OUT OF CONTROL: THE IMPACT OF WILDFIRES ON OUR POWER SECTOR AND THE ENVIRONMENT

JOINT HEARING

BEFORE THE

SUBCOMMITTEE ON ENERGY
AND THE
SUBCOMMITTEE ON ENVIRONMENT AND CLIMATE CHANGE

OF THE

COMMITTEE ON ENERGY AND COMMERCE
HOUSE OF REPRESENTATIVES

ONE HUNDRED SIXTEENTH CONGRESS

SECOND SESSION

JANUARY 28, 2020

Serial No. 116–91

Printed for the use of the Committee on Energy and Commerce
govinfo.gov/committee/house-energy
energycommerce.house.gov

U.S. GOVERNMENT PUBLISHING OFFICE
48–685 PDF WASHINGTON : 2023

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C O N T E N T S

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, DC.

The subcommittees met, pursuant to call, at 10:01 a.m., in the John D. Dingell 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, Barragán, McEachin, Blunt Rochester, Soto, O'Halleran, Pallone (ex officio), Walden (subcommittee ranking member), Upton, Shimkus, Latta, Rodgers, McKinley, Kinzinger, Griffith, Johnson, Long, Bucshon, Flores, Mullin, Hudson, Walberg, Carter, and Duncan.

Also present: Representatives Eshoo, Cárdenas, and Gianforte.

Staff present: Jeffrey C. Carroll, Staff Director; Catherine Giliohann, FERG Detailee; 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 Analyst; Elysa Montfort, Press Secretary; Joe Orlando, Staff Assistant; 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.

OPENING STATEMENT OF HON. BOBBY L. RUSH, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF ILLINOIS

Good morning again.

Today, the committee convenes 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 seven 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 and 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.

[The prepared statement of Mr. Rush follows:]

PREPARED STATEMENT OF HON. BOBBY L. RUSH

Good morning, today the Committee convenes for a joint subcommittee hearing to conduct oversight of an issue ravaging communities and plaguing the environment.

Often occurring on our nation's west coast, an average of 73,000 wildfires burn seven million acres of U.S. land each year. Though these fires are, in some cases, part of healthy ecosystems, their destruction has devastated communities, both here, at home, and around the world.

In this room alone, we have representation from areas recently hard hit by wildfires. This includes my colleagues from California, Oregon, Washington, and Colorado. Additionally, we are joined by a member of my staff from Australia whose community is still feeling the impact of recent wildfires.

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 average by mid-century. Factors contributing to this projected 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 unthinkable destruction to homes and properties. Of the known causes of California's most disastrous fires, one half are linked to electric utility infrastructure. High winds, in particular, blow nearby vegetation into power lines and snap aging electrical infrastructure causing live wires to fall and ignite fires.

Since 2007, California regulators have permitted the use of Public Safety Power Shut-offs 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 lengthy blackouts pose a risk to vulnerable populations and other ratepayers.

I thank our witnesses for their participation in today's hearing and look forward to identifying concrete solution to these daunting problems. And now, it is my district honor to recognize, for the purposes of an opening statement, my friend from the great State of Michigan, With that, Mr. Upton.

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.

OPENING STATEMENT OF HON. FRED UPTON, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF MICHIGAN

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 in 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 right-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 in 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 in gathering 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.

[The prepared statement of Mr. Upton follows:]

PREPARED STATEMENT OF HON. FRED UPTON

Thank you, Mr. Chairman, for holding today's hearing to examine the impact of the recent wildfires and discuss ways to improve forest management and maintain electrical equipment to prevent fires and reduce risks to human health and the environment.

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 playing a role, but

the evidence suggests that our direct impact to the land and the way we manage our forests has much more to do with the situation we are facing today.

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 strengthen planning and preparedness as the State and local 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.

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 and reduce the risk of fires. There are many steps we can take immediately—including thinning of brush, prescribed burns, and allowing some wildfires to run their course naturally.

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. I look forward to hearing from Mr. Johnson and Mr. Markham about what utilities can do to manage hazard 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, and 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 to 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 prevents utilities from clearing hazard trees, we should address them. Much of the focus of today's hearing will be on California, and the challenges they are experiencing with their electric utilities.

While the fires themselves are devastating, millions of residents in California have also been suffering through "public safety power shutoffs" in 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, healthcare, transportation, and other government services.

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

The bottom line is that we need to make sure 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 we should treat wildfires like severe weather and cyber-attacks. We need to be laser focused on the threat, and make sure we have tools in place across the board to protect, respond, and recover to wildfires when they occur.

With that, I look forward to today's testimony and continuing the conversation with my colleagues about some legislative solutions. I would note that we have several bills addressing grid reliability and pipeline security, which would strengthen the Department of Energy's ability to respond to natural disasters like wildfires. I hope to get those bills to the floor soon, but they are one of many steps we can take.

Thank you, 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.

OPENING STATEMENT OF HON. PAUL TONKO, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NEW YORK

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 the 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 sink, 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.

[The prepared statement of Mr. Tonko follows:]

PREPARED STATEMENT OF HON. PAUL 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.

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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 harden our systems.

