ones affecting the landscape. So, the climate opens that window up, but it is really the forest conditions that allow them to continue and burn over tens of thousands of acres.

So, what I would like to say here is let's think about just the drivers for the moment of what that forest change is. One is, obviously, the elimination of fire, right? Folks before have talked about sort of the increases in tree density. We have, however you want to count trees -- if you want to count up the smallest or just count sort of medium-sized trees and bigger -- we are looking at a five- to tenfold increase in trees, in tree density relative to historical conditions.

Fuel loads have doubled, if not tripled. And that is the dead surface, dead material on the surface. And then, also, there is just greater continuity. We have forest cover, sort of wall-to-wall trees, over giant landscapes. And as a result, when fires get up in the crowns of these

trees, we have very limited capacity to put them out.

So, on the side of mitigation, what can we do here? We have been studying this for a couple of decades now in terms of what you can do to restore forest structure and to reduce wildfire hazard. There is no single answer here. The answer is sort of all of the above.

It is thinning. It is thinning the right way, which from a federal standpoint there are many statutes in place to sort of protect from the, quote-unquote, logging that so many people are concerned about. But, then, there is also a lot of things in the way in terms of how readily thinning can get inhibited. But we know that thinning can't happen everywhere.

We have some really inaccessible parts of the landscape where we need to do a lot of burning, either prescribed burning or, frankly, managing natural wildfires under conditions where we could have put them out. And I know that sounds terrible for some folks. Wildfire is the enemy, but, frankly, we are going to have to embrace it to a certain extent and do our best to manage it.

So, I am going to close with this. I think it is time at this point -- if it is not clear already, it should be -- that we need to prioritize forest management. For the past

several decades, we have prioritized other resources, and for good reason, right? They were compromised. But at this point I think it is pretty darn clear that forests are pretty vulnerable and they need to be prioritized, so that all the rest of the things that cascade from forests or that forests depend on are there for future generations.

Thank you.

[The prepared statement of Mr. Collins follows:]

********** INSERT 4 **********

Mr. Rush. I want to thank you, Dr. Collins.

The chair wants to remind our spectators that we welcome you here to the committee hearing and we ask that you really refrain from any displays or commentary on the witnesses or any of the members as they engage on this committee. We hope that you will follow suit.

The chair now recognizes Mr. Markham for 5 minutes for the purposes of an opening statement.

?STATEMENT OF DAVID MARKHAM

Mr. Markham. Good morning, Chairmen Rush and Tonko, Ranking Members Upton and Shimkus, and members of the subcommittees.

I am Dave Markham. I am the CEO of Central Electric Cooperative, and we are headquartered in Redmond, Oregon. We provide nearly 100 percent carbon emission-free electricity to more than 38,000 members throughout central Oregon. I also serve as chairman of PNGC Power, a generation transmission cooperative that is headquartered in Portland and owned by 15 Northwest electric distribution cooperatives. I appreciate the opportunity to testify today on the impact of wildfires on the power sector and the environment.

Oregon's 18 electric cooperatives serve over 500,000 Oregonians across 65 percent of the land mass of the State. And often, that is in some of the most heavily forested areas in the United States. In fact, Central Electric, the area we serve is more than 56 percent federal land.

Now it is a challenging job, but electric cooperatives, we are very committed to keeping our rights-of-way cleared and keeping our electric systems maintained. Oregon electric cooperatives, we are proactively addressing increased

wildfire risk by instituting wildfire mitigation plans, which really they just formalize the actions that we have been taking voluntarily for years.

For example, Central Electric, we upgraded 23 miles of transmission line, much of it through heavily forested areas, and we replaced wood poles with much more expensive steel structures. Now we are in the process of conducting maintenance on 13 miles of distribution line on national forestland. We are replacing 4-foot cross arms with wider 8-foot cross arms that allow power lines to be spaced further apart, so that it reduces the potential for a wildfire ignition from a falling tree limb. And these are just two examples of the many measures that we are taking to reduce wildfire risk.

But I think you all know that even the very best maintained electric systems, they have had pole fires, downed wires, and equipment failures that cause fires. But, I will tell you, we can also do more, and we are going to need the cooperation of the federal government to do so.

And I have had the privilege of twice testifying before Congress about the need to streamline vegetation management practices and eliminating delays when performing routine maintenance and upgrades of our system on federal lands.

America's electric cooperatives, we were pleased that in 2018 Congress passed vegetation management legislation to improve system reliability and reduce wildfire risk. And I would personally like to take a moment and thank Central Electric's Congressman Greg Walden and Oregon's Congressman Kurt Schrader for their extensive leadership passing that legislation.

However, more work needs to be done, and the regulations and the guidelines for vegetation management, they must closely align with the underlying law. Congress made it very clear that we need to eliminate the time-consuming regulatory processes because months are still slipping away before permits are issued to perform routine work.

Last year, Central Electric identified 30 dead and dying trees on heavily forested federal land. And they needed to be removed or trimmed before the wildfire season. We submitted a request to the federal land agency to remove these trees on February 4th, 2019. Now we didn't hear anything until I raised the issue in a meeting with the CEQ when I was back here in Washington, D.C., last April. Within one week of my return, we had an issue of a Notice to Proceed. So, while three months passed before receiving approval, it took only three days to get our crews in there

and remove those 30 trees that posed a wildfire threat. And then, in nearly an identical situation with the neighboring Land Management Agency District, Central Electric requested the removal of more than 50 trees, and we received almost immediate permission to proceed.

And you see, this situation, it highlights the inconsistent application of policies by our Land Agency District Offices. Unfortunately, the delays, they are not an isolated incident to Central Electric and they are a threat to public safety.

Now my intention is not to denigrate the hard-working land management professionals. Rather, I am here to discuss solutions where the federal government can support and approve certain policies and practices. And we support the reform of the National Environmental Policy Act because it ensures clarity and certainty, and it eliminates costly project delays for electric cooperatives.

In Oregon, we are also taking a very unique approach to implementing the National Cohesive Wildland Fire Management Strategy. Electric coop and land agency leadership, we are coming together and we are going to craft agreements, so that we can identify increased actions that we can take together to reduce wildfire risk. And while these agreements, they

will be signed at the local level, it is critical that Congress urge the Departments of Interior and Agriculture to support these agreements.

While significant challenges remain, we look forward to working with Congress to build upon the steps that electric cooperatives have taken as national leaders in wildfire mitigation. And thank you for the opportunity to testify.

[The prepared statement of Mr. Markham follows:]

********** INSERT 5 **********

Mr. Rush. I want to thank all of the witnesses.

We have concluded opening statements, and before we move to member questions, I want to be real clear to you, Dr. Collins. My previous comments, they weren't directed toward you. Behind you is someone who was raising a sign and you didn't see them, but the committee saw them. And so, I was just admonishing that individual to not raise any signs. So, my comments were not directed at all toward you and I wanted to be clear on that. All right?

As I stated, we have concluded the opening statements and we will now move to members' questioning. Each member will have 5 minutes to ask questions of our witnesses. And I will start by recognizing myself for 5 minutes.

Wildfires and climate change-related disasters are having a great impact on the power sector and an even greater impact on those who rely on its services. Mr. MacWilliams, as the Department of Energy former Chief Risk Officer, your testimony is noteworthy in today's discussion. In your recent report on "Market and Policy Perspectives," you discussed the implications of climate change on the utility market, cost-sharing, recovery of costs, and investments in grid resilience. When you highlight the importance of these investments, how might utilities and regulators address these

implications while keeping down the cost to ratepayers?

Mr. MacWilliams. Thank you, Mr. Chairman.

Yes, as I mentioned in my opening statement, this really goes back to the fact that enormous infrastructure is going to be required to deal with this really complex set of issues. There are various estimates out there, which I am sure you have seen, but they range globally from $2.4 trillion to $3.5 trillion to meet our objectives to keep temperature rise to 1.5 degrees C and to meet the Paris targets. So, that is an enormous amount of money. There is a lot of capital, institutional capital, out there that wants to invest in these kinds of projects, but we have got to find ways to incentivize that.

In the paper, as you alluded to, my coauthors and I were trying to look at whether the financial markets are really taking the costs and these risks into account yet. And the answer is that, in the immediate aftermath of PG&E's bankruptcy, we did see some in certain aspects of markets, but, then, markets rebounded. So, markets in general are not pricing-in immediate bankruptcies by other utilities because of these issues.

But, at the same time, what we are seeing, looking at markets broadly, is that investors are becoming concerned

with these issues. Insurance companies are starting to price these things in. You have seen recent remarks by leading asset managers talking about climate change risk. So, as a risk officer, I do think these are very relevant. I am happy to expound more, but I don't want to take more time.

Mr. Rush. I want to thank you.

Mr. Johnson, in your capacity as CEO of PG&E, would you agree with the comments of Mr. MacWilliams? And I understand that your company has conducted de-energization events and provided resource centers to protect public safety. However, I am concerned by press reports of all of this placing a strain on people with medical needs and disabilities. As mentioned by my colleague, Mr. Walden, some people can't breathe without electricity. With this in mind, what improvements has PG&E made to its safety plan?

Mr. Johnson. Thank you, Mr. Chairman, and you hit on a question that is of particular importance to me, which is medical need people, folks like this who need help in the best of times, and when we turn the power off, how do we deal with that? And so, we have made some significant improvements in that.

First of all, we spent a lot of last year notifying everybody in California in our service area about the

potential to have these PSPS events, power shutoffs. When we have an event, we notify every medical baseline customer. If we can't get them on the phone or electronically, we go to their house. We, then, make sure that the local agencies, the communities, the counties -- we all have a common list of these people. We open up customer resource centers where we have air conditioning, water, ability to charge medical devices. And we have also reached out to the NGO and community-based organizations to help us identify the needs that these folks have that we can help with before the next fire season.

Mr. Rush. The chair's time is up, and the chair now recognizes Mr. Upton for 5 minutes for the purposes of questioning the witnesses.

Mr. Upton. Well, thank you, Mr. Chairman. Just a couple of things.

Dr. Collins, I think many of us here recognize that the time to prioritize forest management is long overdue to try to reduce these risks. A couple of questions, and then, I am going to yield some time to my friend, Mr. Walden.

Mr. Markham, when you said that you had identified 30 trees and submitted to the forest. Do they actually come back and, then, check your work to make sure that they are

dead or dying? I mean, do you mark them with a big "X" on the trunk? What is the normal process?

Mr. Markham. Well, in this case, if there were one or two danger trees, we can go out and remove them. But where we are dealing with there were 30 trees identified, we take a picture of those. We submit the geographical location of them. We submit it and, basically, until we hear back from them, we cannot proceed.

Mr. Upton. You can't do it until they --

Mr. Markham. Yes.

Mr. Upton. And they have been more responsive in recent months than they have been in the past?

Mr. Markham. We are working through, and that is what these agreements do that we are putting together, that we are working to put together. So that we can identify these kind of issues. We can take advantage of categoric exclusions. We cannot have to wait.

I personally believe that we have to make things like this a priority with the federal land agencies over approval of a driveway. This is much more important.

Mr. Upton. Yes, yes. So, as you talk about that, then, Mr. Johnson, in your testimony you indicate that -- I am looking at page 1 -- "Between 2010 and 2018, according to the

Forest Service, over 147 million trees in California alone have died from drought and invasive beetles. PG&E estimates there are more than 100 million trees adjacent to its overhead power lines with the potential to either grow into or fall into the lines." So, how are you working with the Forest Service to prioritize those 100 million trees on somewhat of a timely basis, as you are at the center of the controversy?

Mr. Johnson. About 30 percent of our territory is in or around federal lands, and I think we operate in something like 14 different national forests. So, we have a lot of interface with the federal agencies.

I have only been there about nine months, but what I am told is that, in recent months, particularly after the bill passed last year by Mr. Schrader and Mr. LaMalfa as the sponsors, they have been much --

Mr. Upton. He is here, by the way. He is at the end.

Mr. Johnson. -- much more attuned to this process. For example, we signed a 30-year agreement with the Forest Service. We don't have to renew permits every year. We have a 30-year way to do it. We are funding some of the work. So, I think the situation has greatly improved from where it was before I got there, but I think it still needs to make

sure that these things are funded. There are some pilot projects going on that need to be made permanent. But I think it is in better shape than it was.

Mr. Upton. Thank you.

I yield my remaining 2 minutes to Mr. Walden.

Mr. Walden. Thank you very much, Mr. Upton.

Mr. Markham, Mr. Johnson talked about the percentage of his system that is on federal land. What is the percentage of your system on federal land?

Mr. Markham. Fifty-six percent, Representative.

Mr. Walden. Fifty-six percent? How many miles of line do you have to oversee and maintain?

Mr. Markham. We have several thousand miles of transmission and distribution line.

Mr. Walden. Something like 3900 miles of transmission and distribution line? Do you have any idea how many poles you have?

Mr. Markham. We have 45,000 poles.

Mr. Walden. So, when I put up that photo -- maybe we can put it up again -- that is one pole you wanted to move, and it took seven months. And then, that put you outside the work window, right?

Mr. Markham. Yes, we have a short work window. We have

three months that we can work out in this area because of wildlife habitat and wildfire risk.

Mr. Walden. All right. Thank you for that.

I want to go to Dr. Davis. Thank you again for being here.

In our home State of Oregon, in 2017, State fire-protected lands and Forest Service lands received roughly the same number of fire starts, whether it was the State-protected lands or the Forest Service-protected lands. And yet, the Forest Service lands accounted for 95 percent of the acres burned. And this is a pattern. I have seen it. I assume you have seen it in your research. Climate affects both. Can you speak to what the differences are? And then, I have a got a question about woody biomass as well. But I have only got 27 seconds. So, go.

Mr. Davis. Briefly, as several people have mentioned, federal lands tend to have more trees per acre than State or private lands in the State of Oregon. Those stands, those federal lands are often also in more remote and more contiguous blocks of forest. So, it is the multitude of drivers as well as those dry conditions that enter into those forests.

Mr. Walden. And how the fires are fought?

Mr. Davis. How the fires are fought, but, also, the location of those forests.

Mr. Walden. Right.

Mr. Davis. The east side of the forests are drier than those west side, where there is a dominance of private land.

Mr. Walden. All right. My time has expired. Thank you.

Mr. Rush. The chair now recognizes Mr. Tonko for 5 minutes. So, the chair now recognizes Ms. DeGette for 5 minutes.

Ms. DeGette. Thank you so much, Mr. Chairman.

I really want to thank this panel for coming today. I know the focus of this hearing has been on the wildfires in California, but I am from Colorado and we are seeing the same kinds of devastation all throughout the West, not just the Pacific Northwest and the West Coast.

I want to talk for a minute about the Hayman Fire. People forget about it. Some of our witnesses are nodding. It was in 2002, and it was the biggest forest fire we have had in Colorado. I think it was exacerbated, as many of our witnesses have said, by the effects of climate change.

And I just want to point out a couple of the issues that several of our witnesses had mentioned. This fire, it

resulted in the death of a civilian, the indirect deaths of five firefighters, $39.1 million in suppression cost, and $40.4 million in property losses.

My congressional district is the city of Denver and suburbs. What the Hayman Fire did is it dramatically, and for a long period of time, impacted the water quality in Denver because a lot of the fire was directly around one of the reservoirs that serves Denver. And I have spent a lot of time talking with Denver Water about the impacts that the runoff from that fire had in our aquifers.

Dr. Davis, I know you mentioned very briefly in your statement about the impacts on water. I am wondering if you can expand briefly on what you are seeing on that.

Mr. Davis. Yes. As I mentioned briefly, the risk to our watershed -- every day we drink clean water, and in the Western U.S. in particular, Colorado as well, that water is filtered through our forests. And that filtration value before it gets to municipal sources is a tremendous economic contribution or benefit for public good. As many of those forests are overstocked, they are at risk of burning. Making sure that those are priority areas to avoid having a wildfire come in and burn at high intensity should be a priority.

Ms. DeGette. And the other problem -- and I think, Dr.

Collins, you referred to this, too -- is now, with climate change, the heat is so much greater, that the destruction is so much greater, and it is much harder for those forests to regenerate themselves and protect against this toxic runoff.

Dr. Collins, you talked about three methods of reducing wildfire risk -- prescribed fires, mechanical treatment by removing mid-sized trees, and wood-chipping, and also, a combination of both. Obviously, everything doesn't work everywhere, is that right?

Mr. Collins. Right. And I think one of the things, it is funny you mentioned the Hayman Fire. That is the first fire I worked on when I came to Colorado in 2002, and I know the Cheesman Reservoir and all that happened there. One of the interesting things there is they had done thinning projects, and I think even a little bit of prescribed burning.

Ms. DeGette. Right.

Mr. Collins. But it was the scale of the thinning relative to the scale of the forest problem there. The thinning was happening in really discrete areas right along roads and it was blown over pretty easily.

Ms. DeGette. Yes, because of the intensity of the fire.

Mr. Collins. Right. And so, with regard to sort of not

being able to do everything everywhere, I think we are limited oftentimes in terms of slope, you know, the slope that mechanical equipment can operate on, for good reason, right? For protecting the reservoir and things like that. But I was saying that there is no one-size-fits-all sort of thing.

Ms. DeGette. Yes.

Mr. Collins. We need to do all of those things wherever possible.

Ms. DeGette. Well, and the other issue -- and this is true throughout the West; I see it in my State -- is we have millions of acres of trees. So, if you said you were going to go in with mechanical treatment and try to thin all of these forests, it would be impossible, isn't that correct?