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

Mr. CÁRDENAS. 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, and business. From January to October 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.

OPENING STATEMENT OF HON. JOHN SHIMKUS, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF ILLINOIS

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. The 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 the 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 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

fieldwork 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 the adaptive capacity of communities going forward.

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

[The prepared statement of Mr. Shimkus follow:]

PREPARED STATEMENT OF HON. JOHN SHIMKUS

Today's hearing will review the risks and harms of wildfires and what may be done to address these risks. The general focus concerns the role of the electric power infrastructure, which has been linked to destructive fires, especially in California in recent years.

Orienting our focus around the power sector should be useful for the Subcommittees, both from the energy and environment policy perspectives. It should help inform a better understanding of what it takes to reduce wildfire risks and improve the resilience 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 should help us focus on future risks in a practical way. When we talk about addressing long term climate risks, for example, a big part of the discussion must involve what is needed to provide for the adaptive capacity of communities to reduce, respond, and recover from impacts of those risks.

Part of this capacity involves ensuring the economic wherewithal of communities to respond to risks. Another part involves ensuring effective information and permitting for timely decisions that enable for 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 the PG&E's exercising the communications and outreach during its power outages has been to better prepare the communication and response for catastrophic events like earthquakes.

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regional fire events that impact multiple states. It's 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 preventive measures such as prescribed burns, mechanical thinning and related practices would be useful today.

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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 risks.

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

For federal and state policymakers there is also the 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, environmental 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 risks and ensure adaptive capacity of communities going forward.

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.

OPENING STATEMENT OF HON. FRANK PALLONE, JR., A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NEW JERSEY

Mr. PALLONE. 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 they claims lives and property and decimate 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 associ-

ated 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.

[The prepared statement of Mr. Pallone follows:]

PREPARED STATEMENT OF HON. FRANK PALLONE, JR.

This is an important hearing today as we examine the impact of wildfires on our energy infrastructure and the environment. Wildfires are becoming more frequent, more dangerous, and more destructive due to the impacts of climate change.

It is not only the United States that is affected by these fires. Catastrophic wildfires continue to rage in Australia, claiming lives and property and decimating unique wildlife and habitats. The costs of these events are tremendous, and they continue to rise.

Fire is and has been part of the lifecycle of many ecosystems. But inadequate management, coupled with the expansion of communities and infrastructure into fire-prone areas, have increased fire risks. 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 1970s, the average annual number of large wildfires in the western United States has tripled and the area burned is six times greater. Last year, nearly 50,000 wildfires burned nearly 4.6 million acres throughout the United States. 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 must do more to ensure their systems are modernized and maintained to prevent sparking wildfires. 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 must reduce fire risks associated with infrastructure located in fire-prone areas. We must 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 this problem. We must act.

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.

OPENING STATEMENT OF HON. GREG WALDEN, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF OREGON

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 hometown, 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 two 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 three 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.

[The prepared statement of Mr. Walden follows:]

PREPARED STATEMENT OF HON. GREG WALDEN

Today's joint subcommittee hearing on wildfire impacts returns to an important topic for the Committee-and vitally important for tens of millions of people, especially Oregonians, Californians, and those across the West who have been experiencing massive devastation from these catastrophic fires.

When we last held a hearing on this topic in September 2018, my home state of Oregon for the second year in a row was battling near record wildfires. Communities in my district experienced some of the worst air quality in the world, while also suffering significant economic impact as tourists went elsewhere.

Just two months after the hearing, California suffered the tragically 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.

This past year we witnessed how this risk reduction practice put two million people in the dark just as windstorms were threatening new wildfires. And news reports suggest this may become the norm in coming years. But we also know this strategy is not without negative consequences for people who have special medical needs that require electricity without interruption.

Meanwhile, government red tape continues to stand in the way of common-sense hazard tree removal or grid safety improvements in utility right of ways.

We're joined today by Dave Markham of Central Electric Cooperative in Redmond Oregon. Central Electric's service territory is 56 percent on federal land. I know he'll speak to the challenges that presents later, but I want to share this photo he showed me earlier.

Last year Central Electric applied to move the power pole in this photo 20 feet to mitigate against wildfire. The new location would be safer and more accessible. The Forest Service didn't get to their application until October, and then Central Electric missed the short window to move the pole.

Delays in these sorts of maintenance efforts can have deadly consequences, especially when combined with our poorly managed federal forests waiting to burn. Something has to change.

While climate plays a role, I think the evidence remains overwhelming that increasingly intense fires seasons are driven by the decades of poor management that has left our federal forests overstocked with trees.

For example, OSU forestry professor John Bailey testified before us two years ago that tree stand densities in the driest areas of eastern Oregon would naturally be as low as 20 trees per acre, but those forests today could have upwards of a thousand trees per acre. Think about that for a minute—20 trees versus 1,000 trees.

When fire strikes, that excess ends up as smoke and carbon in our atmosphere. We know from Forest Service and EPA data that in 2015 in Oregon we burned 685,000 acres, which emitted the equivalent of three million cars, or 3.5 coal fired plants.

Nationwide since 2015, we've burned 39 million acres. Following the same pattern that would be emissions roughly equal to 170 million cars or 199 coal fired plants.

Taking sensible steps to improve NEPA and increase the pace and scale of forest management activities that thin out our forests is a win for our forests, the climate, and the health of our communities and citizens.

A 2014 study by the U.S. Forest Service, the Sierra Nevada Conservancy, and The Nature Conservancy found that fuel treatment projects can reduce the size and intensity of fire between 30 and 76 percent.

Treatment also helps reduce carbon emissions from these fires by up to 85 percent. This is among the reasons why the UN's climate panel recommends forest management as a key tool for addressing climate risks.

The good news is, we have measures like the Resilient Federal Forests Act that we can enact right now, this year to help propel smarter forest management practices, reduce the risk of wildfire and ensure that we clean up after fires and replant our forests for future generations.

Rather than pursue grand climate schemes that cannot become law, we should focus this Congress on practical measures, like forest management where we have made some bipartisan progress in recent years, but plenty of meaningful work remains.

Turning back to energy infrastructure, we should look also look today at technology and practices that can reduce inherent risks in the power sector and increase reliability and resilience during fire emergencies.

Our panel offers an array of experience that can help work through core issues like fire management, resilience, the intersection of our electric infrastructure with

fire risks and public safety, the prospects of advancing technology to minimize risks, and to more rapidly respond and recover from wildfires.

I look forward to your insights.

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 D. JOHNSON, CEO AND PRESIDENT, PG&E CORPORATION; JOHN J. MACWILLIAMS, SENIOR FELLOW, CENTER ON GLOBAL ENERGY POLICY, COLUMBIA UNIVERSITY; ANTHONY S. DAVIS, Ph.D., INTERIM DEAN, COLLEGE OF FORESTRY, OREGON STATE UNIVERSITY; BRANDON M. COLLINS Ph.D, 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 D. 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 pro-

viding 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, economy wide 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:]

Testimony of William D. Johnson
Chief Executive Officer and President
PG&E Corporation
Before the
Committee on Energy and Commerce
Subcommittee on Energy and
Subcommittee on Environment and Climate Change
United States House of Representatives
on the "Out of Control: The Impact of Wildfires on our Power Sector and the Environment."

January 28, 2020

Good morning Chairman Rush, Chairman Tonko, and Chairman Pallone, and Ranking Member Upton, Ranking Member Shimkus, and Ranking Member Walden, and members of both subcommittees. My name is Bill Johnson, and I am Chief Executive Officer and President of PG&E Corporation.

I am pleased to appear before the House Energy and Commerce joint subcommittee hearing on the impact of wildfires on energy infrastructure and the environment entitled: "Out of Control: The Impact of Wildfires on our Power Sector and the Environment." PG&E appreciates the time and consideration the committee and Congress are giving to wildfire mitigation, grid reliability, resilience, and other clean energy solutions.

PG&E Corporation is a holding company headquartered in San Francisco, California. It is the parent company of Pacific Gas and Electric Company (PG&E), an energy utility with approximately 23,000 employees, which operates and maintains more than 100,000 miles of electric transmission and distribution lines, and 49,200 miles of gas transmission and distribution lines, delivering energy service to 16 million Californians across a 70,000-square-mile service area in Northern and Central California.

PG&E is focused on the critical role it plays in preventing wildfires caused by electrical equipment. We understand the urgency of this situation and the consequences for our communities. The safety of the communities in Northern and Central California that we have the privilege to serve drives the expansive effort to reduce wildfire risk PG&E is undertaking. PG&E also recognizes that it takes collective effort to prevent wildfires, and we welcome the input and feedback of our communities, customers, representative leaders, first responders, and others to collaboratively solve the unprecedented wildfire risk facing our state.

For more than a century, all of PG&E's equipment, technology, processes, procedures, and expertise have been developed with the goal of keeping the energy flowing with as few interruptions as possible over a large and geographically complex service territory.

More recently, PG&E is proud to have partnered with the state of California and our customers to mitigate the climate challenge by delivering electricity that is nearly 80 percent free of greenhouse gas emissions, while at the same time improving the reliability of our system.

Yet within that same time period, California experienced several climate-driven events that contributed to dramatic changes in the environmental conditions in which our assets operate. These circumstances contributed to the largest, most destructive, and deadliest wildfires in the state's history.

These wildfires have been tragic and devastating. PG&E acknowledges the role our equipment had in some of those fires, and we are deeply sorry. We are committed to helping those communities recover and rebuild, and we are taking action to address the increased wildfire threat in which our infrastructure now operates. Now more than ever, PG&E's commitment to safety must also include meeting the challenge of climate change, both mitigating and adapting to its impacts, and increasing the resilience of our infrastructure to all hazards.

Wildfire Risk is Increasing

Like any home, building or other infrastructure, electric transmission and distribution lines and related infrastructure are vulnerable to extreme weather conditions, including winds over 70 miles per hour. This creates conditions in which utility equipment can come in contact with surrounding vegetation, utility assets or other objects, potentially resulting in wildfires.

Over recent years, California has experienced a prolonged, record drought, unprecedented tree mortality, heat waves, and changing Diablo offshore winds that have resulted in a significant and an unforeseen increase in the wildfire threat and the number of wildfires.