Mr. Collins. Well, I wouldn't say impossible.

Ms. DeGette. How much do you think it would cost?

Mr. Collins. Well, it depends if you can set up a market for the material, right? I mean, woody biomass was mentioned. It is not new, right?

Ms. DeGette. Right.

Mr. Collins. But the key is, can we incentivize woody biomass utilization? Can we have other products? Oriented strand board that uses small --

Ms. DeGette. But you still couldn't do it throughout the whole West?

Mr. Collins. No, not on every acre. No, not at all.

Ms. DeGette. Right. Yes. Okay. Thank you.

Thank you. I yield back.

Mr. Rush. The gentlelady yields back. The chair now recognizes Mr. Shimkus for 5 minutes.

Mr. Shimkus. Thank you, Mr. Chairman.

Dr. David, Dr. Collins, thank you for being here.

And I also, too, want to highlight Doug LaMalfa from California, who is sitting in and listening to us, and his legislation, along with our good friend, the Democrat from Oregon who has been mentioned. So, good work on that and we appreciate that.

I am not trying to be flippant, but prior to the industrial age, were there forest fires in the West, Dr. Davis?

Mr. Davis. Absolutely.

Mr. Shimkus. And, Dr. Collins?

Mr. Collins. Yes.

Mr. Shimkus. Okay. Again, I am not trying to be flippant. I also, many of us, accept the premise that climate change is occurring, and I think as some of the

people out West, it is extending the season a little bit longer, and then, you have drier stuff. And then, you can count this buildup.

For people on this committee, this will be no surprise, but I want to talk to Mr. Johnson a little bit. Before I do that, a nuclear power plant, how much CO2 does it emit, Mr. Johnson?

Mr. Johnson. Zero, I believe.

Mr. Shimkus. Mr. MacWilliams, you know the answer.

Mr. MacWilliams. That is correct, yes, sir.

Mr. Shimkus. You all know zero. Okay. Nuclear power plants emit zero.

So, I want to focus on Diablo Canyon, if I may, for a few minutes. My friends from California know I have focused a lot on California because of just the challenges that are there. It is still operating, but it is planned for closure, is that correct?

Mr. Johnson. It is operating with a planned closure date, one unit in 2023, the other in 2025.

Mr. Shimkus. So, how much megawatts electricity is it generating?

Mr. Johnson. So, each unit is roughly 1250 megawatts.

Mr. Shimkus. That is where my calculations were a

little bit off. I thought it was 1100, and I calculated it would service about 1.1 million homes, I think. But with the larger megawatt outage, you predict -- if we are doing it on homes, how many homes is that?

Mr. Johnson. A million and a half homes, somewhere in that range.

Mr. Shimkus. Per reactor?

Mr. Johnson. Yes, per reactor.

Mr. Shimkus. So, 3 million in total?

I would encourage my colleagues that, as we move on this debate, just for electricity cost, just for clean generation, nuclear power has to be part of the portfolio. You just can't get there without that, and I would encourage that.

But we have additional problems, don't we, Mr. Johnson? So, why are you closing? If it is cleaner burning; no CO2 emissions, which everybody wants; a baseline major generation, why are you closing it?

Mr. Johnson. Well, as I said, I have been here nine months, and the decision had been made by the time I got there. But I think the decision was a policy one based on the desire not to have nuclear in California.

Mr. Shimkus. And whose decision was that?

Mr. Johnson. I assume the policymakers, whoever they

were.

Mr. Shimkus. You know who they were.

[Laughter.]

Mr. Johnson. Well, I would think it is the governor and the legislature, those folks.

Mr. Shimkus. Okay. All right.

Mr. Johnson. Yes.

Mr. Shimkus. So, they don't want it, but there are probably some good reasons, too, I think. I mean, Diablo Canyon is located where?

Mr. Johnson. On the Pacific Ocean a couple of hours south of San Francisco.

Mr. Shimkus. And so, we all know California. I lived there for a year and a half, serving in the United States Army. I experienced a few earthquakes. It is prone to earthquakes, right?

Mr. Johnson. Yes.

Mr. Shimkus. So, there are credible reasons why Californians may think that maybe a nuclear power plant on an earthquake region might not be the best thing to do. I mean, I think that makes sense.

First of all, who pays for the decommissioning of this power plant?

Mr. Johnson. The customers of PG&E.

Mr. Shimkus. The ratepayers? Okay.

Mr. Johnson. The ratepayers.

Mr. Shimkus. That would be these 3 million homes-plus, whatever.

The next question is, the plant is all level to the ground; then, you can walk away? You have no problems, right?

Mr. Johnson. No, you can never walk away.

Mr. Shimkus. And why?

Mr. Johnson. Well, you have radioactive materials there for some period of time. You have to decontaminate and decommission the plant.

Mr. Shimkus. What radioactive material do you have remaining?

Mr. Johnson. Well, you have the vessel.

Mr. Shimkus. Okay.

Mr. Johnson. You have taken the fuel and probably moved it offsite, but you still have a lot of pieces --

Mr. Shimkus. Is there a plan to move fuel offsite?

Mr. Johnson. I don't think there is a plan yet. You have to take it out of the reactor and store it.

Mr. Shimkus. Yes, that is why we are working with Mr.

Peters and Mr. McNerney, and all my friends in California, and Ms. Matsui, to develop a place for regional and, then, long-term storage. So, we get that off the books. Because who is going to pay for the storage of that nuclear waste on your property?

Mr. Johnson. The same people who are paying for everything else.

Mr. Shimkus. It is going to be the federal government --

Mr. Johnson. Sooner or later --

Mr. Shimkus. -- is really the answer to that one, after you litigate with us.

Thank you, Mr. Chairman. I yield back.

You also have a lot of power plants in the Chicagoland area, Mr. Chairman.

Mr. Rush. Very interesting.

The chair now recognizes Mr. Doyle for 5 minutes.

Mr. Doyle. Thank you, Mr. Chairman, and I want to thank you for holding this hearing.

Obviously, we are here to focus on the devastating effects of wildfires, but I think it is also a good opportunity to talk about the larger threat of climate change and the challenges it presents. As Mr. Johnson testified, in

under a decade, PG&E's service area went from 15 percent elevated fire risk to 50 percent designated as high fire threat. Much of that is due to a warming climate that has brought record temperatures, drought, and an unprecedented amount of dead trees.

But it is not only wildfires affecting communities around the country. We have seen record flooding in the Midwest, massive hurricanes in the Southeast, and in Pittsburgh, where I live, record rainfalls leading to flooding and landslides. So, while climate change does not cause any individual disaster, it certainly plays a role in making the conditions worse. And as we have seen all over the country, not being prepared for these new conditions and the risks they bring can have deadly consequences. So, even as we work to reduce our carbon emissions and limit future warming, we still have to adapt to a world that is already being impacted by climate change.

Mr. Johnson, you talked about one of the more drastic measures, the PSPS program, where you turn people's power off. And the transmission or distribution equipment is a main issue both in starting the fires and determining who gets their power shut off. What role do you see energy storage and microgrids playing in making communities more

resilient, reducing the amount of people affected by the PSPS program, and reducing the overall need for more transmission infrastructure?

Mr. Johnson. Thank you for that great question. Just to put this in context, less than 10 percent of fires are caused by electric infrastructure. Of that number, a great many, 70 percent or more, caused by distribution, the little wires. So, that is the causation.

And so, yes, I think a lot of things are going to play a role in reducing it, including microgrids, materials, new technology, sensors, covered wires, but microgrids, some form of storage with a smaller footprint, so you are not relying on that thousand-mile-long corridor in the forest. I think all of those things; in fact, we are planning to do many of those things ourselves starting this year.

Mr. Doyle. That is good to hear.

Mr. MacWilliams, as you know, the CLEAN Future Act would create a National Climate Bank, and this bank would invest in a number of clean energy, transportation energy efficiency, and grid modernization projects. And so, while we are investing and making a cleaner future, we need to adapt to the current world that we live in. What suggestions do you have for how we can specifically incentivize public-private

partnerships to fund resilience and adaption projects?

Mr. MacWilliams. Well, thank you, Congressman.

And as you mentioned, the threats here really are broader than wildfires. I recognize it is not the direct subject of this testimony, but in my written testimony I referred to that, and for that matter, very similar threats from cybersecurity and physical security, as Mr. Johnson knows from the Metcalf incident a few years ago.

So, essentially, what we need to be doing is investing in our infrastructure. In this country, we essentially operate our government on a cash basis, not an accrual basis. And so, as a result of that, we don't have a concept of accumulated depreciation. And if you ran a company like that, you would be in trouble pretty quickly.

And so, what is happening in this country is we are facing this large wall that we are about to hit in our infrastructure, and certainly in our energy infrastructure, but also in other areas such as our national security infrastructure, which is why in the past I and others have argued for a national infrastructure bank. Now what is being talked about here, which I think is very positive, is a climate bank, a very similar concept. But, essentially, what we need is a public-private entity to be able to support

infrastructure investment. Or I am afraid, unfortunately, if we just use our traditional methods of infrastructure investment, we will never get there, given the billions and billions of dollars that are required.

Mr. Doyle. Thank you, Mr. MacWilliams. I want to thank all of our panelists for your testimony today. It has been quite informative. Thank you.

I yield back.

Mr. Rush. The gentleman yields back. The chair now recognizes Mr. Latta for 5 minutes.

Mr. Latta. Thank you, Mr. Chairman. Thank you very much for holding today's hearing.

And thanks to our witnesses for appearing before us today. We really appreciate your testimony.

Mr. Markham, if I could start my questioning with you, one thing is, I have the largest number of rural coops of anybody in the State of Ohio. So, I appreciate the work that you do out West.

I am also a co-chair of the Grid Innovation Caucus with my good friend, the gentleman from the 11th District from California. One of the goals of the Caucus is to discuss solutions to the many challenges facing the electric grid, including resiliency and how advanced technologies can be

utilized to enhance the grid. It is important that we are looking to protect the grid, not just from cyberattacks, but also physical threats like wildfires, hurricanes, and tornadoes.

In your testimony, you speak about efforts to install new technologies such as taller steel poles that would enhance reliability and resiliency. Will you go into more detail about other technologies that are being deployed to respond to physical threats to the grid?

Mr. Markham. Yes. Yes, you bet. Thank you, Representative.

We are pursuing right now looking at a pilot program. This is probably the most significant, is the opportunity to use digital waveform analytics technology, and it has the capability of detecting a problem on the line before it becomes a fault and can ignite a wildfire. That is probably one of the biggest things that we are looking at now.

The other things that we are pursuing and looking at in our long-term plan is demand response and how we manage the heavy loads that come onto our transmission lines, being able to reduce power from significant events or weather events, things like that.

We also have fully deployed advanced metering

infrastructure. It allows two-way communication with our meters. It gives us a lot of information.

And then, we are moving towards electronic closures in our substations, a lot more advanced things. The more information we get, the better technology, the more that we can get data and better respond and be in front of the issues.

Mr. Latta. Let me just kind of follow up with my friend, the ranking member, who was sitting next to me a little bit ago. In your testimony, you are talking about quite a bit of issues you have had with the permit approval times, the inconsistent application policy, and the delays involved. But I would like to go back, again, to this.

In your testimony, you talk about the application you filed back on April the 17th of last year. And in that, you were talking about what you are trying to get done and the window of opportunity in Camp Sherman to perform the job before the fire season remains limited due to the heavy winter snow and the wet spring months. But eight months, as Mr. Walden had pointed out, had elapsed before the federal agency decided to even post the proposed action to get those public comments for that two-week period. Where are you at on that right now?

Mr. Markham. Right now, it is still receiving input from the public. I will commend the Forest Service Ranger for applying categoric exclusions to reduce the timeframe of doing this. But, again, I don't know if it is resources available to our federal land agencies that it has to take this long, but in that instance we have three months to complete a job -- in October, November, December. If we have heavy snows in November and December, we can't do it. So, we are down to one month, October. That is how critical it is where we are at.

Mr. Latta. Okay. And again, when you are looking at that critical period of time, are you finding that, in talking to other electric coops out West, that they are experiencing the same delay, that it is taking this long to get something done?

Mr. Markham. Absolutely, yes. And we are working to improve that, the relationships. Again, central Oregon and throughout the State, we are working with our federal land agencies to get agreements together, so we can get some accountability, some consistency, and get some of these issues resolved.

Mr. Latta. We were talking a little bit beforehand, Mr. Walden and I, and the question that came up was SHPA. Are

you still having a problem with SHPA? And maybe you could explain what this is.

Mr. Markham. Yes, Representative, State Historic Preservation Office. And so, out where we are working to replace the 113 poles, Congressman Walden showed the one pole. That is under a State Historical Preservation Site, Historical Site. We actually have to have an archeologist there when we relocate and begin digging for the new pole. In fact, there are, I believe, 29 poles where the archeologist has to be present while we do our digging. Now, again, I commend the Forest Service because they could have required a full survey, but they are only requiring that archeologists be there. So, yes, we deal with SHPA.

Mr. Latta. Does it take very long to get the archeologists?

Mr. Markham. What's that? I am sorry.

Mr. Latta. Does it take long to get the archeologists?

Mr. Markham. You know, I am not involved in part of that. I just know that, if that is part of why the delay of nine months, I am not sure if that is part of it or not.

Mr. Latta. Thank you very much, Mr. Chairman. My time has expired, and thank you for your indulgence.

Mr. Rush. The gentleman yields back. The chair now

recognizes Mr. Tonko for 5 minutes.

Mr. Tonko. Thank you, Chairman Rush.

Yes, Mr. MacWilliams, I really appreciate the image in your testimony that shows wildfires are projected to be worse in many parts of the country, well beyond California, by mid-century. These climate-related conditions may be appearing first in the West, but, make no mistake, many other regions will be impacted. So, can you give a little more explanation on the factors driving this increased risk?

Mr. MacWilliams. Thank you for the question.

Yes. And as my colleagues here to the left who are scientists, which I am not, clearly, the conditions that we are seeing caused by climate change are exacerbating the intensity and the frequency. And when combined with forest management issues that have been discussed, we are in the situation that we are seeing.

But one of the things we tried to indicate there in the paper, as you indicated, was that this is, while severe in California, this is a problem across the country. And as I previously testified, we have seen similar problems with flooding and other climate change-related issues as well.

Mr. Tonko. Thank you for that.

And do you believe there are lessons we should be taking

from the response to recent Western fires and applying them more broadly?

Mr. MacWilliams. Yes. I spoke a few minutes ago about the need for infrastructure. My concern is that we really need to treat this as a call to action and that we need to really get on this. We have enormous infrastructure needs.

And secondly, I think, you know, there is really encouraging work being done on the technology front. And so, as I mentioned in my opening statement, I would really encourage Congress to be funding, and looking carefully, but funding technology development because, in short, essentially, when you look at the enormous amount of data that is being generated from all these sensors, you combine them with advanced data analytics and high-performance computing advances in deep learning, there is an enormous amount that can be done there.

Mr. Tonko. So, are those tasks that you would assign to the utilities arena or are there other steps that utilities in future high-risk areas should begin in terms of reducing these long-term risks?

Mr. MacWilliams. I mean, my understanding -- and others can speak to this as well -- my understanding is that it is really a combination of efforts. I am familiar with the

efforts, as I mentioned, that Livermore Lab and some of the other National Labs are doing working with the CPUC, working with utilities such as PG&E. Perhaps Mr. Johnson can add to that. But it is, obviously, a combination of effort here, but I think technology combined with infrastructure, that we can do a lot.

Mr. Tonko. Thank you.

And, Mr. Johnson and Markham, to the extent federal investments support grid modernization, do you believe there should be additional focus on how grid modernization can support resilience?

Mr. Johnson. Absolutely, I do. We used to think about reliability all the time. I think now it is time to think about reliability and resilience as discrete things. And so, anything that helps with resilience, given these challenges, would be helpful.

Mr. Tonko. Mr. Markham?

Mr. Markham. Thank you, Mr. Chairman.

Yes, absolutely. Resilience, just, for example, over the next 20 years, we are investing $300 million into hardening our system. That is a tremendous amount of money for an electric cooperative.

I talked about the pilot project where we would like to

use the digital waveform analytics. That is not inexpensive. And any sort of assistance we can get to provide resiliency, it just helps speed up the process.

Mr. Tonko. Thank you.

And it seems that new sensors and microgrids and other smart technologies may be helpful, but you are also working on more traditional hardening approaches: an increased focus on vegetation management, replacing wood poles with metal, and the coating of wires. Do you have any thoughts on the role for some of these lower-cost and perhaps lower-tech solutions as part of a more resilient electricity system? Any of you?

Mr. Markham. Absolutely. As far as for me, there are three things to mitigate wildfire risk. The most important step is hardening your system, vegetation management, and technology. We just talked about technology. Hardening the system, $300 million. Vegetation management, and I want to hit on that because that is more traditional.

I commend PG&E, $3.8 billion they have spent on vegetation management since 2009. I wanted to contrast that with one of our smallest electric cooperatives in the State. The $3.8 billion comes to $22 annually per customer per year. And at West Oregon Electric Cooperative, they spend

$300 a year for vegetation management. So, you have to do those traditional forms, not just technology, but those, too, to prevent wildfires.

Mr. Tonko. Thank you.

And when you relate that fiscally to the damage that may occur, it seems like it is a very sound preventative device.

Mr. Markham. Absolutely.