Between 2010 and 2018, according to the U.S. 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.

Moreover, as air temperatures rise, forests and land are drying out, increasing fire risks and creating weather conditions that readily facilitate the rapid expansion of fires. In fact, just seven years ago, only 15 percent of PG&E's service area was designated as having an elevated wildfire risk. Today, more than 50 percent of PG&E's service area is designated as a high fire-threat area by the California Public Utilities Commission (CPUC) and CAL FIRE. This means that now, over 30,000 miles of PG&E's electric assets are exposed to a higher wildfire risk – more than a tripling of the threat in less than a decade.

California's Fourth Climate Change Assessment, released in 2018, estimates that the wildfire risk across California could worsen, with large wildfires becoming 50 percent more frequent by the end of the century.

In short, the past is no longer a predictor of the future as we experience the increased risk, magnitude and devastating impacts of wildfires. PG&E is adapting to this new reality expeditiously and transparently.

PG&E is Addressing the Wildfire Threat Through its Wildfire Safety Plan

Building upon additional safety precautions the company began implementing in 2017, and through benchmarking best practices from our peers both here and abroad, including San Diego Gas and Electric, PG&E developed and received approval for its 2019 Wildfire Safety Plan from the CPUC.

The plan expanded and enhanced additional safety precautions given the increased and growing wildfire threat, and it is comprised of three key elements: 1) bolstered situational awareness, wildfire prevention and emergency response efforts; 2) new safety measures that include accelerated safety inspections, enhanced vegetation management, and Public Safety Power Shutoffs (PSPS), and 3) doing more over the long-term to harden the electric system to help reduce wildfire threats and increase resilience for our customers and communities.

The core elements of the Wildfire Safety Plan work together to comprehensively address the known fire ignition causes from electrical equipment, such as contact with vegetation, and prioritize mitigations based on the consequences of ignitions, such as population density and limited egress.

The highest historical driver of wildfire ignitions from utility infrastructure is vegetation coming into contact with distribution powerlines. The Wildfire Safety Plan addresses this risk through several important measures, including:

- Enhanced vegetation management work in the high fire-threat areas;
- Initiating PSPS, or de-energization events, when the weather conditions, including windspeed, could cause vegetation outside of our right-of-way to contact our lines;
- Situational awareness and weather monitoring to help us better understand the likelihood and consequence of ignitions from our electric infrastructure to prioritize investment and guide PSPS decision making; and
- System hardening investments such as using covered wire to prevent an arc when vegetation makes contact with powerlines.

To date, PG&E has undertaken a significant amount of work and made tremendous progress. For example, PG&E has installed more than 600 weather stations and 140 high-definition cameras across its service area. PG&E will continue to expand these networks to enhance weather forecasting and modeling and improve the company's ability to predict and respond to extreme wildfire danger. PG&E is on track to install a total of 1,300 weather stations and 600 cameras by 2022, a density of one weather station roughly every 20 circuit miles and video coverage of roughly 90 percent of the high-risk areas.

PG&E analyzes this data at its Wildfire Safety Operations Center (WSOC), which serves as PG&E's 24/7 hub for monitoring wildfire risks and coordinating prevention and response efforts across Northern and Central California.

We also finished an unprecedented process to inspect every element of our electric system within the high fire-threat areas in 2019, comprised of almost 750,000 transmission, distribution and substation structures and over 25 million electrical components in those areas. We climbed structures, used drones and helicopters, and performed approximately18 months' worth of inspections in only four months.

Whenever we found equipment that needed immediate repair, we fixed or replaced it. Through this process we have validated that the health of every piece of electrical equipment within and next to the high fire-threat areas is suitable to serve our customers and the broader system.

To manage vegetation risks along our rights-of-way alone, PG&E has spent approximately $3.8 billion since 2009. Our vegetation clearance efforts continue to meet important state and federal vegetation and fire safety standards through routine vegetation management work. State requirements for distribution lines require clearances of 4 feet in high fire-threat areas, with recommended minimum clearances of 12 feet or more at time of prune to ensure compliance year-round.

PG&E is taking this work a step further to proactively address forest health management and fire risk reduction, including analyzing tree failure patterns across different species; using advanced detection techniques to help predict tree failures; and patrolling of power lines in high danger areas. In total, in 2019 PG&E hired more than 2,000 additional contractors, most of whom are qualified IBEW represented members, and employees to conduct this important vegetation work.

Beginning in 2017, PG&E disabled automatic reclosing in high fire-threat areas during wildfire season and periods of high fire-risk. Automatic reclosers are used on distribution lines to detect and interrupt momentary faults to maintain reliability but can result in a fire ignition under certain conditions. PG&E is upgrading more reclosers and circuit breakers with remote control capabilities.

PG&E is installing stronger and more resilient poles and covered power lines and performing targeted undergrounding, starting in areas with the highest fire risk, ultimately upgrading and strengthening approximately 7,100 miles over the next 12-14 years. To date, PG&E has completed 188 miles of hardening work.

Also included in the 2019 plan is an expansion of the PSPS program to include all electric lines that pass through high fire-threat areas – both transmission and distribution – and the creation of temporary microgrids or "resilience zones" that can power central community resources during PSPS events or keep some customers from being impacted by a PSPS event entirely.

Incorporating the lessons learned and new information obtained from the 2019 wildfire season and the associated PSPS events, PG&E is continuing to refine its wildfire risk reduction strategies and will be filing an updated 2020 Wildfire Mitigation Plan with the California Wildfire Safety Division in February.

Public Safety Power Shutoffs are An Important Tool for Wildfire Risk Mitigation and PG&E is Working Hard to Reduce the Impact on Customers

Proactive de-energization to reduce the threat of catastrophic wildfires when certain weather conditions (e.g., Red Flag Warnings, high winds, low humidity levels, and condition of vegetation) are present that have the potential to damage our powerlines and other equipment is a recognized best practice and required in PG&E's CPUC-approved Wildfire Safety Plan.

Before last year's wildfire season, PG&E began an aggressive outreach campaign to increase awareness and preparedness with first responders, local communities, and customers for such outages. This outreach included distributing over 18.8 million PSPS-related direct mail pieces and 17.1 million emails, as well as conducting over 1,000 in-person stakeholder meetings, 23 open houses, 17 workshops, and 6 webinars.

Throughout PSPS events, PG&E works in partnership with first responders, impacted counties and tribes in real time, while continually working to improve our communications about PSPS events with customers. That includes providing as much notice as possible of a potential PSPS event to those impacted, 48 hours when possible, as well as notifying those that will not be impacted as our event evolves.

During these events, PG&E provides support to customers including through Community Resource Centers, where restrooms, bottled water, coffee, snacks, electronic-device charging, and air-conditioning are available.

Before a PSPS event, crews visually inspect PG&E's powerlines that are in scope for a potential event to provide on-the-ground conditions that factor into our decision making. After the weather clears and it is safe, crews again inspect the impacted power lines and make any necessary repairs or corrective actions, so that an ignition does not occur upon re-energization.

As we continued the program during the 2019 wildfire season, PG&E experienced challenges and incorporated lessons learned in subsequent events. Those include improved capacity to respond to customer call volume and web traffic, better coordination with local counties, and increased support for impacted customers. For example, we expanded the services offered at our Community Resource Centers, deployed temporary generation, including up to 65 megawatts during the late October events, and began testing infrared technology to conduct inspections at night in order to reduce restoration times.

Last year, millions of PG&E's customers were impacted by nine PSPS events, which were very disruptive to people's daily lives, challenged essential systems our society depends on, and put vulnerable customers at temporary risk.

Ultimately, PG&E's PSPS program, and its broader wildfire safety efforts, achieved our goal in preventing loss of life and a reduction in ignitions from electric infrastructure, despite some of the most extreme fire season conditions that our region has seen in decades and the wind-related damages to our system that could have resulted in a fire

had the power been on. The shutoffs were the right thing to do for public safety, even as it is not the way PG&E wants to serve its customers.

Throughout these events, our most important responsibility is the safety of the customers and communities we serve. We can and will improve our execution through better pre-planning and coordination with first responders and government partners, and by better anticipating the needs of PG&E's vulnerable customers. PG&E is conducting in depth, in-person PSPS listening sessions with impacted counties and tribes to incorporate feedback and lessons learned, as we work to make these shutoffs less impactful in the future. Going forward, we will continue hosting open houses for community members to learn about wildfire preparedness and will conduct Town Hall meetings at various locations in the high fire-threat areas attended by at least one officer of the company to share safety and service-related information and gather community feedback.

We know that our work will never be done when it comes to protecting human life and public safety – and we are determined to get it right. At the same time, we know with just as much certainty that repeatedly turning off the power for millions of people in one of the most advanced economies in the world – even in the interests of safety – is not a sustainable solution to the wildfire threats we face.

PG&E is Deploying Customer-Centric Solutions to Increase Overall Resilience

I want to assure you that we do not expect an annual repeat of what we went through this past fall. We are working hard now to narrow the scope and duration of future safety shutoffs and minimize their customer impact as much as possible.

This includes evaluating new technologies, such as sensors to detect emerging conditions on the electric grid and improve situational awareness, use of artificial intelligence and hyperspectral imaging of vegetation, and testing equipment that has been successfully deployed in Australia to reduce the risk of causing a spark from a falling power line before it hits the ground.

We are partnering with communities to create new microgrids or "resilience zones" with the potential of powering central community resources during a PSPS or other loss of power event and deploying sectionalization and other solutions to minimize the scope of PSPS events. PG&E, using shareholder funding, is partnering with the California Foundation for Independent Living Centers on a pilot program to alleviate disruptive impacts for, and support the safety and welfare of, vulnerable customers before, during, and after PSPS events and other disasters.

In addition to our engagement with California's state, local, and tribal agencies, PG&E is coordinating with federal agencies. In November 2019, PG&E participated in the San Francisco Federal Executive Board meeting to share information on its PSPS program and better understand the needs and impacts to federal agencies, hosted by the Region IX Office of the U.S. Department of Housing and Urban Development. As a result of that effort, PG&E continues to engage with several federal agencies to better prepare, respond, and mitigate the impacts of PSPS events.