Mr. Tonko. So, I thank you all.

With that, Mr. Chair, I yield back.

Mr. Rush. The gentleman yields back. The chair now recognizes the gentleman from West Virginia, my friend, Mr. McKinley, for 5 minutes.

Mr. McKinley. Thank you, Mr. Chairman, and thank you for having this hearing on this.

This is important because it really focuses back on forest management, and I thought that it seems to be that a lot of premise of where we were moving on this was that would be our primary objective, because that is something we can set policy and we can work on, forest management. But you have heard throughout the hearing so far that there have been efforts to distract us, to divert us over, by adding into some of the issue, I guess, of climate change.

I don't disagree that climate change is out there. But

my concern -- and eventually, I'll get, Dr. Collins, to a question to you -- but I am concerned about we don't control the climate in America. If you look back on it, there was an MIT study that came out just recently that said, regardless of anything the United States does to decrease its emissions -- regardless -- until China and India reduce their emissions, the result will be climate catastrophe. In that period of time, China and India have both increased their CO2 emissions by over 200 percent. We are vulnerable in America for droughts, wildfires, rising sea levels, all based on what is happening around the world.

Earlier this year, the Financial Times came out with they are increasing the use of coal in China. Actually, they are under construction now. For the next five years, they are going to be producing brand-new coal-fired power plants equivalent to all the capacity of Europe, the European Union. So, the world is still continuing to use fossil fuels and it is impacting us in America. So, yes, we can do all the right things. That is why I am hoping we can get back to focus on forest management, because we can't control what the other countries are doing on this.

And then, there were some interesting reports that came out that conflict me with this testimony that came out here

today. Here the Royal Society in London came out with a report that said global area burned appears to have overall declined over the past two decades.

The Washington Post, in June of 2017, said that fires have consumed -- the amount of land being burned in wildfires is declining. That conflicts with what we are hearing. So, I am concerned about it. I don't know all the aspects of this. But you see this conflicting data on this.

So, my question to you, Dr. Collins, would be, if we were to follow Congressman Pallone and others on the other side of the aisle and go for decarbonization of America -- we can do that; that can happen -- if we were to do that, by year 2050, would we still experience droughts, wildfires, severe weather storms, and rising oceans? Can you elaborate on that?

Mr. Collins. I will say this: I am not a climate scientist. So, on that respect, I probably had better decline to answer that. My guess as a forest scientist is that fire is going to be around for a long time; drought is going to be around. And so, my take on it is that we need to plan for its inevitability. And to do so means to do large-scale forest management, large-scale reductions in tree density for dealing with these expected droughts.

Now whether or not our policies -- let's say from a standpoint of forests, I think it is a good goal to look to forests to do some of the sequestering, but not at the expense of exposing forests to further disturbance from drought and fire. There is sort of a resilient capacity that the forests can take in terms of carbon, but we can't just keep packing it in there. I don't know if that answers your question.

Mr. McKinley. Well, so the answer is you still think, from forestry, there would still be wildfires, even if we totally decarbonized our economy in the United States?

Mr. Collins. I think so, yes.

Mr. McKinley. Yes. Thank you.

I yield back.

Mr. Rush. The gentleman yields back. The chair now recognizes Mr. Pallone for 5 minutes for questioning our witnesses.

The Chairman. Thank you, Chairman Rush.

It is clear from the testimony today that wildfire risk in the American West is extreme, and it is also clear that wildfires are not exclusively a Western State problem. In fact, Alaska, not California, saw the most acreage burned last year, and high-intensity wildfires occurs recently in

east Texas, the Smoky Mountains, the Shenandoah Valley. And as Mr. MacWilliams' testimony shows, fire will likely increase nationwide over the next 50 years. And I mentioned in my opening statement wildfire threats exist in my home State of New Jersey.

And I know we have heard from our witnesses today that climate change is driving the nationwide increase in fire severity. So, I wanted to ask Mr. MacWilliams or Dr. Davis, can you explain the specific aspects of climate change that are driving this increased risk? I would start with Mr. MacWilliams, if I could.

Mr. MacWilliams. Yes. Again, I am not a climate scientist, but I have spent much of my career in this area. I mean, essentially, the science behind climate change has been around for 100 years. And we essentially have a one-way mirror that, as CO2 is put into the atmosphere, CO2 comes down to earth, and the wavelengths change. And as it is reflected back in, it bounces back off and comes back down to earth. That is causing heating. It is causing thermal expansion of water and intensifying storms and other weather effects, and obviously, wildfires. So, that is the essential effect.

And I also did not mean in any way to -- I think putting

opposition between climate change and forest management is a false dichotomy. We obviously need both to solve these problems, and the low-hanging fruit in some ways is forest management practices because that is the fuel. What we have to look at is the conditions over time across the country and other places in the world that are creating more fuel and exacerbating the wildfires, which, as has been stated, have been a natural part of forests really forever.

The Chairman. And these changes are not unique to California or even the American West?

Mr. MacWilliams. No, those are global effects, and we are seeing them, as we have talked about, we are seeing them everywhere, including Siberia, for that matter.

The Chairman. All right. Dr. Davis, did you want to comment?

Mr. Davis. Certainly. I would like to add that one of the elements that changing climate brings to this is that we shouldn't expect traditional methods to yield traditional responses. And that is where the forests that we have, the rangelands that we have may behave differently, even if we go in with the expectation that what has worked in the past won't work more. In the West, we see our fire season is about 30 days longer now than it was three decades ago. That

increased length means there is more opportunity for those areas to burn each year and more areas at risk each year, coupled with people choosing to live in that wildland-urban interface.

The Chairman. Okay. Mr. Johnson, from what we have heard today and from what we know about climate change, climate-related threats to the grid are diverse. Wildfires, hurricanes, and rising sea levels are just a few examples.

So, your company is struggling with it now. I just wanted to ask, how can utilities keep up with the threats? And have you learned any useful lessons from other utilities in your own State or elsewhere that have dealt with these questions already?

Mr. Johnson. Thank you for the question.

California is in an interesting place here. It is 1 percent of global emissions. It's the fifth or sixth biggest economy in the world, and it is suffering some of the most significant climate change effects already, despite being such a small contributor. So, we are sort of hyper-attuned to this issue.

Decarbonizing electricity, and then, moving to electrification is probably the greatest step we can take to deal with this challenge of carbon. And I think if you look

at the utility industry over the last decade, you have seen pretty good progress on that front in decarbonizing. I think that is the most important thing we could do.

The Chairman. I appreciate it. As was already mentioned, I think we have to take some bold action to stem the worse impacts of catastrophic climate change. We are announcing today on the Democratic side that we are going to put forward the actual legislative text for the CLEAN Future Act, which seeks to have carbon-neutral by 2050, and the power sector seeks to establish that standard. So, I appreciate your comments.

And thank you, Chairman Rush, for having this hearing today. I think it is really important for all of us, including my State. Thank you.

Mr. Rush. The gentleman yields back. The chair now recognizes the gentleman from West Virginia, Mr. Griffith, for 5 minutes.

Mr. Griffith. Thank you very much, Mr. Chairman.

And it is good to be from western Virginia, where we have lots of trees and we try to manage our forests.

Mr. Rush. The chair stands corrected.

Mr. Griffith. That is all right.

Mr. Rush. The gentleman from Virginia.

Mr. Griffith. I am so close to West Virginia it might as well be the same, but I do appreciate it.

And I will say, Mr. MacWilliams, I agree with you that trying to say it is either climate or forest management is a false dichotomy. I am going to focus in my questions on forest management, but climate change is clearly part of the issue as well. We have to focus on both, and I agree with that comment you made a minute or two ago.

Dr. Collins, what a fascinating area that you have to study. So, I want to ask some questions, and I am going to start with your comment in your written testimony about "large-scale tree mortality from bark beetles and possibly other yet-unseen insect and pathogen outbreaks," because that can be a significant portion.

My question is you talked about tree density previously. Does the density of the trees lead to a faster spread of both the bark beetles and possibly other pathogens?

Mr. Collins. It does. It does partly because, in the case of bark beetles, they communicate with each other by pheromones. And the closer trees are to each other, the more readily accepted the pheromones are.

Mr. Griffith. They reproduce more rapidly?

Mr. Collins. Yes, and then, they can, also, what they

call mass attack.

But the other effect it has is on individual tree vigor, right. As there are more trees, they are competing for the same amount or less water and nutrients. And so, there is decreased vigor; hence, their defenses are lower and cannot defend themselves from bark beetles or other pathogens.

Mr. Griffith. Yes, and we have to pay attention to these. And I certainly am no expert, but I love this kind of area of science. And so, I had one of my team go pull up out of the archives the May 2007 National Geographic where it references the red marsh worms and the common nightcrawlers that apparently were brought over by the Europeans and devastated the leaf litter in the previously-wormless northern woods of what is now the United States, drying out areas such as the pines and making it more susceptible to any of the problems that you might have with drier areas, because previously it was all wet.

That being said, I was interested in your comments about the fact that we are burning all the trees, instead of having patchy. Because, historically -- and many of our species have adapted to -- there is a fire, but inside of the fire area there are areas that did not get burned. And so, you

have the red-cockaded woodpecker that used to live in Chairman Pallone's pines in New Jersey, but don't live there anymore. That is not necessarily the reason. But we could reintroduce them if we had some living trees and some burned-out trees, because they feed on the dead trees and they live in the living trees.

Do you see examples similar to that? Because I am more familiar with the eastern birds. Do you see more examples like that in the western forests?

Mr. Collins. In terms of maybe what some of the impacts of forest change have been on species?

Mr. Griffith. Well, that, and the fact that they need to have some fire, but not where it burns everything.

Mr. Collins. Absolutely. I think there are cases of a few woodpeckers that are what they call "burn specialists," and they thrive in burnt forests, although they can still live in green forests, but they do best in burned forests. The thing is that it took that sort of patchy landscape that you described where they could rely on sort of constant burned forests, although they shifted around to different areas. Now, with these giant patches of burned forests, you have a feast for a short time, and that time period is maybe a few years after the fire, and then, you have famine because

you have a giant area that is deforested. So, we do have these examples.

Mr. Griffith. And they don't have any place to live because, normally, they live in the living trees?

Mr. Collins. Sure. Yes, it is sort of a population dynamic where they move between green and burned forests.

Mr. Griffith. Right. Right. That is a significant problem.

Are you seeing anything else in regard to, whether it be insects or birds, the impact of this? And I am assuming that the reason we are having this huge burn is not just that we are hotter and drier, but because all these trees are so close together, your fuel. You mentioned that in your opening statement, too, if you want to talk about that some more, about how the crowns are so close together, the trees, when the fire gets up in there, there is no way to retard it.

Mr. Collins. Sure. I think about it in terms of something we call continuity, where let's say in the historical forest condition there were a lot of breaks, and not only just in the tree crowns, but on the surface as well. So, we have really not to say lost continuity, you know, that we have lost that, but we have really homogenized forests. And we have greater continuity not even just in the

tree crowns, but on the surface. I mean, there is not a lot stopping the spread of fire right now, except for when we can get in there with crews and cut the fuel away.

Mr. Griffith. So, what we need is a diversity of species and a number of places where we don't have so many trees close together, and some patches of prairie or open land in between?

Mr. Collins. Sure. We call it a mosaic on the landscape.

Mr. Griffith. I yield back.

Mr. Rush. The gentleman yields back. The chair now recognizes the gentlelady from California, Ms. Matsui, for 5 minutes.

Ms. Matsui. Thank you very much, Mr. Chairman.

And I want to thank all the witnesses for being here today on this very important topic.

Under the authority of the Clean Air Act, the federal government has a responsibility to monitor and set standards for national ambient air quality. Included in the list of pollutants to monitor is particulate matter -- or, as we call it, PM -- which are small, inhalable particles that can cause serious health risks.

Dr. Davis, more specifically, what are the health risks

to those who are exposed to wildfire smoke, whether this is direct exposure from communities where these fires are occurring or indirect exposure for communities who are downwind?

Mr. Davis. Thank you for the question.

And I am not a medical expert. I am a forester by training. So, I will speak to this from the forestry perspective and my own experience.

Ms. Matsui. Certainly.

Mr. Davis. The people who spend time outside in the smoky season do inhale different sizes of particles. And there are some important distinctions in terms of particles from wildfire versus particles from prescribed burn or controlled burns. Those are often different sizes.

One of the areas that is expanding in study across the U.S. and around the world is both the acute short-term exposure to smoke and what that causes in terms of a daily response, but, also, for people who live in smoke-prone areas, that prolonged chronic exposure. We don't actually know what some of those effects are, but we see them as similar to other types of smoke that people inhale.

Ms. Matsui. Okay. Do our constituents have tools to monitor this smoke and, more specifically, elevated levels of

PM in the event of a large wildfire?

Mr. Davis. We collectively do not have great tools to be able to inform what different levels of smoke mean. People may be aware that it is smoky, but not what that particular matter is. I suspect if we were all asked what a particular level of smoke meant to us, we would not know those numbers. That is also disproportionately more likely to affect people in lower-income brackets who are exposed to smoke chronically and, then, also, to those who simply do not have a choice to opt out of being exposed to smoke.

Ms. Matsui. Right. Well, what we find, also, is that, since it is around an urban area, which could be my city of Sacramento or even areas like San Francisco, the particulate matter was such that they had to cancel schools and everything else. And it is a type where everybody thinks they can wear a mask, but the masks aren't effective, and it stays there for the longest time.

Mr. MacWilliams, you laid out in your testimony a number of federal policy recommendations, including how entities like FERC or NERC can become more engaged players in encouraging grid upgrades and developing financial mechanisms for private utilities to utilize. Does the federal government currently have standards for transmission lines to

prevent fire risks?

Mr. MacWilliams. Thank you for the question.

What I was trying to focus on in the testimony there, as I mentioned, is that I think we have got to provide incentives for utilities, as well as accountability, but incentives for utilities to be able to invest in all these necessary upgrades in infrastructure and technologies. And one of the concerns is that some of the current regulatory structures -- and I recognize much of that is governed by state law -- do not necessary incentivize utilities to do that.

So, the reason I mentioned the FERC is, as you mentioned, obviously, FERC has regulatory authorities over transmission lines, although many of these issues have been caused by local distribution lines. And therefore, in the past, as you are aware, the FERC has agreed to incentives for certain transmission-related areas, and I think those could be applied here. So, that is why I indicated that I think FERC could be doing some very positive work in this area.

Ms. Matsui. Okay. Thank you.

Earlier this week, a member of CAL FIRE communicated to my office that the devastating fires of the Camp Fire and the Kincade Fire were the result of historic wind events, some of

which reached 100 miles per hour for sustained periods of time. If these wind events are happening every year and are causing wildfires to continue to rank amongst the worst in State history, they are obviously not historic or isolated events anymore, but the new norm. As such, should we be focusing our resources on research and developing more accurate prediction models and on infrastructure upgrades to take these new norms into account?

Mr. MacWilliams, again, you referenced ongoing research being conducted at laboratories around the country on this. Is there latest research to better predict dangerous wind events that can lead to wildfires?

Mr. MacWilliams. Yes. The research that I was referencing, which I am familiar with -- and obviously, there is a lot more being done -- is that, particularly in California, there is a lot of work being done. We are putting enormous amounts of sensors in, which needs to be done. Those sensors are providing or creating a lot of data. And it is everything from high altitude winds to local effects, to try to be able to, first of all, warn when situations are likely to cause wildfires. But, to me, some of the more interesting things are using big data, high-performance computing, and some of the advanced simulation

technologies that we are developing to be able to simulate and look at creating prevention models.

Ms. Matsui. Well, that is good, and I would like to follow up later on that.

Mr. MacWilliams. We would be pleased to.

Ms. Matsui. And thank you very much, Mr. Chairman. I have gone over my time. I yield back.

Mr. Rush. The gentlelady yields back. The chair now recognizes Mr. Walden, the ranking member of the full committee, for 5 minutes.

Mr. Walden. Thank you, Mr. Chairman. We appreciate it. And again, thanks for hosting this hearing as well.

And I want to thank all of our witnesses for your testimony. We have another hearing going on upstairs. So, I have had to go back and forth.

Talking about air quality, at one of the prior hearings we did in the prior Congress, I had a constituent from Medford that sent me a photo of his CPAP filter from his breathing device. After a couple of days, it was literally black, and we put it up on the screen. And so, to my friend from the Sacramento area, Ms. Matsui, we have suffered the same sort of things. And you get into Medford and some of these areas, they are in a bowl, and the smoke gets in there.

Literally, it will settle in there for a month at a time. It is awful. Somebody told me it was the equivalent of your kid smoking a pack of cigarettes every day. So, they closed schools. They cancelled festivals, the Bread Festival. The Ashland Shakespearean Festival had to cancel outdoor performances. It has a huge economic impact, a huge human health impact.

I want to talk about the forest management component of this. As climate changes, we know there is more stress on the trees; we know there is more density, because we have managed fire to the best of our ability. And we have got to do something about it. I mean, you have got to reduce the fuel loads, in my opinion.

Now, when you talk in these terms, there are groups that say, "Oh, you're just for industrial logging and you're going to clear-cut everything and rape and pillage the land." But if you go back to nature, a lot of these environments had natural fire events. They thinned it out.

And I want to ask about the issue of woody biomass because there are organizations that treat that like it were the evil of the land. And yet, we know you can take that woody biomass, get a market for it, produce it. It is used as a fuel source. Some would argue it is a zero carbon

overall. And I wonder, Dr. Collins, do you want to speak to that? Mr. MacWilliams maybe? You seem to be nodding, Dr. Collins. Woody biomass?