PG&E is also continuing to work in coordination with the Edison Electric Institute and its Board of Directors to focus on industry's efforts to manage and mitigate wildfire risks, including (but not limited to), public land access, permitting and technology issues.

Last year, the Electricity Subsector Coordinating Council (ESCC), which represents investor-owned electric companies, electric cooperatives and public power utilities, expanded its focus to include wildfire issues. Initially the ESCC, along with the Departments of Energy, the Interior, and Agriculture, will focus on enhancing wildfire safety, prevention and response, including permitting and land management policies, and deploying technological advancements. The Grid Modernization Lab Consortium (GMLC), a strategic partnership between the Energy Department and the National Laboratories, is also a key partner in this effort.

Going forward, we are developing climate and vulnerable population screening data analysis to inform our wildfire safety plans and investment, and to consider prioritizing mitigation measures in communities with higher sensitivity to wildfire risks. PG&E is also providing $2 million over five years in charitable grants, funded by shareholder dollars, to the communities it serves to increase local climate resilience, including grants to build community capacity to reduce wildfire risks.

PG&E, in partnership with the International Brotherhood of Electrical Workers (IBEW) and educational institutions in Northern California, is also establishing a Tree Crew Training Program to provide the training, skills, and knowledge necessary to be hired as entry-level tree workers by PG&E and its contractors and obtain certification as International Society of Arboriculture (ISA) Certified Tree Worker Climber Specialists.

PG&E is committed to continuous improvement and putting the safety and well-being of our customers first and foremost in everything that we do. PG&E will incorporate these lessons learned its annual Wildfire Mitigation Plan submissions to the CPUC, and as these broader plans are implemented, the frequency, scope, and duration of PSPS events will continue to improve.

The nature of the wildfire risk, like other climate-driven and dynamic risks to PG&E's systems, and its potential consequences require PG&E to plan, operate, and maintain its system differently with a focus on resilience. More broadly, all these efforts will have a cumulative positive impact of increasing grid resilience to any hazard that we face.

Federal Policy Solutions Are Needed to Increase Wildfire Resilience

PG&E fully supports the common sense, meaningful steps taken by Congress over the years to prevent catastrophic wildfires, and you can be assured that we will remain an active voice in sharing our experiences related to reducing wildfire risk.

We appreciate all the efforts made to date by Congress to reduce the wildfire risk and keep our customers and the communities we serve safe. More specifically, we applaud the previous, 115th Congress for advancing comprehensive legislation (now Public Law) that includes provisions to: 1) modernize how utilities manage vegetation along utility rights-of-way that cross federal lands; and 2) provide realistic solutions to fire borrowing so the federal government can complete its maintenance and prevention work.

With respect to the vegetation management policy, we remain hopeful that the U.S. Forest Service and Bureau of Land Management will implement policies in March 2020, as mandated by Congress, that respect congressional intent, including a commitment to electric reliability and public safety.

We also applaud Congress' decision to include Unmanned Aerial System (UAS) provisions under the Federal Aviation Administration Act. These important policies allow utilities to apply for a beyond visual line of sight (BVLOS) waiver, which can be utilized for emergency response and to speed up restoration following storms, outages or PSPS events.

PG&E also applauds the previous Congress for advancing the Disaster Recovery Reform Act of 2018 (now Public Law) that allocates 6 percent of disaster spending to pre-disaster mitigation grants, which will provide the resources necessary for our communities to better prepare for, and reduce the impacts of, future disasters. PG&E believes the Federal Emergency Management Agency's forthcoming Building Resilient Infrastructure and Communities program, which will implement these mitigation grants, could allow for successful public-private partnerships, and PG&E looks forward to working with FEMA and our communities to help support community-based mitigation projects.

PG&E also thanks Congress for advancing the National Defense Authorization Act (NDAA), which includes important wildfire-related provisions authorizing the U.S. Department of Defense to report out on the feasibility of using satellite and other aerial technology, like Unmanned Aerial Vehicles, to detect wildfires at ignition. It also requires reporting the location of such fires to first responders once the incident is detected.

While these steps on the federal legislative front have been encouraging, we believe additional action at the federal level is necessary to further reduce wildfire risk.

More specifically, Congress should focus on addressing the following areas:

Address the threat of climate change – Increasing global temperatures lead to an increase in the severity and frequency of extreme weather patterns and events that have significant implications for public safety and security. Congress should enact a market-based, economy-wide carbon reduction policy that is effective, durable, affordable, and encourages innovation in both carbon mitigation and adaptation technologies. PG&E applauds this committee's ongoing efforts to develop a comprehensive climate framework, and we look forward to continuing to work with the committee to provide input on climate mitigation and resilience solutions.

Protect Energy Affordability for Low-Income Customers – Increasingly frequent and destructive climate events require utilities to rebuild and reinforce energy infrastructure – whether it is rebuilding power lines after a storm or installing new grid technologies to mitigate damage in the future. In most cases, the costs of these efforts fall on consumers. Congress should examine assistance programs that provide eligible customers relief from increasing electricity costs that result from climate adaption and

resilience. A program modeled after the federal Low-Income Home Energy Assistance Program (LIHEAP) or creating a resilience tax grant program would ease the burden of utility bills for those low-income Americans who meet relevant criteria.

Continue to Fund Forest Management, Fire Suppression Activities – There are approximately 147 million dead or dying trees in California that increase the risk of wildfires. Congress should continue to fully fund federal agencies and support public-private partnerships charged with managing forests on federal lands. Additionally, Congress should continue to provide federal firefighting programs with enough funding to cover the costs of suppressing an increasing number of wildfires. If federal land managers do not have enough wildfire suppression funds, they can be forced to divert funding from forest health and fire prevention programs.

Ensure Administration Implements Forest and Vegetation Management – Congress must ensure that the U.S. Departments of Agriculture and the Interior implement measures passed by Congress that allow utilities to better manage vegetation near their infrastructure on federal lands. Congress should also consider advancing legislation to complement certain policies outlined in Executive Order (EO) 13855, "Promoting Active Management of America's Forests, Rangelands, and Other Federal Lands to Improve Conditions and Reduce Wildfire Risk."

Ensure Access to Federal Lands for Prevention, Response – Limited accessibility to some federal lands can compromise first responders' ability to access and respond to wildfires. Lack of roadways and restrictions on aircraft usage, for instance, can complicate efforts to respond swiftly and forcefully to fires as soon as they are identified. Congress should work with the Executive Branch, state and local emergency responders to identify and remove artificial barriers that can inhibit quick response. Additionally, the federal government should establish standardized approaches, in coordination with utilities, to address routine utility maintenance work on federal lands.

Authorize Regional Operations and Maintenance Plans – Promote coordination and cooperation by adopting regionally-based templates for operation and maintenance plans, which establish consistent work practices with clear expectations of the federal land agencies and utilities. At the same time, it is important to clarify work-streams that can be performed with notifications and those which require prior agency review and approval. To the extent possible, steps should be taken to promote joint preparation of National Environmental Policy Act documents among federal agencies for vegetation management activities to maximize efficiency and coordination, while ensuring consistency with applicable land management plans and policies, and applicable law.

Enable Federal Agencies to Share Satellite Data on Wildfire Detection – Most wildfire detection occurs when someone sees an outbreak and informs first responders. Since fire outbreaks can occur in very remote areas, a fire can burn for a long time before human identification. Modern satellite technology operated by the U.S. Department of Defense can detect an outbreak almost instantaneously – when the wildfire covers an area as small as 100 square feet. Under certain circumstances,

DoD can share geospatial data with other federal agencies. Congress should encourage the Defense Department to institute a data-sharing program with the U.S. Forest Service through which it would be immediately notified if the Defense Department satellites detect an outbreak, allowing the Forest Service to alert local authorities and coordinate a quicker response.

Promote Resilient Communities – There are many ways Congress can promote resilience in the local communities they represent, and among their constituents including (but not limited to): promoting public-private partnerships to design, develop and fund resilience projects; establish voluntary resilient zoning and building codes and standards, using the LEED certification program as a model, and providing economic incentives for customers and communities in disaster prone areas; incorporating climate resilience in future federal spending and planning decisions to maximize infrastructure lifespans; and ensure continued federal government support for programs supplying climate change research, modeling and data collection, knowledge sharing and transfer, and funding for climate resilience planning and implementation.

Federal Support for Research and Development – The federal government can play a critical role in advancing research, development and deployment of the technologies that can allow utilities to better plan for and increase their wildfire resilience. Such technologies could include: 1) technologies to harden electric infrastructure in the face of wildfire risks, such as faster, more intelligent reclosers and improved "downed line" technologies; 2) improved sensor technology for electric transmission and distribution lines; 3) analytical tools to better model the impacts of climate change on energy infrastructure; and 4) long-duration energy storage systems, advanced, low-emission mobile generation systems and other distributed generation systems that can provide power during outages.

Comprehensive study of wildfire causes, impacts, and recovery – Congress should request a comprehensive evaluation of recent events by the Government Accountability Office. The study should evaluate the direct and indirect causes and contributing factors of recent large-scale wildfires; the federal, state, and local response efforts; and other relevant factors with a focus on critical infrastructure impacts and resilience. The report should provide recommendations for improving critical infrastructure resilience, enhancing emergency response, modernizing vegetation management and forest practices, assessing rural planning and zoning policies, and improving government coordination.

PG&E believes these commonsense, much-needed federal policies can be accomplished in a responsible and bipartisan manner and will have a positive impact on reducing wildfire threats, improving safety and the environment, and increasing overall resilience.

Conclusion

PG&E faces multiple threats to its infrastructure, from climate change to cyber and physical security threats, that require a robust response with public safety at its core and resilience as our goal.

Increasing resilience to wildfires and other threats requires a comprehensive, societal approach and partnership with multiple stakeholders, including government partners. This work will never be complete, and the hazards will continue to evolve.

We know that this work starts with us in our own operations. The challenge of providing electric service in an increasingly hazardous environment is one that PG&E must – and will – master for its customers. And PG&E welcomes the attention and partnership of this committee and the 116th Congress in the effort.

Thank you for the opportunity to testify today.