Mr. Collins. Sure, I will take a stab at it. So, yes, and I think there is an argument that could be made there that, if you assume that that biomass will ultimately burn in a wildfire, and you balance that out with the opportunity to remove it, and then, burn it and make energy, then, yes, you could argue it is a zero-balance on the carbon.

Mr. Walden. All right. Mr. MacWilliams, do you want to --

Mr. MacWilliams. Yes, just to add, there is interesting work being done now. I think there is a report coming out shortly on the subject from the National Labs at Livermore, in particular, looking at biomass gasification when complying with CO2 sequestration, which it turns out California has some very good areas in the Central Valley to sequester CO2.

Mr. Walden. Right.

Mr. MacWilliams. But, then, ultimately, turning that into hydrogen.

Mr. Walden. Oh, interesting.

Mr. MacWilliams. If that could be made to work, of course, that is a good thing.

Mr. Walden. And part of this is the funding issue, which some of you spoke to, and we battle over that in Congress. There is never enough. We are going to be a hundred years behind probably at the rate we are going to keep up because the forests keep growing and dying, and everything else.

But you have got this woody biomass that remains on the forest floor. And aren't I correct that that adds to the intensity of the fuel and the destruction of the soils, and often you get a second fire that goes back through that? Dr. Davis? Dr. Collins? Anybody disagree with that notion?

Mr. Collins. No, I don't disagree.

Mr. Walden. All right. Good. I am doing basic science here. All right. More fuel, more intensive fire.

And so, what we are trying to figure out is, how do we get back in balance with nature here? And can you use this material? And meanwhile, Mr. Markham over here is struggling seven months to get approval to move one power pole out of the way of what he thinks will be a more fire danger area into a safer area.

Now I know my colleague, Mr. Latta, and I were talking about the issue involving the approval process that may include the Historical Preservation Office. Did you all talk

about that while I was upstairs?

Mr. Markham. Yes, I filled them in on that. SHPA has to be involved because it is an historic site.

Mr. Walden. And the historic site is because of what?

Mr. Markham. Actually, I believe it goes back many years and that at some point the tribes were occupying that area.

Mr. Walden. Okay. All right. So, you are looking for any tribal sort of issues there?

Mr. Markham. Yes, yes.

Mr. Walden. But, when you are looking at this overall approval process, the example that I used, the seven months, how often does that happen to you?

Mr. Markham. You know, Representative, it is getting better, but, historically, we have timelines that we have to meet with budgets, with the need to get things done, small windows. And so, it is pretty common that it takes that long.

Mr. Walden. All right. And, Mr. Johnson, I want to go to you for a final question and comment. Given the horrible tragedies of these fires, given the backlog of maintenance to thin out or cut out and improve your rights-of-way, do you have landowners that try to stop you from trimming trees you

believe in your right-of-way need to be cut?

Mr. Johnson. Yes, in fact, we do, which is hard to understand, given the circumstances we face. I will say people have gotten a lot more willing to have things cut, but there are a number of people who just do not want their trees, or not even their trees, cut.

Mr. Walden. And if those trees end up causing a fire, who is liable?

Mr. Johnson. In California, if your equipment is involved in the fire in any way, you are liable.

Mr. Walden. So, even if the private owner of the tree says, "Don't cut it," and you are in a fight over that, if that tree gets into your line and starts a fire, you have the liability, is that accurate?

Mr. Johnson. That is inverse condemnation in California, yes, sir.

Mr. Walden. Thank you.

Thank you, Mr. Chairman. Thanks for your indulgence. I yield back.

Mr. Rush. The gentleman yields back. The chair now recognizes another fine Representative from the State of California, Mr. McNerney, for 5 minutes.

Mr. McNerney. Well, I thank the chair for that shoutout

there.

And I thank the witnesses. Your testimony has been very helpful, a lot of good suggestions or recommendations. PG&E showed what is already being done. So, I appreciate those comments.

Mr. MacWilliams, has there been a decline in the nation's energy infrastructure in the past decades?

Mr. MacWilliams. Yes, as I referred to earlier, I think our infrastructure in many areas, including critical energy infrastructure and, also, other areas such as national security infrastructure, are in decline and badly in need of investment.

Mr. McNerney. So, what factors led to that decline?

Mr. MacWilliams. Well, as I was saying earlier, I think part of the issue is just the way the government approaches infrastructure investment being essentially on a cash basis as opposed to accrual. So, we don't have a sense of accumulated depreciation. So, we are not preparing for the reinvestment. And as a result, we are essentially facing a wall in infrastructure investment that we are facing, unfortunately, at the same time that we have all these new demands on our infrastructure, particularly the grid, as we need to make it more intelligent and more resilient.

Mr. McNerney. So, the federal government has a role, then, in improving the situation?

Mr. MacWilliams. Absolutely. It is a nationwide issue.

Mr. McNerney. Absolutely.

One thing that many people don't realize, Mr. Johnson, is how broad the risk or threat of climate change poses to our energy infrastructure and how much it is going to cost to make that more resilient. Can you speak to the importance of federal investment and advancing research development and deployment of technologies that will make our grids more resilient?

Mr. Johnson. Yes. So, one of the great things about our country is the National Laboratory system, where many good things come out. And it is a good investment, in my view, in those institutions. There is a lot of work being done in those institutions on things that will help with fire prevention and suppression -- sensors, sectionalizing devices, all kinds of things. So, I think investment in those National Labs is a great idea in this space.

Mr. McNerney. Well, what about local governments? What should the state and local governments be doing?

Mr. Johnson. Well, I think the states have to take their part in the forest management pieces of state lands.

And I think on the local level, that is mostly a coordination/communication to make sure that people who are affected by these things, like power shutoffs, are well taken care of. So, I think the local thing is more about taking care of the local people.

Mr. McNerney. Could you talk a little bit about the grid, the new sensor technology and microgrid resilient zones?

Mr. Johnson. Sure There is a couple of things going on. The essential problem for fire and electric equipment is a piece of vegetation hits the line. There is a spark. It causes a fire. It is really that simple.

So, if you can cover your line with some material that it won't spark, that is helpful. Historically, that line, when it breaks, we can't see it break. So, we need a sensor that will shut off the power to that line as soon as it breaks, right? And so, things like rapid earth fault current limiter, which has been used in Australia -- we are piloting it here -- that is exactly the kind of thing that will do distribution fault anticipation. There is maybe some artificial intelligence that will tell us when we are likely to have a fault on a line, a lot of radiofrequency sensors, these kinds of things. So, there is a lot of technology work

going on here.

Mr. McNerney. Dr. Collins, you indicated that proper thinning is needed, but what about improper thinning? I mean, if we pass authorizations to do thinning, what is the propensity that that will result in improper thinning and what would be the consequence of that?

Mr. Collins. Are we talking on federal land?

Mr. McNerney. Federal land.

Mr. Collins. Yes, I think it is pretty unlikely, given the set of regulations that are in place already, at least for the Forest Service in California. I mean, I suppose if we were to raise what we call diameter limits for cutting, then it could be improper thinning where you are cutting the largest trees. But that seems like something that is not really on the table, at least from what I understand.

Mr. McNerney. Dr. Davis, what caused the large increase in tree density? What specifically caused that? I mean, we heard a lot about that today. What has caused that?

Mr. Davis. Simply suppression of fires. And where previously fires for millennia would burn through at different intensities, that would actually clear out what would burn in the future. As we started to put out fires more and more effectively, and we did that at a point where

it was wetter and cooler, then those trees all grew, and they grew into that continuous forest that Dr. Collins mentioned before, where the ability for flame to travel over greater distance increased.

Mr. McNerney. So, fire suppression has caused fire explosion?

Mr. Davis. Yes.

Mr. McNerney. All right. Thank you.

I yield back.

Mr. Rush. The gentleman yields back. The chair now recognizes Mr. Johnson from Ohio for 5 minutes.

Mr. Johnson of Ohio. I want to thank both committee chairs for holding this hearing today.

I know we are discussing an issue defined by recent wildfires out West, but this issue is certainly relevant to Ohio as well, as I have about 2500 acres of the Wayne National Forest in my district, where the carefully burned process, which is what you folks would call prescribed burns, took place last year to clear out some of the problem areas.

As I mentioned, the Wayne is in southeast Ohio. It is a patchwork of public and private lands, and these burns are one of the important ways to protect human property and to reduce damages from wildfires. Additionally, they encourage

plant and animal biodiversity and help ensure that our native oaks remain prevalent within the forest.

We have been largely spared in Ohio from the devastation of wildfires, and I do share my colleagues' concern that something has to be done. Regardless of this debate we are having today about why they are occurring, we have got to figure out a solution.

So, this question, Dr. Davis, you have noted in your testimony that more people are living in forests than ever before. So, to both you and Dr. Collins, has public acceptance of prescribed burning or active forest management become an issue?

Mr. Davis. I think that education of people who live in the wildland-urban interface is one of the great opportunities we have to be able to accept those treatments that we use, whether it is through thinning treatments appropriately conducted or through managed fire and prescribed fire. I don't think we are there yet.

Mr. Johnson of Ohio. Yes. Dr. Collins?

Mr. Collins. In California, I will tell you that it seems like acceptance is growing, at least in those communities that are immediately adjacent to some of the wildlands. And that is partly just because of what we have

experienced. I think people are pushed to that acceptance, I will say.

Mr. Johnson of Ohio. I have an analogy because in Ohio we live on the Ohio River. So, we have flooding issues and watershed issues. And so, we have manmade retainments that are put in place, and have been put in place, to control water retention and those kind of things, to protect from flooding. Over the years, residents have come in and built up around those manmade lakes. And now, in order to manage the watershed, you have to reduce the water in those manmade lakes. And so, people get upset because, wait a minute, now we can't run our boats and all that kind of stuff in our lake, not realizing, of course, what the intended purpose was.

So, it seems to me that prescribed burning and public acceptance of it is a big challenge because folks build property and they set up their homesteads there. They begin raising their families there. And then, all of a sudden, now they have got to face this prescribed burning.

Does the media report this issue accurately you think? Either one of you? Both of you?

Mr. Collins. I am seeing, at least in California, I am seeing some media attention on the prevention side, and it is

neat to see. The thing that is always the dilemma here is that you can have public acceptance, but the implementation is kind of a different story, right? When you are talking about small parcels of land, each with their own unique considerations on what you would have to account for on a prescribed burn, you almost just can't do that at scale. People might want it, but, then, from an implementation side, you can't do it. So, I am a little concerned about that.

Mr. Johnson of Ohio. Dr. Davis?

Mr. Davis. So, I think that one of the challenges we have is that right now we are concerned about the wildfires in Australia. Last year, it was the wildfires in Brazil. Before that, it was the wildfires in California or in Oregon. And the fire itself garners a lot of attention, but that smoke issue I referred to earlier affects residents hundreds or thousands of miles away even from where those treatments might need to take place. And there is a disconnect between someone who experiences smoke from a fire a hundred or a thousand miles away and someone who experiences the threat of the actual fire. So, it is space where we have to do more work.

Mr. Johnson of Ohio. Yes. So, how do we develop community support for prescribed burning? How do we do that

differently?

Mr. Collins. One thing we are seeing -- and we are kind of adopting this from the Southeast -- is that there are these prescribed burn associations where there are individuals, landowners, some sort of maybe ex-fire-types from agencies, that get together and want to do something locally on their land. And I think they are getting more support for that where even some of the agencies like CAL FIRE would even back that, but it is not totally ready to turn over. I mean, CAL FIRE is not ready to just hand the reins of burning off to some association.

Mr. Johnson of Ohio. Yes. Okay. All right.

Thanks, Mr. Chairman. I yield back.

Mr. Rush. The gentleman yields back. The chair now recognizes Mr. Kennedy for 5 minutes.

Mr. Kennedy. Thank you, Mr. Chairman, and I apologize for bouncing back and forth, as some others have been as well.

But I thank all the witnesses for being here, for your thoughtful testimony.

And, Chairman Rush and Chairman Tonko, and Ranking Members Upton and Shimkus, thank you for convening this hearing and for taking the threat of wildfires as seriously

as it deserves

Few natural disasters so clearly and painfully illustrate the reinforcing cycle of climate change and the cost of our continued inaction as wildfires. Climate change leads to rising temperatures, invasive species, frequent droughts, and extreme winds, which contribute to historic wildfires, which cause skyrocketing carbon emissions, which exacerbate climate change, which causes fires, and that cycle continues until we commit to ending climate change.

Every single day that we wait only makes it harder to finally come up with a solution and end it. We can debate and discuss mitigation factors today, and I appreciate the suggestions that have come forth and the testimony, but those mitigation factors will mean little if you are not willing to have an honest conversation about one of the driving factors to it, obviously, climate change.

Some of our colleagues will say that the science isn't as clear as I claim it is. In response, I would point to a recent NASA report, released just a few months ago, that said that, quote, "Where warming and drying climate has increased the risk of fires, we have seen an increase in burning." End quote. A Pentagon study, released a year ago, before historic fires scorched California, warned that, if we did

not address climate change, more than 40 U.S. bases around the world would be threatened by wildfires in the next two decades.

There are other colleagues that will acknowledge that climate change is real, but that it is just too complicated or too late or too early or too expensive to confront. But if we listen to the testimony from our witnesses today, we will understand how disingenuous that argument often is.

We are already paying for climate change. We are paying for it when climate change forces energy utility companies to file for bankruptcy. We are paying for it when ratepayers are forced to contribute $10.5 billion to an insurance fund to cover climate costs. We are paying for it when entire species are wiped off the face of the earth. We are paying for it when devastated families have to open GoFundMe pages to rebuild homes. We are paying for it when Americans die trying to escape fires and when brave first responders sacrifice their lives for others.

So, to begin, to Dr. Davis and Dr. Collins, you both spoke at some length about the mitigation factors we can take to prepare for wildfires and contain damage. And I would say, I think from the testimony that I have heard, you would agree this is not an "either/or" about mitigation or climate

change, but definitely a "both/and".

To start that conversation -- again, some of these questions might have been referenced earlier -- could you quantify if we have already spent billions, if not hundreds of billions, collectively, on climate change? To start, Dr. Davis?

Mr. Davis. I think we have spent a lot responding to and learning about how these novel climate situations interact with our forests and rangelands, which represents much of the West. Moving forward, we have to realize that the treatments that we will put into place that worked before will not work the same way, absolutely. We have to recognize that the dry conditions that we have are leading into what causes fuels to dry out and increases that burn susceptibility. The drought condition that has prolonged the Western U.S. is something that leads into forest mortality. It also affects our agricultural producers as well.

These responses are collective together in response to both historic management practices and changing climate conditions. It is going to be a multi-billions of billions of dollar solution and take decades to actually arrest the trend that we have seen in our forests.

Mr. Kennedy. Dr. Collins?

Mr. Collins. So, in California, I can't quote you on the numbers, but our investments have been pretty significant with regard to trying to mitigate climate change. And we have had this debate for 10 years, it seems like, and it seems like maybe we have gotten over it in terms of whether or not it pays to do forest treatments, whether it is prescribed burning or thinning, from a carbon standpoint to mitigate some of the effects of climate. And I think we have collectively agreed, especially after the last couple of years, that it does. Because, frankly, what you are talking about is removing carbon, either burning it with prescribed burning or removing it by thinning, which, of course, is a negative on the ledger, but, then, it is the foregone emissions when a wildfire comes.

So, I think that one of the things that is important to consider is that we can't just keep packing carbon into these wildlands, that the wildfire threat is pretty real, and that has its own carbon implications.

Mr. Kennedy. And very briefly, because I have got 10 seconds, to you both, if we continue on the current path, do forest fires become more prevalent or less frequent? Dr. Davis?

Mr. Davis. The models show us that they will be more

prevalent.

Mr. Kennedy. Dr. Collins?

Mr. Collins. The same.

Mr. Kennedy. Thank you.

Mr. Rush. The gentleman yields back. The chair now recognizes the gentleman from Missouri, Mr. Long, for 5 minutes.

Mr. Long. Thank you, Mr. Chairman.

And five months into my term as a Congressman, in Joplin, a Missouri town of 50,000 people, we lost 161 souls to a tornado. Tornadoes are extremely scary and worrisome. Hurricanes, the same thing. But in each of those instances, a lot of times you will have some type of warning. I cannot imagine anything that would strike more fear into someone than a wildfire. And you see this footage on TV.

Our youngest daughter was a student at Pepperdine, and she was in the broadcast journalism department there. And Stefan Holt, Lester Holt's son, was a couple of years ahead of her, and he was reporting from out there. I never will forget, he announced that Pepperdine had said that they had a mandatory evacuation of their faculty and staff, but didn't say anything about the kids. So, I never did understand that program, how they evacuated the faculty and staff, but didn't

evacuate the students. But, with that being said, like I said, especially as a parent of someone on campus, and seeing the fires, there is nothing more frightening.

Mr. Markham, you mentioned in your testimony that you have an upcoming meeting with the Oregon electric coops, State, regional, and district land management agencies, on actions to reduce wildfire risks. What are the specific goals the coops are hoping to accomplish through those meetings?

Mr. Markham. Representative, we are very optimistic that, by being able to come together, we can resolve some of these inconsistencies that we are having between our federal land agency district offices -- and this isn't just in central Oregon; it is throughout the State -- that we can agree on why it takes in one place four months to get a permit to go remove dead trees and in another district we get immediate approval. If we can do these agreements that were similar to the sage-grouse with insurances, I think we can hash this out, and it will be a huge approach to implementing the cohesive strategy and mitigating wildfire.

Mr. Long. How have the federal land management agencies supported the Oregon coops in implementing your cohesive strategy to prevent a wildfire?

Mr. Markham. They are being very supportive, as we proceed with working on applying the principles of the cohesive strategy and coming together. I am very pleased with the support we are getting.

Mr. Long. I know that much of your coop territory covers federal lands. So, you work with the U.S. Forest Service, Bureau of Land Management, and other federal agencies on preventing these wildfires. If a wildfire were to break out on federal land, who is the lead agency in charge? Who does your first call go to?

Mr. Markham. The first call on federal land, that is a good question on that. I am not sure I can answer if that is the Forest Service that takes over, depending on where it is at; the BLM, or the state forestry.

Mr. Long. Say that again, the last part?

Mr. Markham. The state forestry department, Oregon State Department of Forestry. You have got the BLM, the Forest Service, and the Oregon Forestry Department.

Mr. Long. Okay. Some have described federal lands as powder kegs because of all the easily combustible brush and deadwood that has been allowed to accumulate on the ground, as we have talked about several times here today. How did this occur and how does it contribute to the severity of

these wildfires?

Mr. Markham. It obviously can be devastating. I was looking earlier at the Oregon State University statistics, or it was U.S. Forest Service statistics, where their inventory, there are more trees dead on the ground than there are standing, and that is concerning when it comes to wildfire risk.

Mr. Long. What more needs to happen at the federal level and the state level to achieve more effective forest management?

Mr. Markham. Well, we have to have consistency within our federal agencies. We have to be able to take the regulations we have and put in some robust timelines. We have to have accountability. And then, we also have to have prioritization. I mentioned that earlier, where I believe that, when we are looking at a project that is going to reduce wildfire risk, we can't go down to the bottom of the pile where somebody may be wanting to put in a driveway on federal land. We have to be a priority where we are not waiting nine months.

Mr. Long. Real quickly in my last 15 seconds here, what role does litigation play in the ability to manage federal forests? What role is litigation playing?

Mr. Markham. It is pretty critical because, if there is a tree that we have not been able to remove and it starts a wildfire, we are going to be held responsible for it.

Mr. Long. Okay. Thank you, Mr. Chairman, for giving me seven extra seconds. I will yield back.

Mr. Rush. The gentleman yields back. The chair now recognizes the gentlelady from New York, Ms. Clarke, for 5 minutes.

Ms. Clarke. I thank you, Mr. Chairman, and I thank our Ranking Member Upton, for convening this important hearing on how we can improve the power sector in order to better serve and safeguard our communities.

I want to thank you, our panelists, as well for offering your testimony here today.

And I have heard a number of panelists mention forest management as part of this issue. However, there was also an across-the-board acknowledgment of the exacerbation and force multiplier of climate change as part of the equation. So, the recent wildfires in California, as well as the major fires in Oregon, Alaska, Australia, and Brazil over this past year, are a stark reminder of the climate crisis facing our nation and of the severity of the impacts that this crisis is already having on our homes, communities, and critical

infrastructure.

NASA-NOAA just recently reported that this past decade was the hottest ever on record, and our computer models project that the average temperatures will continue to get hotter for many years to come, unless we act swiftly to curb climate warming emissions.

As our climate changes, natural disasters such as wildfires, droughts, storms, and floods are becoming more frequent with more severity. From 2016 to 2018, there were 15 individual billion-dollar disasters, and on average each year, that is more than twice the number of billion-dollar disasters that occurred each year from 1980 to 2016. In 2018 alone, NOAA estimates that the total cost to the United States from natural disasters was over $91 billion.

As these impacts continue to increase, there is no doubt that the power sector is of critical importance, as recent fires in California, unfortunately, demonstrate. This issue also hits very close to home for me. From Superstorm Sandy to intense summer heat waves, extreme weather has caused communities in Brooklyn to experience major power outages almost every single year over the past decade. Last summer, over 40,000 people lost electricity when extreme temperatures pushed our electric grid to the brink of failure, leading our

local utility to preemptively cut off power.

So, right now, in cities across our country, new smart technologies are being put in place to increase the efficiency and resilience of critical municipal systems and service. Many of these technologies also make us safer by granting us greater degrees of control and by enabling us to access data and respond to problems in real time.

So, I would like to ask, Mr. Johnson and Mr. Markham, do you think there is an important place for these technologies within the power sector and on transmission lines? And do you think that we could use smart grid technology in locations such as California or New York City to prevent future wildfires or blackouts, and make these systems more resilient?

Mr. Markham. Yes, thank you, Congressman.

Technology, as I mentioned earlier, three major components, and technology being one of them. We have to get better at utilizing technology to prevent things from blackouts. I do believe that, as we look at load management capabilities, demand response capabilities, we can use those. In our area, it is potential blackouts or issues during wintertime, not summertime. So, we have to manage our high peak demands which quadruple on our system. And so, yes,

doing things like that is very critical to the system.

Ms. Clarke. Very well.

Mr. Johnson. I agree entirely with that answer. Anything that we can do to use energy smarter, more resiliently, to use less of it, because it is a precious resource, so any technology we can deploy -- storage, smart grid, anything that achieves a move toward decarbonization -- I think is a very helpful thing.

Ms. Clarke. And as you think about sort of the forest type of setting, even sensors. You know, I don't know that we have begun to look as much into sensor technology, given the density of the forestry and things of that nature, but I do want to put that on the record.

I know that you have mentioned a few of the technologies before, Mr. Johnson, but could you please elaborate on what you see as a couple of the most important technologies and how they could be used?

Mr. Johnson. The most important technology in the short term is materials that keep our conductors from sparking. So, material coverage, different materials. After that, I think a move to microgrids with a storage capability probably is the best answer to a lot of these questions.

Ms. Clarke. Very well. I yield back, and I thank you,

gentlemen, for your expertise here today.

Mr. Rush. The gentlelady yields back. The chair now recognizes the gentleman from Texas, Mr. Flores, for 5 minutes.

Mr. Flores. Thank you, Mr. Chairman.

Dr. Collins, let me start with you, if we can. Your testimony goes into great detail about how the century-long forest management practices that we have had of fire removal and suppression have transformed the sort of severe wildfires that we see today. The accumulation of dead or dying trees has allowed an unnatural and chaotic form of wildfires while also allowing harmful invasive species to find a home, which further damages the forests. These disasters subvert the benefits of a healthy forest, as you talked about, including natural carbon storage and clay water filtration. It appears that we are missing out on huge opportunities to benefit from the outcomes of a healthy, more resilient forest.

And so, do you agree that the unnaturally severe wildfires we are experiencing today prevents us from enjoying the all-important ecological benefits of a more resilient forest?

Mr. Collins. Yes, I think there are instances where recreation, in particular, has been impacted, people's scenic

views from their homes, all that, yes.

Mr. Flores. What are some of the challenges from fire smoke, both from a health perspective and a safety perspective?

Mr. Collins. The challenges to just the general public or?

Mr. Flores. Yes.

Mr. Collins. You mean in terms of mitigating it or --

Mr. Flores. No. I guess, what are the environmental and health challenges?

Mr. Collins. When a wildfire happens?

Mr. Flores. Yes. Fires, from the smoke.

Mr. Collins. Sure. I mean, the smoke obviously, as has been mentioned before, especially particulate matter, is quite concerning. The obvious thing of evacuating them. And even if you are evacuated in a safe time, there is a lot of emergency problems as you tend to put people on narrow roads and people sort of freak out a little bit, I guess.

Mr. Flores. Yes.

Mr. Collins. And then, there is the obvious thing like what happened in Paradise in California. So, it spans the gamut in terms of impacts to communities.

Mr. Flores. And so, let's compare and contrast the

challenges for a wildfire versus a prescribed fire. So, walk us through. Let's just focus on smoke for a minute, the environmental and safety aspects of smoke.

Mr. Collins. From a smoke standpoint, there is pretty good regulatory structure in place to approve burns when there is good dispersion. So, in general, they can be done at least under forecasted conditions that don't tend to impact communities. Now, that being said, there is going to be unforeseen things that weren't forecasted that will impact communities. But, in general, we try to manage smoke.

And then, also, there is containment lines that try to prevent fire from escaping the footprint, but there is always that little, small percentage of risk that is out there, that a fire will escape containment, even a prescribed fire.

Mr. Flores. Okay. Mr. Johnson, quick questions for you. During wildfires, how does your natural gas distribution system hold up?

Mr. Johnson. It held up well. We did, out of caution, turn off a number of customers in one of the fires, but, in general, it held up well.

Mr. Flores. Okay. And I assume it held up well because of the inherent resiliency of a buried pipe versus a suspended high line, is that correct?

Mr. Johnson. Yes, that is correct.

Mr. Flores. Okay. And did you have to cut off gas? Okay, you did say you had to do some preventive cutoffs of supply to customers. But did you, under the PSPS, in addition to cutting off electricity?

Mr. Johnson. No. We cut off about 20,000 gas customers because there was a fire in their area.

Mr. Flores. Okay.

Mr. Johnson. As part of the PSPS, we do not turn off gas.

Mr. Flores. Okay. All right. And how many total customers were cut off, had their electricity cut off?

Mr. Johnson. In meters, 900,000, so 2.5 million people, on that order in the largest one.

Mr. Flores. Okay. So, 900,000 customers versus 20,000 customers, electric cutoffs versus gas cutoffs. But PG&E has supported gas bans in many jurisdictions. Do you support these gas bans for safety reasons not expressed in your letters and comments?

Mr. Johnson. So, we have supported the California policy, which is to work out of using gas as a fossil fuel into the future, and we have supported it in several instances where it made sense in new construction to ban gas.

Mr. Flores. Do you support these gas bans for economic reasons?

Mr. Johnson. No. Well, in the new construction, if it makes sense not to use gas, it is economic, but our support is really the support of the California policy, which is to eventually, over some period of time, work out of natural gas as a fuel.

Mr. Flores. Okay. All right.

Thank you. I yield back the balance of my time.

Mr. Rush. The gentleman yields back. The chair now recognizes Dr. Ruiz for 5 minutes.

Mr. Ruiz. Thank you, Mr. Chairman.

And thank you to all the witnesses for being here today.

Wildfires have devastating impacts to life and livelihoods, to homes and economies, but most people visualize rapidly-spreading fires that are an imminent threat to life and homes, triggering evacuations and Red Cross shelters. Communities and counties are good at these rapid responses to severe threats. However, most people don't think about the effects that lingering particulate matter from smoke has on people's health. Smoke triggers asthma attacks in children and respiratory failure in older Americans with COPD, emphysema. And chronic exposure can

decrease lung function, even in non-asthmatic children. So, lingering smoke is correlated with increased risk of emergency department visits and hospital admissions for asthma.

Furthermore, resource-poor and underdeveloped communities are especially at risk for these health conditions because of outdoor work environments, decreased access to health care, and lack of access to filtered indoor air, closed air conditioning.

This past fall, in my district, there was a 50-acre mulch fire that did not pose an imminent threat to life or homes. However, it did produce lingering smoke that caused students from nearby schools to be transported to the hospital and the school district to close for a full week. Students at home did not have closed-air circuit ACs because many live in trailers with swamp cooler window units which concentrate the smoke indoors, making the matter worse. Farm workers endured this smoke working outdoors in the fields.

You see, this isn't theoretical. Airborne hazards are real for my constituents. I grew up there, and enough is enough. This is why I have taken action, forming a collaborative effort bringing together federal, state, county, tribal, and school officials to better prevent,

mitigate, and respond to airborne hazards. We must have better systems to protect the public from the risks associated with breathing smoke-filled air.

So, I would like to ask you a question, Dr. Davis. In your testimony, you spoke about the need for collaborations like this when it comes to informing the public and mitigating health risks. How important is effective communication between different agencies when it comes to mitigating the impacts of health? And I am not talking about the imminent threat of life and homes and evacuations with the shelter, which it happens. I am talking about the situation where there is just poor air quality in a community. How important is it for that dialog?

Mr. Davis. I think it is a vital issue that we really address. And I think education is the way to go. This has to be multi-scale in terms of all aspects of government, all the different levels of government. And we have to recognize that there are many inherent social barriers towards more at-risk or lower-income people being able to participate.

Mr. Ruiz. So, what is the importance of the agencies communicating? What is the most important information that the public needs to know when a smoke event is occurring?

Mr. Davis. Without being an expert in emergency

communications, I do think understanding how those chronic situations can emerge, where people often feel like they can respond to an acute situation, an immediate situation, but they do not necessarily know what it means to go day after day after day into those same conditions, and the lifelong potential health impacts that has on individuals.

Mr. Ruiz. And one specific problem you describe is the lack of consistent messaging regarding how we talk about the impacts of smoke. What is your recommendation to Congress to harmonize this type of messaging?

Mr. Davis. Again, I think if we look at the research and the experience that we have from communicating other major potential health impacts, even looking at things like smoking as an issue and how we have changed our messaging over decades in relation to smoking, the same approach could be taken with messaging around wildfire smoke exposure.

Mr. Ruiz. And so, in resource-poor settings where you don't have closed-circuit ACs to send students home to, what is your recommendation and how important is investing in comprehensive plans to have a shelter-in-place location for communities, especially those underserved communities?

Mr. Davis. I do believe that shelter-in-place has to be something that we really do look to develop. I also believe

that there are social barriers to people being able to take time off of work, being able to go home and make sure that their children are being taken to those shelters as well. So, it is not as simple as just having the shelters.

Mr. Ruiz. It is a form of communicating and addressing the other needs.

Thank you. I yield back.

Mr. Rush. The gentleman yields back. The chair now recognizes the gentleman from South Carolina, Mr. Duncan, for 5 minutes.

Mr. Duncan. Thank you, Mr. Chairman.

I want to reference the memo put out by the Energy and Commerce Committee. In paragraph 1, or (i), the current state of wildfires, it says, "Additionally, 2018 and 2017 were some of the worst years for wildfires in California." It says on the memo that 2018 saw 7600 fires that burned 1.9 million acres. In 2019, there were 7800 California wildfires.

Let me just go back, a little simple research, 2000 through 2018, and I am going to read some numbers to you. I am not going to read the years, but start at 2000 to 2018: 7,622, 9,458, 8,328, 9,116, 8,415, 7,162, 8,202, 9,093, 4,923. 2009 was 9,159; 2010, 6,554; 7,989; 7,950; 9,907 in

2013; 7,865; 8,745 in 2015; 6,986; 9,133 in 2017, and 8,572, based on Wikipedia, in 2018. That's a heck of a lot of wildfires. To say that 2018 and 2017 were some of the worst years for wildfires in California, this debunks that. There's been a lot of wildfires. Those were all California wildfires -- 8,000, 7,000, 9,000. The numbers refute that statement.

But what is mitigation? I think we all know what mitigation is, sitting on the panel. But FEMA says that mitigation is "the effort to reduce loss of life and property by lessening the impact of disasters. In order for mitigation to be effective, we need to take action now -- before the next disaster -- to reduce human and financial consequences later." That is "analyzing risk, reducing risk, and insuring against risk". That is mitigation.

Now I am from South Carolina. You go, you don't know anything about Western fires and Western situations. I own property in Montana. In August of 2011 -- excuse me -- August 11th, 2018, I was out there. A lightning storm came through. There was already a fire burning, I believe, on Gibralter Ridge. But, on August the 11th, the lightning storm caused four fires, three of which were just outside of the Glacier National Park on Montana State property. They

had mitigated the risk and the fires were reduced to a very small amount of acreage.

But, inside Glacier National Park, where no mitigation is done because it is a National Park, 14,500 acres were burned, the Lake McDonald Fire or the Howe Ridge Fire, because they haven't done any mitigation. I have been to a fire line. I have talked with firefighters. I have seen the need for prescribed burning. Those were lightning fires in Montana.

But wildfires aren't unique just to Western States. In 2009, Horry County, South Carolina -- that's Myrtle Beach, for those that don't know where Horry County is -- burned 20,000 acres, destroyed 60 homes, evacuated 2500 people. Now the reason that fire got so out of control and would burn so hot was because they had not done any prescribed burning on that State forest. Why hadn't they don't any prescribed burning on that State forest? It is because of the encroachment of the communities under development up on that State forest. And when they had tried prescribed burning in the past, the residents said, "Whoa, whoa, whoa. Wait a minute."

We have the Sumter National Forest in my district, in my home county. They do prescribed burning on those national

forests. They wait for westerly winds. They wait for the right conditions, so that the fires can burn and they can do a prescribed burning to keep wildfires like that from happening.

And I listened to all this talk today about climate change and how all that is changing and affecting wildfires, when I see thousands and thousands of wildfires in California, and I have to think to myself, why do these wildfires seem to be more out of control or more intense? And I go back to the spotted owl, go back to lack of good forest management of prescribed burning and cutting old-growth forests, that sort of thing that happened after spotted owl in the 1990s forward.

But I also understand that our communities are growing and encroaching on these areas that we normally would do good forest management practices. So, it is just like farms; people don't like the smell of farms because they have moved out there and they go, "Wait a minute. I don't like the smell of that farm. I don't like those trucks going at six o'clock in the morning down the roads."

Mr. Rush. The gentleman's time has --

Mr. Duncan. We need to do prescribed burning and good forest management. That will help mitigate this.

I yield back.

Mr. Rush. The gentleman yields back. The chair now recognizes the gentleman from Oregon, Mr. Schrader, for 5 minutes.

Mr. Schrader. Thank you, Mr. Chairman.

I think pretty much everybody on the panel has referenced a bipartisan bill I worked on for several Congresses with my good friend and colleague, Doug LaMalfa from California, to streamline the ability of power companies to get into the rights-of-way and clear these areas of these trees and vegetation, to prevent the catastrophic fires. Fire is going to happen, but at least the catastrophic fires.

I am disappointed that only 69 members of my party voted for that bill, when it is a no-brainer. Every person on this panel has talked about vegetative management as a critical piece of the puzzle to deal with the climate change effects we are seeing that are starting these catastrophic fires. There is 60 million acres of national forestland at risk right now.

Mr. Markham, I would like you to talk about a situation you had in the Prineville area a few years ago where you sought the ability to treat some problems, and what happened, and then, what happened in terms of what the agency wanted

you to do after the fact.

Mr. Markham. Okay. Congressman, I am trying to remember this. It was over in Prineville. I cannot recall this story that we are talking about.

Mr. Schrader. Well, I can refresh your memory.

Mr. Markham. Okay.

Mr. Schrader. You had asked to remove some hazardous fuel, some trees in the area. You were worried about the right-of-way. The Forest Service refused to do that. There was a fire, and then, they tried to bill you for the damn fire.

Mr. Markham. Actually, yes. Okay. Actually, down in La Pine, it was with Midstate Electric Cooperative.

Mr. Ruiz. Right. Yes.

Mr. Markham. And they had requested removal of a danger tree and they basically were denied. That tree ended up coming down. It started a fire, and I believe it was over half a million dollars in fire suppression cost they ended up having to pay.

Mr. Schrader. Yes. That is ridiculous. That is ridiculous -- asking to do the right thing, getting refused, and then, being billed for the aftereffects.

Mr. Johnson, do you have a budget for vegetative

management?

Mr. Johnson. Yes, sir.

Mr. Schrader. And what is that number?

Mr. Johnson. Historically, it has been about $300 million a year for the last 10 years. This year it was a billion dollars.

Mr. Schrader. Now that is a lot of money, even in Washington, D.C. And so, the number is going up, trying to be proactive and deal with these issues that are out there. Has the federal government over the years been helpful in trying to help you get in there with the regulatory framework and stuff? Or has it been a little bit of a hassle?

Mr. Johnson. More helpful in the last year or so. Before that, it was quite a bit of a hassle, but I think the last year, a couple of things; the bill made a big difference. You got their attention. And also, everybody is starting to wake up to the fact that, whatever the cause of the risk is, the risk is growing of these fires.

Mr. Schrader. Sure. Mr. Markham, do you have clear guidelines yet from the federal government about the vegetative management bill that this Congress and the President signed, and it is in the law now?

Mr. Markham. No, Congressman, we do not.

Mr. Schrader. No, we don't. That is two years ago -- two years ago -- before the fire that devastated California. Where the heck is our federal government? Where are the agencies sitting on this where it is pretty crystal-clear all they want to do is remove hazardous fuels? They are not clear-cutting the American forests. They are not burning all the BLM grasslands. They are just trying to do a little extra work. This should not be very complicated at this point.

And I hold the federal government responsible, not PG&E, for these catastrophic fires that we are seeing throughout the West -- Oregon, Washington, California; you name the particular area. It is not the utilities' fault. They don't get any positive press by allowing a fire to happen. They try and do the right thing, but, again and again, they come up against various obstacles.

Dr. Davis, I would like to talk a little bit about forest mortality. There was a study coming out of Oregon State University that talked about. If we are not doing management of the forests, what sort of emissions occur from the death and decay of our forests right now, particularly in Oregon?

Mr. Davis. This is an area where really we are seeing a

lot of new studies come online because this is something we have to get a better handle on as we look towards that carbon balance in forests. So, I would like to dig in a little bit more on that and follow up with you afterwards.

But some of this builds off of something Dr. Collins mentioned, where when those fires burn more intensively, the stronger, hotter burning fires, then it can be difficult for trees to regrow afterwards, which can disrupt the way that that cycle of emissions, and then, absorption of carbon occurs over time.

Mr. Schrader. Absolutely. And the study I was talking about indicated that we have 22 million metric tons of CO2 emissions that come from just the mortality in the forests, from the overgrowth that you and Dr. Collins both alluded to. That is equal to all the emissions put into the air by the transportation sector in the State of Oregon. And that is just by letting trees die, not doing project management, not doing the right things at the end of the day.

I think it is a huge problem that we have got out there. We are way behind the curve in addressing this. People want to do new technology. That is great, but let's use the old technology.

One last thing that I will reference real quick. There

was a question by one of my colleagues that talked about can we possibly thin all these acres. The answer is yes. It may take 20, 30, 40 years. That is jobs in rural Oregon. That is a great way to leverage both opportunities. And what is the cost to the federal government? Zero, because the companies will pay for the privilege to harvest trees and do the project management for us. This is a win-win for the taxpayer, a win-win for rural communities, and a great win for getting rid of these catastrophic fires.

And I yield back, Mr. Chairman. Thank you.

Mr. Rush. The gentleman yields back. The chair now recognizes the gentlelady from Washington, Mrs. McMorris Rodgers, for 5 minutes.

Mrs. Rodgers. Thank you, Mr. Chairman.

And building upon my neighbor from Oregon, I believe that if Americans really understood the condition of our national forests, they would be outraged and they would be demanding more action. We are seeing it with the larger and larger catastrophic fires.

But just to kind of put it in perspective, the national forests, the U.S. Forest Service owns nearly 200 million acres, and they estimate that 40 percent -- so, 80 million acres of trees in America -- are dead, diseased, dying

timber. And my neighbor in Oregon just highlighted the impact of carbon that is being released because of the mismanagement.

In recent years, my home State of Washington has faced catastrophic fires. And these fires are so damaging. They hurt our health, dangerous impacts due to smoke. In Spokane, Washington, our air quality has been so bad that it is off the Air Quality Index. We can't even measure it. And there is no place to go. It really is a scary feeling when the air quality is so bad and there is no place to go. It jeopardizes our safety. It is destroying our environment, releasing dangerous emissions into the air.

We should all, Republicans and Democrats, be able to come together to support healthy forests. When our forests are healthy, it becomes harder for these fires to take off. But, right now, we are not effectively managing or responding to an increasingly at-risk forest.

Unfortunately, decades of overregulation and frivolous lawsuits have stalled forest management and our ability to keep our forests healthy. And we are all paying the price.

Over the last few years in Congress, I have been encouraged that we took steps to fix fire borrowing, so we can better fight fires. And we have worked to advance active

forest management reforms to give communities more tools to improve the health of our forests.

Last year, I introduced the FORESTS Act of 2019 to further promote active management on federal forestland. There is still more work that needs to be done. Local communities, industry, tribes, states, and the federal government should all play a role in actively managing our forests and reducing the risk of fire.

In eastern Washington that I am proud to represent, we have shown that local collaboration can work and what it can accomplish. We are proud right now that on the Colville National Forest, a million-acre national forest in northeastern Washington, we have the A to Z Project, which is a public-private partnership where local communities, conservation groups, the recreational community, industry, and the Forest Service teamed up together and awarded a contract for 50,000 acres over a 10-year period. The Vaagen Brothers Lumber Company is managing this contract. They funded the environmental review process, and we are reducing fuel loads by removing small-diameter logs. It is working.

If you want to come visit, we would love to have you. We had the Chief of the Forest Service out last August. Many other groups are coming and seeing it, and it works.

It has been so successful that we are planning another A to Z Project, and it is almost completed. After decades of warring between industry and the environmental communities, these types of collaborative projects should serve as a national model for forest restoration that would improve our environment and the economy.

So, with the remaining time, Dr. Collins, what forest management strategies have shown successful, especially in thinning the small-diameter logs? Would you talk about carbon sequestration impacts of thinning and what roles fires historically have played in the natural landscape, especially related to watershed health? Yes?

Mr. Collins. We have talked about this before, but I will briefly summarize. The historical role of fire was as sort of a regulating mechanism. It sort of kept the forests in check with regard to growth, the establishment of young trees, and accumulation of surface fuel on the forest floor. But it did that at a very complex and heterogeneous way across a watershed, for example. So, to think that we just need to thin everything the same way and need to burn everything the same way would be an oversimplification and, frankly, ecologically not something we would want. So, I think to a certain extent we need to embrace some of that

complexity, the heterogeneity, and incorporate these ideas both from a thinning standpoint and from a prescribed burning standpoint in order to achieve that health, I guess.

Mrs. Rodgers. Yes. So, would you talk about the collaborative approach and if other strategies are working that you think are going to help?

Mr. Collins. Sure. I recognize that we are out of time. The collaborative approach is working in California. There are many examples of it. My problem with it is it is slow. It is slow and we are not keeping up with sort of the pace at which fires happen.

Mrs. Rodgers. It does keep us out of the courts, though.

Mr. Collins. It is true.

Mrs. Rodgers. Thank you, Mr. Chairman.

Mr. Rush. The gentlelady yields back. The chair now recognizes the gentleman from California, Mr. Peters, for 5 minutes.

Mr. Peters. Thank you, Mr. Chairman.

And thanks to the witnesses for being here.

As you may know, the San Diego region, including parts of my district, was devastated by wildfires in 2003 and 2007, when I was a local elected official. We have had more fires

since then. But the first one showed how unprepared we were. And afterwards, we made huge changes. One of the outfits that made changes was our utility, San Diego Gas & Electric, which made investments in much of the infrastructure we are hearing about today. That was done in coordination with county emergency operations, CAL FIRE, and city fire departments. We have new technologies like cameras, weather stations, helicopters, the input of the community groups around fire preparedness, and more.

And, Mr. Chairman, I ask unanimous consent to introduce to the record a January 28th letter from SDG&E.

Mr. Rush. Hearing no objections, so ordered.

[The information follows:]

********** COMMITTEE INSERT **********

Mr. Peters. I want to ask, first, Mr. Collins, in your testimony it is clear that we need an all-of-the-above strategy for managing -- thinning, vegetative management, prescribed burns, controlled burns. What I didn't hear or at least read in the presentation was how we are managing all of the residuals created from thinning and other vegetation management. So, we have a lot of leftover waste in the form of treetops, limbs, non-merchantable timber, underbrush. We shouldn't be leaving this material out on the forest floor. What are the options for removing the waste? In particular, is there a way to use it, sustainably harvested, for some sort of biomass energy?

Mr. Collins. I think that is essential to where we need to go with regard to forest health.

Mr. Peters. What do we need to do, though, as Congress? Because there is not a market for that, I think a free market. So, what should we be doing to encourage that kind of use?

Mr. Collins. You know, I am not a policy person myself, so I don't know what it takes to incentivize that production or that establishment of the industry. But the hurdle that we often can't get over is transportation. We can't push that material any further than, let's say, about 50 miles

before it costs more than it is worth to turn it into energy. So, we end up burning that stuff in giant piles. After a thinning project, there are piles the size of a house that we burn under light snow and have lots of emissions associated with it.

Mr. Peters. So, we are burning that material today, but without getting energy out of it?

Mr. Collins. Right. And causing air quality impacts.

Mr. Peters. What I would like to look at maybe is whether something like the California low carbon fuel standard is enough of an incentive to encourage us to reuse that material. If we are burning it anyway, we ought to be getting energy out of it.

Mr. Collins. I mean, at least as far as what I see, it hasn't happened yet.

Mr. Peters. Okay.

Mr. Collins. I think there is talk about it. There has been talk about it for five or seven years, but it hasn't really hit the road yet.

Mr. Peters. I would suggest that is something that our committee might want to look at.

I would ask Mr. Johnson, we talked about the Schrader-LaMalfa bill, which I voted for in 2017, and we are now

waiting for the administration to issue regulations under that. And we are hopeful that that generates the kind of permission for you to do your job in a way that helps prevent fires in the future. Are you aware of any other legislative action that the Congress needs to take along those lines? Or as long as the regulations come out and are favorable, did the Schrader-LaMalfa bill meet the needs of the legislation that we were looking for?

Mr. Johnson. I think that bill meets at least the needs of PG&E, if it is enacted the way that we think it should be and if there is continued funding from the Congress to make sure that the activities are being done. But I think if we can get the regulations in the right place, that is a giant step forward.

Mr. Peters. And I assume we will be in touch as the regulations come out -- I think I share a little bit of Mr. Schrader's impatience -- to make sure that we do cover all the bases. And we will be looking forward to working with you on that.

Mr. Johnson. Thank you.

Mr. Peters. And I would ask Professor MacWilliams about the research you referenced. You talked about the work the National Labs are conducting. What kind of investments are

we looking for the federal government to make in terms of planning, monitoring, modeling, other research needs?

Mr. MacWilliams. Sure. Well, actually, I will go back to the first topic that you were referring to, which is biomass. And I mentioned a little bit earlier there is really interesting work being done right now at National Labs and other places looking at biomass gasification to produce hydrogen, which is exactly to your point. And then, you need to sequester the CO2, and it turns out, as I mentioned, in California there is some good geology for that.

That is the type of thing, when you talk about what the federal government can be doing, obviously, many of these are state and local issues. Recognize that. But the federal government, through funding the Department of Energy and other agencies working on these technologies, and then, also, obviously, as you are aware, looking at financial incentives, tax incentives and other things, to encourage those kinds of technologies.

The other technologies, very briefly, are the ones we have been talking about -- center technology, advanced computing technologies, building large data lakes, those types of things.

Mr. Peters. Very much appreciate the hearing and

realize this is work for all of us to do, and we hope everyone will continue to step up, from the communities on up to the federal government.

And, Mr. Chairman, I yield back.

Mr. Rush. The gentleman yields back. The chair now recognizes the gentleman from Georgia, Mr. Carter, for 5 minutes.

Mr. Carter. Thank you, Mr. Chairman.

And thank all of you for being here.

Obviously, this is a very important subject, particularly for us in the State of Georgia. Georgia is the No. 1 forestry state in the nation and we have a lot of forestland, particularly in my district. We, too, have had forest fires. In fact, I will remind you about the West Mims Fire that was just a few years ago in the Okefenokee Swamp. Also, we have the Big Turnaround Fire in 2007.

I represent the entire coast of Georgia and go all the way across, almost halfway across Georgia. So, I have the Georgia-Florida state line. And, of course, the Big Turnaround Fire choked Georgia and Florida for many years and for a long time while it was happening.

But I want to talk about forest management because forest management is extremely important to us in Georgia,

something that I think we do a good job with. We have sustainable forests. We have prescribed burns quite often. In fact, I am having a prescribed burn on my property that I own in Camden County near Cumberland Island on Sheffield Island. I am having it done next week, as a matter of fact. It is a precautionary measure. We are doing it to make sure that we don't have problems later on. Of course, we are doing this in conjunction with DNR, the Department of Natural Resources in Georgia, making sure that the wind conditions are right, the weather conditions are right. But now is the time to do that.

And I want to ask you, Dr. Collins, the growth of communities, particularly in areas that before we didn't have communities, combined with the lack of forest management, how has that contributed to the rise of some of the severe fires that we have seen in our country, particularly out West?

Mr. Collins. Dr. Davis mentioned this as well. It is an issue. I mean, there are many issues. One is that some of the people moving into those communities aren't totally familiar with the ecology of the forest, the fact that they are prone to burn, they are adapted to burn. And so, they don't know/understand that there is a role that we need to play there in terms of managing the forests.

The other thing is that what they see when they move there is their expectation of what is natural. But the problem is that what we are looking at right now is a completely unnatural condition for the forests. So, any alteration to what they see in terms of thinning, or something like that, looks unnatural to them. And, in fact, it is trying to move us back towards a more natural condition. So, I think we have some problems, and I suppose education would definitely work there. But, also, what is happening, frankly, in California is the wildfires are educating people pretty quickly and they are making them want to do something.

Mr. Carter. I have the pleasure and the privilege of serving on the Select Committee on Climate Change. And one of the things that we talk about is resiliency and ability for our resiliency, and that is bipartisan. I mean, we all believe that, that we need to do that. There is no question about it.

And I believe that, in order to address climate change that I do believe in, I believe we have got to have innovation, adaptation, and mitigation. One of the ways that we can mitigate some of the things that are happening here is through land management.

Again, Dr. Collins, is that something that you think we are doing a good enough job of practicing? Or are there improvements that we can make?

Mr. Collins. Well, I still think we are behind in terms of the scale that we are implementing. We kind of know what we should do, but we are just not implementing it at a scale that is necessary. I mean, there is a number of reasons for it, but I think that we just need to get over that hurdle.

Mr. Carter. Right, right.

Well, let me ask you this: in your testimony, you discussed the Blodgett Forest -- I hope I pronounced that right -- the study that was undertaken by UC-Berkeley. Did you go into the study with any kind of preconceived notions about what should or shouldn't be considered to address wildfire suppression?

Mr. Collins. Yes, I think a lot of us understood that thinning of different strata of fuel, where you take out what are called the ladder fuels, and then, if you were to remove surface fuels, yes, you would absolutely have an effect on wildfire hazard. And, of course, we did. But what we didn't anticipate were some of the longer-term effects.

Mr. Carter. Such as? Longer-term effects?

Mr. Collins. Well, the changes in the fuel structure.

Like, for example, in the area where we did a thinning, which was a commercial thinning, but it left about 30 or 40 percent canopy cover of the trees, and then, we burned it. We actually had a really strong and uniform shrub response, which was not probably something we wanted a ton of. So, there are things like that that we could adjust future treatments and do better. I think those are some of the neat take-homes of that long-term study.

Mr. Carter. Yes. Well, my time is about up, but I do want to thank you all for being here. This is a very serious subject. I do think it is something that, if we use common sense and use what is available to us, and build up our resiliency, that regardless of the carbon buildup, regardless of whatever, we could do a better job. There is no question in my mind about that.

And thank you, Mr. Chairman, and I yield back.

Mr. Rush. The gentleman yields back. The chair now recognizes the gentlelady from California, Ms. Barragan, for 5 minutes.

Ms. Barragan. Thank you, and thank you all for being here for this conversation. It has been interesting to hear about climate change and forest management. I think we can agree that it is going to be a combination of both.

I happen to be a big believer that the combination of the increasing heat, longer droughts, and intensifying winds, along with record-breaking wildfires, are becoming the new norm for California, which is not a good new norm for us. In Southern California, Los Angeles County Fire Chief Daryl Osby has been outspoken on this, stating that, "Climate change is undeniably a part of why these wildfires are more devastating and destructive than ever before." I think it is such an important issue that he is going to be my guest at the State of the Union to talk about the impact that wildfires are having, and being intensified by climate change.

And, Dr. Davis, I want to thank you for talking about the health impacts. Because sometimes people say, well, the wildfires are not in my backyard; why should I be so concerned about it? So, to talk about the health impacts of what they are doing to our air and to our communities is so critical.

Some people want to just ignore the climate change aspect of it. We have heard a little about that today. We heard the President merely say more rakes will solve the problem. I happen to believe, especially after our conversation today, it is more complicated than that.

Mr. Johnson, I want to go to you to talk a little bit

about microgrids. One of the solutions for improving community resiliency to outages from climate disasters is microgrids, where we combine local clean energy resources such as solar with battery storage, to keep the power on. Can you speak to this solution and what policy changes Congress can make to bring microgrids to more communities?

Mr. Johnson. Thank you for that great question.

We know they work because we had one during the fire season. The Blue Lake Rancheria Tribe has a microgrid. It is solar with battery storage. And they were able to use that to keep some of the Humboldt County area electrified during one of the PSPSes. So, we do think going forward and have actually significant plans to increase the number of microgrids, on the order of perhaps 20 more this year and 40 more over time.

I think these are largely -- well, one thing that would happen to help fix this would be a carbon standard, would be a climate standard by the Congress. That certainly would move this in the right direction. Otherwise, I think these are mostly state decisions, reflecting state standards. And in California, it is very hospitable to this kind of application.

Ms. Barragan. What do you envision that carbon standard

by the Congress would be like?

Mr. Johnson. Economywide, affordable, and driving innovation.

Ms. Barragan. Okay. And, Mr. MacWilliams, as the area designated as a high fire threat widens and additional risk from climate change hazards such as storms and flooding grow, I am concerned that homeowners, particularly low-income residents and people of color, will not be able to afford home insurance. How is access and affordability to insurance being impacted in California and the country?

Mr. MacWilliams. Yes, I think that is absolutely an issue. One of the things I mentioned in my written testimony is that, to me, what is happening in California, but in climate change-related issues more broadly, is that we are seeing society really having to grapple with the question of how we are going to take these increased costs, which are going to be very significant, and allocate them among all these different stakeholders, whether it is the ratepayers or taxpayers, et cetera. And so, this is another example where we are going to look at and decide how we can support those communities because increased costs are going to go up because risks are going up, and the actuaries will reflect that ultimately in rates.

Ms. Barragan. Right. I happen to represent a district -- there are only four districts poorer in California than my district. And when I would call people throughout California during the wildfires, those in more affluent communities would say, "Well, my family is just evacuating. We're going to get a hotel. Not a big deal for us, more of an inconvenience." But when I think about my own district, and districts like mine, there will be many communities who will not have the ability to do that, which is why I think it is so important that we collaboratively work together to prevent more wildfires. And how do we get it so that it is not the new norm?

And so, thank you to our panel for all your suggestions. And I am sure this will not be the end of the conversation.

With that, I yield back.

Mr. Rush. The gentlelady yields back. The chair now recognizes the gentleman from Florida, Mr. Soto, for 5 minutes.

Mr. Soto. Thank you, Mr. Chairman.

When we are looking at the numbers, it is staggering. Since 1970, in the U.S., the average number of large wildfires has tripled. The area burned is six times greater since 1970. Since 1984, the area burned by wildfires in the

Western States has doubled. And I think we all understand this is not a coincidence. This is the result of a human-caused climate crisis.

I think a lot of these individual policies that have been recommended, including by Congressman Schrader -- I was happy to vote for that bill, along with other recent federal policies -- California and their new vegetation management programs, and I just witnessed this today, those are all helpful. But, as the saying goes, we must see the forest from the trees. That is why we put forward the CLEAN Future Act, a holistic, economywide approach to the climate crisis to get to 100 percent carbon-neutral by 2050.

We talked about the West Coast. We talked about Australia. We lost a Floridian, Rick A. DeMorgan, Jr., from Navarre, Florida, a firefighter down there trying to help out.

In southern Polk County in central Florida, over two years ago, we saw rampant fire in our forest. And in 1998, over 500,000 acres in Florida went under flames.

So, first, my questions are for Mr. Johnson and Mr. Markham. Are we embracing clean energy and reducing fossil fuels in a way that we could bend the arc of carbon pollution to potentially get to carbon-neutral by 2050? Are we seeing

that among both your organizations? And I will start with you, Mr. Johnson.

Mr. Johnson. We are certainly making an effort to do that. And that is in the standard in California. I think it will be difficult to do that. We don't have the technology to do it today. But part of setting a standard and a goal is that you are going to have to figure out how to do it and how to make the technology.

So, you know, PG&E, I think last year the electricity was 80 percent carbon-free. So, we are moving toward that standard. But the closer you get, the harder it is going to get.

Mr. Soto. Sure.

Mr. Johnson. That is just the nature of things. But this is how innovation happens.

Mr. Soto. Well, we said we would go to the moon and we did.

Mr. Johnson. I know.

Mr. Soto. And I believe in American ingenuity. And that's why we are here today. So, thanks for that commitment.

And for you, Mr. Markham, I know our cooperatives are doing a lot, too.

Mr. Markham. Thank you, Congressman Soto.

Central Electric and the cooperatives throughout Oregon, we are about 97 percent carbon-emission-free right now. So, our growth, I think the most important thing in protecting our hydropower that we have right now is a carbon-emission-free resource. That is very critical.

Now the State has been working. It had a carbon plan last year. They are looking at it again in this year's legislative session with the investor-owned utilities and utilities, larger utilities like we are as a coop.

But I think that technology is going to have to improve as far as battery storage because, in Oregon, in my area, for us to have the ability to use more of that, we have to have a week's worth. It can get 10-20 below and stay there for a week. So, we have to have battery technology that can last that long, not just a day.

Mr. Soto. Sure. Thank you for that.

And when we are hearing about forestry management, we see this fine line and this quandary of forest and trees that are some of the best ways for carbon sequestration. But if you don't manage it right, it actually is a net contributor, as we have seen in some of these areas.

And so, my questions are for Dr. Davis and Dr. Collins.

The new California vegetation plan, the wildlife suppression funding, and Forest Management Activities Act that we passed last year, Congressman Schrader's bill, and even in the farm bill, we have put forward new policies. How are those going right now? We will start with you, Dr. Davis.

Mr. Davis. I think it takes a long time for us to learn how to apply policies and to be able to use those, also recognizing that the scale of wildfire issues and the size of the landscape that we are talking about, this is a decadal-century issue, not a year-to-year issue.

Mr. Soto. And, Dr. Collins?

Mr. Collins. I agree with that, very much so. And I think one of the things we struggle with a little bit is the actual probability of wildfire occurrence. In order to realize the benefit of doing some kind of treatment and actually taking carbon off the landscape, it has to burn, frankly, because you are balancing that against the wildfire impacts, and it is really hard to prove. So, it takes that longer-term perspective.

Mr. Soto. Thanks for that.

And I yield back.

Mr. Rush. The gentleman yields back. The chair now recognizes the gentleman from Maryland, Mr. Sarbanes, for 5

minutes.

Mr. Sarbanes. Thank you, Mr. Chairman.

I am going to be pretty brief because, as you can imagine, by this point in the hearing, most of the questions that I have have been asked and answered.

But I thought maybe Mr. MacWilliams, and anybody else who wants to answer, we certainly have talked about managing the forests in order to limit wildfires and the ways that they should. And we have talked about prescribed burning and other measures that are part of a comprehensive and robust management program. But maybe you could speak a little bit to how much the lens is being brought, or maybe it could be brought more effectively, of thinking of the forests in terms of the carbon sink that they represent.

In other words, you could approach -- and I think probably traditionally we have approached these forests -- with the idea of how to limit wildfires, manage the fuel, et cetera. That wouldn't necessarily mean that in the planning you are bringing the lens of how to design the forests and build the forests to maximize the carbon sink potential that these forests have. And I wonder if you could speak to the value of bringing that kind of a lens and perspective in on the front end, so the groundwork of building these management

plans, as opposed to kind of thinking of it as an afterthought.

Mr. MacWilliams. Well, I think from a climate perspective that is absolutely an important point. And I will defer to Dr. Collins and Dr. Davis on the technical side, designing the forest management. But, obviously, forests are a very important sink, and that is why the burnings and the clearings we have seen, particularly in the Amazon and other places, since this is a global problem, are such a concern for us.

In general, I mean, as we have been talking about all day long, we have a very complex problem here, and complex solutions usually do not yield to single solutions. That is why all the things we are talking about here, forest management and all these other climate-related activities, are so important. And that is why leadership, obviously, from the Congress is so important, which is why, personally, I am so encouraged by the bipartisan nature of this hearing.

Mr. Collins. One thing I think you brought up which is kind of interesting is that we need to differentiate between total carbon capacity that a forest could carry versus the stable carbon capacity. And I think that the stable is one that could endure fire and still remain; whereas, the total,

you know, we could keep packing it in there, but it won't last, given the current sort of trajectory for wildfire.

Mr. Davis. And I would just add that we are here talking about wildfire. We are talking about climate. We also have to look at our forests as the source of carbon storage as one lever. There are reactional values, There are cultural resources within these forests, sustainable bioproducts and timber that we can grow to use and renew our cities. There is water filtration and values. There is a recreational economy and rural economies. And looking at these collectively across the forest is really important, so that we don't maximize one set of values right now, and then, try to adapt to a different set of values in five years. We need to look at this as a lasting change.

Mr. Sarbanes. Thanks. I yield back.

Mr. Rush. The gentleman yields back. And the chair now recognizes the gentleman from Arizona, Mr. O'Halleran, for 5 minutes.

Mr. O'Halleran. Thank you, Chairman Rush.

Today's hearing focuses on an issue that greatly impacts the Southwest and Arizona, preventing catastrophic wildfires. I do want to mention that I am in agreement with the gentleman from West Virginia when he talked earlier about

what other countries are contributing more and more CO2 into the atmosphere, even though they have indicated that they want to do less. But that doesn't mean that the United States doesn't lead. If they are not leading and they are so large, then somebody has to lead, and I think our citizens want us to lead.

Arizona CD1 includes all or part of six large national forests and, also, the Grand Canyon, each of which is filled with ecological beauty and plays an important role in Arizona's rural communities and the State's water supply. I have actively supported forest restoration policies for over 15 years. In the Arizona legislature, I chaired the natural resource committee and co-chaired the Governor's Forest Health Oversight Committee, which produced a report with recommendations for stakeholders, local governments, the State, and Congress.

We need to maintain forest health and prevent catastrophic fires today. My office provides active oversight and support for the U.S. Forest Service's Forest Restoration Initiative, 4FRI, the largest restoration effort in our nation. And it does have its problems even after what we have done in the last couple of years.

Last summer, nearly 2,000 acres burned in Flagstaff.

For Arizona, that is a really small fire, but it was in Flagstaff, which surrounded by our national forests. And it was within a block of homes. Luckily, people got to it fast during the Museum Fire. I would like to Arizona's utility partners, State and federal agencies, and our first responders for actively preventing the Museum Fire from worsening into the next tragedy.

The climate threat is real, and we must take every measure possible to prevent future wildfires from devastating our forests, which help our air quality and capture carbon; are critical for the water supply into the future for Arizona and for the Colorado River.

And I do have a question for Dr. Collins. Your testimony highlights the rate of forest restoration efforts nationwide as insufficient. I would be in agreement with that. 4FRI is one of the largest forest restoration efforts nationwide. I would like to see forest thinning in Arizona pick up the pace. They are critical and, also, for economic development in rural areas. What barriers still exist that prevent the pace of forest maintenance?

Mr. Collins. I think we have talked about some of those today. Obviously, things tend to always flow back to funding, right? But one of the things that we haven't talked

about that is kind of interesting in my interactions with folks on the Forest Service as the district level is how much trouble there is internally with regard to the NEPA process itself. And I am not saying that the NEPA process is problematic inherently, but it has gotten so complex that, even within what they call an interdisciplinary team, they cannot agree on priorities. Each specialist -- you know, the aquatic specialist, go on down the line -- each specialist sort of protects their own duty. And as a result, the area for treatment gets trimmed further and further. So, it is amazing to me, we always think about sort of some outside litigants and things like that, but it is actually some of the internal stuff that is really difficult to overcome.

Mr. O'Halleran. And in the case of the Forest Service, they might want to expedite it, but there are other agencies involved all the time.

Mr. Collins. Sure.

Mr. O'Halleran. And that might not be their immediate priority. And so, that lengthens the process also.

Mr. Davis, could you comment on whether the research efforts of the U.S. Forest Service and the rest of the government agencies for productive uses of forest byproducts and biomass are sufficient?

Mr. Davis. There is excellent research being conducted. I do believe that, if we reframe the scale of work that needs to be conducted on our landscapes to invest in research at that scale, we would see an investment in research collaboratively across federal agencies, across private universities, public institutions, NGOs. There is research being done that is advancing this, but I don't think it is at the scale that we need to see to be able to move this into a functioning economy.

Mr. O'Halleran. And then, Doctor, you also highlighted the natural effect of controlled fires leading to an increase in biomass remnants. In our case, biomass, if we can't get rid of it, we can't thin those forests out. That is just a fact. And I just think that we need to get going on that. How can biomass and forest byproducts -- and I am the wrong way, Mr. Chairman. Thank you.

Mr. Rush. The gentleman yields back. The chair now recognizes the gentlelady from Delaware, Ms. Blunt Rochester.

Ms. Blunt Rochester. Thank you, Mr. Chairman.

And thank you so much to the witnesses today.

The science is clear; we must transition to a 100 percent clean economy, energy economy, as quickly as possible if we are going to avoid the worst impacts of climate change.

I hear every day from my constituents in Delaware who are facing the impacts on a daily basis, whether it is our farmers who are suffering from drought or small business owners who rely on tourism that our beaches provide. And as a resident of the State with the lowest -- and I have to get it correct because Florida has challenged me -- but our State has the lowest mean elevation in the country. We see the effects all too well.

Climate change is fueling extreme weather, which impacts every part of our country. And whether it is the wildfires ravaging communities out West or heat waves, extreme drought, or major hurricanes, these events are happening more frequently and more intensively because of climate change. That means that we must have an electricity grid that is resilient and also will keep the power on during these extreme weather events.

I enjoyed the conversation back and forth as well about prescribed burns. In Delaware, we actually have an example where the Nature Conservancy in Delaware conducted a prescribed burn on 20 acres of the Hurley Tract property of Middleford North Preserve in April of 2018. And so, even the conversation about prescribed burn associations was interesting to me.

But my first question is for Mr. MacWilliams. When we look at wildfires in the context of climate change, it is clear that multiple strategies need to be deployed to strengthen the grid. Not all threats will look the same. How does planning for wildfires fit into the broader strategy of planning for climate change?

Mr. MacWilliams. Well, I think planning for wildfires is sort of part and parcel with strengthen a grid, making it more resilient, making it more intelligent, which is required for a number of threats. It is not just wildfires, as you well know. You referred to sea level rise. It is a huge issue. I referred to earlier that, from a technical perspective, cybersecurity threats, some physical security threats are all very similar. So, it is really tied into a broader effort that is very important to make our grid more resilient and more intelligence and, ultimately, more efficient. And so, that, in turn with technology such as microgrids, storage, and other things, will change the generation mix and will facilitate us moving to a lower carbon future.

Ms. Blunt Rochester. You kind of anticipated my next question, which was, as we protect against these multiple threats, how do we ensure that grid planning is

comprehensive?

Mr. MacWilliams. Well, as you well know, energy policy in this country is really a combination of federal, state, and local. At times, that is very helpful, and at times, that could be impediment to large-scale change. In this situation where we are dealing with transmission and interstate commerce, obviously, the federal government has authorities and FERC has substantial authorities. So, that is one way. But I think, as has been said numerous times, building partnerships between federal and state and local authorities is going to be critical here if we are going to solve the complex issue.

Ms. Blunt Rochester. Mr. Johnson, in your testimony you detailed some of the resiliency projects currently underway at PG&E. Are you also pursuing clean options like solar paired with storage? And what do you think is the role of renewables in making communities more resilient?

Mr. Johnson. Thank you for that question.

We are pursuing everything, all of the above, as long as it is clean. To do microgrids, you know, PG&E I think has the most distributed energy resources of any company in the country, something like 450,000 rooftop solar. So, we are familiar with distributed clean. And so, yes, I do think

this will help with resilience. The closer the generation and distribution is to the community, the more resilient it is.

Ms. Blunt Rochester. And that kind of leads to, what efforts are the easiest and fastest to deploy? And what demonstration projects can be easily scaled? And I have 20 seconds.

Mr. Johnson. Yes. So, we know how to scale solar. We do rooftop. We also have big solar. We will deploy some gas generation, but it is renewable gas. So, we will be in the renewable gas business, hooking up microgrids with that kind of technology.

Ms. Blunt Rochester. Thank you so much, and I yield back.

Mr. Rush. The gentlelady yields back. There are two members who have patience and have endured in the hearing for a number of hours now, and they are not members of the subcommittees, but they waived onto the subcommittees. And now, we will recognize the gentleman from Montana, Mr. Gianforte, for 5 minutes.

Mr. Gianforte. Thank you, Mr. Chairman, for holding this hearing and, also, allowing me to participate today.

My home State of Montana exports about half of the

electricity it generates, some from coal, some hydropower, some natural gas, and some from wind. But, no matter what color the energy is, it still moves on a transmission line.

In 2017, we had a devastating fire season all across the West. In Montana alone, we burned 1.2 million acres in 2017.

The first bill I voted on as a new Member of the House was the Electricity Reliability and Forest Protection Act, introduced by my colleague, Representative Zinke, at the time. The bill, now law, makes it easier to perform vegetation management on rights-of-way across federal lands. That bill and other forest management provisions, including the fire borrowing fix, were included in the year-end package that President Trump signed into the law. We are thankful to get some more tools.

Mr. Markham, thank you for being here today. Your coop serves customers in Oregon and is part of a larger organization that stretches across the Pacific Northwest, including Montana. Your members know that transmission lines aren't cheap and neither are fires. What else can Congress do to help ensure you are able to continue delivering affordable, reliable electricity to your customers?

Mr. Markham. Thank you, Congressman from the great State of Montana.

As I mentioned, we are member owners of PNGC Power, 15-member distribution electric cooperatives throughout there. I think the most important thing that we have to make certain is that there is resource adequacy within the Northwest. That is a significant issue right now. We are, obviously, removing a lot of the fossil fuel plants we are replacing -- but are we replacing fast enough? -- with solar wind. And so, that is probably the biggest issue, making certain that there is resource adequacy and capacity.

Mr. Gianforte. So, production capability --

Mr. Markham. Correct.

Mr. Gianforte. -- to keep the grid reliable?

Mr. Markham. Yes, absolutely. Yes.

Mr. Gianforte. Okay. Good.

Well, there has been a lot of talk today about climate change. The solution to addressing climate change is unleashing American innovation, not imposing government regulation. History bears out the successes of American innovation for confronting big challenges. And while we are innovating, we have to remember that we cannot control the weather, but we can control how we manage our forests. Healthy forests sequester carbon and are more resilient to catastrophic wildfires.

We have to promote collaborative approaches that reduce the constant litigation against critical forest management projects that would help us resolve our forest health crisis. We need to modernize the Endangered Species Act. We need to build on President Trump's NEPA reform, so that we can get critical energy infrastructure built and forest management projects approved in a timely manner. These are not theories. They are not academic discussions. These are pragmatic, common-sense steps we can take to bring health back to our forests and reduce the danger of wildfires.

I thank the witnesses for being here today and sharing your experiences. It is very important to us.

And with that, I yield back.

Mr. Rush. The gentleman yields back. The chair now recognizes the chairman of the Subcommittee on Health, the gentlelady from California, Ms. Eshoo, for 5 minutes.

Ms. Eshoo. Thank you, Mr. Chairman, and to the ranking member, for allowing me to waive onto the subcommittees today.

And thank you to each of the witnesses. I have been here for a while and I have been listening hard, and I have learned a great deal from you. So, thank you.

I want to start today by -- I know that the title of the

hearing is "The Impact of Wildfires on our Power Sector and the Environment". I want to kind of rename it, if I might, "The Impact of Wildfires on our Power Sector and our Power Sector on Us," because we have had some real problems.

For the rest of you, I am a Californian and I know that Mr. Johnson knows this. Now I have some questions for you, Mr. Johnson. I am going to give you my questions first, and then, allow you the time to answer them.

I don't presuppose that everyone in Washington, D.C., knows who PG&E is or what they have done. Now Californians know it. I certainly know it, and my constituents have lived it.

In your testimony on page 3, you indicate that it will take 12 to 14 years -- 12 to 14 years -- to harden and strengthen the grid. That timeframe implies that you have deferred a lot of maintenance over the last 10 years. So, my first question is, why didn't the deferred maintenance happen and why was this allowed to happen?

Secondly, how are ratepayers to be convinced that these preemptive blackouts, which have just caused hell in people's lives, in plain English -- these preventive preemptive blackouts, are they really based on good science and careful assessment of safety concerns, and not just simply PG&E

turning off the juice to shield the company and its shareholders from legal liability, and not protect the ratepayers and Californians from possible fires? There is a great deal of trust that has been lost between the utility and people. I also would like to know, how can ratepayers be confident that you are putting safety first when you have only hardened 3 percent -- 3 percent -- of your systems in high-risk areas?

And something that was notable last fall in part of my congressional district in Santa Cruz County, which I think you are aware of, they discovered that PG&E's list of critical facilities was incomplete and, notably -- notably -- excluding a local hospital. Now this is, you know, it is like you can just blow a hole through the ceiling with that one. So, I would like to know what steps you have taken to ensure that these lists are correct.

You can start with strengthening the grid, the deferred maintenance. And then, on to the preemptive blackouts, is it science or is it turning off the juice for the reasons that I stated? And then, obviously, your lists, have you updated them? Are they correct? As well as ratepayers being confident that you are putting safety first.

Mr. Johnson. Well, thank you for those questions. I

will try to respond.

Ms. Eshoo. You are nice to say, "Thank you."

[Laughter.]

Mr. Johnson. I will try to answer them in order.

Ms. Eshoo. Okay.

Mr. Johnson. First of all, the 12 to 14 years is not an issue of deferred maintenance. It is an issue of putting up new conductor that is covered wire. So, this is a new project. This is not --

Ms. Eshoo. Are you suggesting that you did not, that PG&E did not defer maintenance?

Mr. Johnson. I am just saying, on this particular thing, the 12 to 14 years is part of a plan we --

Ms. Eshoo. Well, I remind everyone that there were, not under your watch but previously, six felony charges against PG&E for the homes exploding and people's lives lost in San Bruno, California. That was a direct result of deferred maintenance. How about no maintenance, I would say. But, at any rate, go ahead.

Mr. Johnson. I cannot speak to that. That was a decade before I got there.

Ms. Eshoo. I said -- okay.

Mr. Johnson. But I am familiar with it. The 12 to 14

in the testimony refers to a new project, not to deferred maintenance.

On the preemptive blackouts, so you know about our company and you know that in the last couple of years our equipment was involved in the fatality of 100 people. And so, when we came to the fire season this year, I wanted to make sure that we had a program that was based on science, sound science, filed with the Commission, that we would protect public life and public property. And we did achieve that. Now we did it at a cost, and that is your point.

But these were not just made up out of the air. We have a very precise algorithm that takes into account wind speed, wind direction, humidity, fuel content, all these things, based on very significant meteorology input. And so, I do understand the point that where you are standing or living there might not be any weather, but your power is off. And that is because of the way the transmission system is built and the distribution system. Somewhere a line connected to your house was in those conditions that was a fire risk. So, there is no trying to get around the liability rules or anything else. This is based purely on the science and on the methodology that we filed with the Commission.

Can the ratepayers be confident we are putting safety

first? I think they can. We only did 3 percent of the system. It was the first year. We are going to do a lot more of the system as time goes on. These are new programs.

Ms. Eshoo. And what year do you anticipate 100 percent?

Mr. Rush. The gentlelady's time is up.

Ms. Eshoo. Can he answer? Can he answer?

Mr. Rush. Yes.

Mr. Johnson. Long after I retire. I would say not 10 years. I think one thing we learned this year is we have to get these programs shorten, in place quicker. So, maybe five to seven years, but shorter.

Ms. Eshoo. Thank you, Mr. Chairman. I will submit the rest of my questions to the witnesses in writing. Thank you.

Mr. Rush. The gentlelady yields back. The chair now recognizes the gentleman from Texas, Mr. Veasey, for 5 minutes.

Mr. Veasey. Thank you very much, Mr. Chair.

While the wildfires in California and Australia have been dominating the news, we have had our issues, too. And we try to be very responsible in Texas about how we have put renewable energy on our grid. We have done a great job of it, too, and being able to keep safety first and foremost as well. But that doesn't mean that we haven't had issues

because of the power lines.

We have had about 4,000 wildfires in Texas that have been caused by power lines. And in the aftermath of some really bad fires that we had in 2011 that were caused by electric distribution lines, the legislature in the State authorized the Texas Power Line Caused Wildfire Mitigation Project. The project aimed to study the causes and possible solutions to wildfires. They found that, while most utilities' initiatives to harden physical structures through things like better poles and covered wires were steps in the right direction, they ended up being insufficient.

In addition to shoring up the physical infrastructure and reducing foliage near lines, the group suggested using more advanced technologies and big data to detect, and even forecast, when failures might occur. My understanding is that it is difficult to statistically predict failures of distribution circuits because components that are designed to last 40 years in service very rarely fail.

And so, my question to the panel today is, what advances have been made in using remote sensors and big data to more reliably detect or even predict events or other failures before they have a chance to start fires?

Mr. Johnson. Let me try a little bit of that.

Actually, in your home State, at Texas A&M there is a lot of work going on on this particular item --

Mr. Veasey. Absolutely.

Mr. Johnson. -- using really artificial intelligence to be able to predict when we are going to have a fault on a distribution line. And so, that is in the field being tested.

And the other thing, historically, utilities like ours have back-cast and looked at historical data. We are now learning that big data is a much better tool for projecting forward. And I think you will see we are starting to deploy that in our own wildfire program. So, there is a big impact.

Mr. Veasey. Anyone else?

Mr. MacWilliams. I would just add, one of the reasons that I have stressed the role of the National Labs is, as you all know, the National Labs, several of them in particular, including Bay Area labs, are the home of the largest supercomputers in the United States. And so, there is a lot of work being done on new computing architectures using big data and data analytics and deep learning to build what they refer to as cognitive simulation. And those are exactly the technologies you are referring to, which I believe are quite applicable to fire prevention.

Mr. Veasey. In order to make sure that safety is being maintained responsibly, does the safety component of making sure that this infrastructure is being maintained properly, does it need to be completely separate from the way the rest of the electric distribution is run in the state? Does it need to be a completely separate entity for people that don't necessarily have anything to do with anything else surrounding electric distribution and what goes on the grid, but just something that is a completely different safety component that is independent of anything else political that may be happening in any state surrounding a grid?

Mr. Johnson. I don't know the answer to that question. Maybe my colleague in operations at the end does here.

Mr. Markham. I can say that, in Oregon, we have the Oregon Public Utility Commission that oversees electric cooperatives, all utilities, for safety. They actually come out in the field.

We know our system better than anybody else, our line personnel, employees who have been there 20-30 years. We know the nuances. We know where we need to focus our maintenance plans and hardening plans every year.

The Public Utility Commission has strict requirements on what we need to do for safety every year. And then, they

come out and check us on that. So, they are an independent party, and then, it is our job to make sure that the safety is being employed.

Mr. Veasey. Any thoughts, in particular, on PG&E and them separating the safety component versus the other aspects of the business?

[No response.]

Thank you. I yield back.

Mr. Rush. The gentleman yields back. The chair now recognizes the gentleman from California, Mr. Cardenas, for 5 minutes.

Mr. Cardenas. Thank you very much, Mr. Chairman, and thank you for holding this very important hearing on this critical matter, and all the other chairmen and ranking members of the committees.

I want to touch base -- it wasn't going to be my first question, but since Ms. Eshoo touched on it. This question is for Mr. Johnson over at PG&E. Does the CPUC have any authority or any actions that they need to take before a company like yours can actually invest and/or do maintenance or management of your system? The California Public Utilities Commission --

Mr. Johnson. Yes, yes.

Mr. Cardenas. -- for those people who don't know what CPUC is.

Mr. Johnson. Yes, typically, the way that works is that you go to the Commission with a project. They approve it and they approve the rates that you would need to collect to recover it, yes.

Mr. Cardenas. So, you go to them on Monday and, by Friday, they have it done? The answer? I want to educate the people of what happens.

Mr. Johnson. Oh, no. No, it is --

Mr. Cardenas. It is important.

Mr. Johnson. It is a year later.

Mr. Cardenas. Okay. A year later?

Mr. Johnson. Yes.

Mr. Cardenas. Okay. Now a year later to get an answer?

Mr. Johnson. Yes.

Mr. Cardenas. It doesn't mean that a year later you get the answer and they say, "Okay, go cut that forest back and make it safer," right? Sometimes they say no on a safety matter?

Mr. Johnson. Yes. Typically, you don't ever get what you ask for and you negotiate a solution over that period of time.

Mr. Cardenas. Okay. And that is one of the things that is unfortunate. The public sees a fire erupt, and then, people just want to focus on the moment. And the fact of the matter is there are a lot of factors -- good, bad, and otherwise -- that go into the scenario and the situation at hand at the moment.

I happen to know a little bit about the CPUC because I spent six years in the State legislature, and I was a bit surprised when sometimes some of the organizations, private institutions that, rightfully so, want to protect the forests, et cetera, and some people have just never seen a dead tree or a live tree that they would want any human being to touch.

And the fact of the matter is, that leads into my next question when it comes to fuel loads. And this question is to Dr. Davis. When it comes to fuel loads and these drought-changing conditions that we are experiencing more and more, and we seem to have catastrophic fires, what is a megafire? Why would they label something a megafire? Is that term used these days?

Mr. Davis. It is a term that has really gained a lot in modern vocabulary, recognizing the size, the number of acres --

Mr. Cardenas. Because there is a greater frequency of megafires today than perhaps we were recording decades ago?

Mr. Davis. Correct.

Mr. Cardenas. Is what is going on in Australia, is that in any way categorized as a megafire?

Mr. Davis. I think what we see in California is that this is a fire-driven ecosystem that has had larger fuel loads and prolonged drying conditions that we have seen elsewhere. So, it would move into that same category.

Mr. Cardenas. So, when people say fires have been going on since the beginning of time, that is a fact.

Mr. Davis. Yes.

Mr. Cardenas. But, at the same time, what human beings can do or not do to help mitigate and reduce the potential for an eruption of a fire and/or the short-term and long-lasting effects of the fire getting to be the point where it is, instead of tens of thousands of acres, fires could now be to the tune of hundreds of thousands of acres, even millions of acres, that we have seen more and more frequently?

Mr. Davis. That is the result of more fuel on the landscape, those drier conditions, and, also, where we communicate differently than we did 25 or 50 years ago. So, we are aware at that global scale, or even a regional scale,

of those issues.

Mr. Cardenas. Are there examples in other countries around the world where they are actually taking human mitigation, legislation, et cetera, and doing a better management in pockets of the world, or at least examples that perhaps we can learn from here in the United States?

Mr. Davis. I think there are examples around the world. There are examples around the United States where there are proactive approaches. We heard earlier of examples in the Southeastern United States where familiarity with prescribed burning and with smoke awareness allows for a different conversation. We are see this more emerging, as Dr. Collins mentioned, in California as a readiness to accept treatments on the landscape over that long term that we have to apply them.

Mr. Cardenas. Mexico doesn't have the best reputation of having government and/or public partnerships that actually result in good management or good practices, but it is my understanding that Mexico has some pretty enlightening examples of them with their private landowners and their federal government working with them, allowing them to do forest management. There are some examples in Mexico that have rung to be true and good practice?

Mr. Davis. I am not familiar with the situation.

Mr. Cardenas. Anybody at the table?

[No response.]

Okay. I read a document about that. It was an anecdotal. I just wanted to point that out because one of the biggest problems we have in the United States of America, we always think that we do everything better than everybody else; that we don't want to learn from other countries, and that is unfortunate. That is a bit too myopic and it is selfish and ignorant.

So, I yield back. My time has expired.

Mr. Rush. The gentleman yields back.

And the chair requests unanimous consent to enter the following articles into the record: a letter from the Edison Electric Institute; a letter from Jupiter Intelligence; a letter from the Western Governors' Association; an article from The New York Times; an article from the National Public Radio, and an article from CNN.

Hearing no objections, so ordered.

[The information follows:]

********** COMMITTEE INSERT **********

Mr. Rush. This concludes the witnesses' statements, and I would like to thank each and every one of the witnesses for your participation in today's hearing. And as you travel to your destinations, I wish that you travel with grace and arrive safely at your destination.

I remind members that, pursuant to committee rules, they have 10 business days to submit additional questions for the record to be answered by the witnesses who have appeared before us today. And I ask each witness to respond promptly to any such questions that you may receive. And at this time, the subcommittees stand adjourned.

[Whereupon, at 1:56 p.m., the subcommittees were adjourned.]