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 J 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 United States 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. 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:]

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Center on Global Energy Policy

CONGRESSIONAL TESTIMONY OF **JOHN J. MACWILLIAMS**

Senior Fellow, Center on Global Energy Policy, Columbia University January 28, 2020

BEFORE A JOINT HEARING OF THE **COMMITTEE ON ENERGY AND COMMERCE SUBCOMMITTEE ON ENERGY AND SUBCOMMITTEE ON ENVIRONMENT AND CLIMATE CHANGE**, UNITED STATES HOUSE OF REPRESENTATIVES 1ST SESSION, 116TH CONGRESS

Thank you, Chairman Rush and Chairman Tonko, and Ranking Member Upton and Ranking Member Shimkus, for the invitation to testify before the Subcommittee on Energy, and the Subcommittee on Environment and Climate Change, regarding the impact of wildfires on the domestic power sector and the environment.

I am a senior fellow at Columbia University's Center on Global Energy Policy and an adjunct professor at the School of International and Public Affairs. My testimony will cover the impact of wildfires and other climate-related events on the domestic power sector, expected increases in wildfire activity across the United States as a result of climate change, the role of the power sector in wildfire risk and prevention, and lessons learned from California's legislative responses. Finally, I will close with actions the federal government should consider taking to mitigate wildfire and other climate-related risks and to ensure a more resilient domestic energy sector.

Pacific Gas & Electric (PG&E): The First Climate Change Bankruptcy

In November 2018, the Camp Fire in Northern California destroyed over 150,000 acres, 13,972 residences, 528 commercial structures, and 4,293 other buildings, and tragically claimed the lives of 86 people.[1] As the magnitude of the damage became clear, PG&E declared bankruptcy, estimating at the time that it could face liabilities surpassing $30 billion from the 2017 and 2018 Northern California wildfires.[2]

The bankruptcy of PG&E has been called the first climate change bankruptcy. Details of the bankruptcy are complex and not the subject of this testimony, and certain aspects of the California ecosystem and regulatory framework are unique. However, the California wildfires and resulting bankruptcy of one of the nation's leading utilities are important as a case study for how we will manage these complex issues going forward and appropriately allocate the inevitable, enormous, and increasing costs of climate change threats and damage to our nation's critical infrastructure among numerous stakeholders, including ratepayers, investors, and federal and state taxpayers.

In August 2019, Columbia University's Center on Global Energy Policy published a research paper titled "PG&E: Market and Policy Perspectives on the First Climate Change Bankruptcy."[3] In that paper, my co-authors Sarah La Monaca and James Kobus (who are here with me today) and I sought to trace the factors that led to the bankruptcy, assess wildfire and climate risk broadly across the US power and utility sector, examine financial market and policy responses

to the bankruptcy, and provide recommendations for policymakers and other stakeholders.

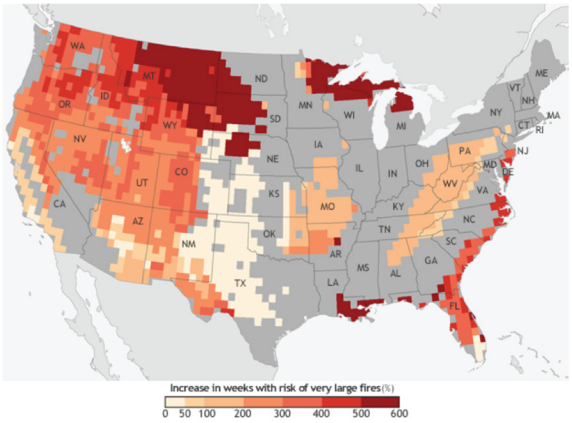
As discussed in our paper, while dynamics specific to PG&E and California's liability framework were factors, climate change played a material role in the wildfires and PG&E's subsequent bankruptcy. This is because climate change has created conditions in California and elsewhere that make fires more intense, more damaging, and more likely to occur. Researchers at Columbia University, the University of Idaho, and the University of California, Los Angeles have found that climate change has already diminished autumn rains, increased winds in the western US, and driven an increase in daily maximum temperatures of more than three degrees Fahrenheit, measured relative to the late 1800s.[4] This has led to tinderbox conditions as brush and vegetation become drier and more prone to burning. Putting these trends together, another study estimates that climate change has caused an extra 4.2 million hectares of wildfire damage in the western United States since the 1980s—nearly *double* the number of acres burned than would otherwise have been expected.[5]

Climate Change is Going to Make Wildfires Worse – and Not Just in California

Although the magnitude of the forecasts varies, the scientific literature almost universally projects significant climate-change-driven increases in wildfire activity and intensity across the United States by the end of the century.[6] The United States government's Fourth National Climate Assessment, released in November 2018, 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, depending on the geographic area, ecosystem, and local climate."[7]

Importantly, while current wildfire activity in California is of national concern given its population, the size of its economy, and its climate leadership, the largest increases in wildfire activity are expected in other states. The map below, taken from a 2015 study in the *International Journal of Wildland Fire*, shows how different regions across the US are likely to be affected.[8] As is painfully evident in the map, many regions are likely to face growing danger, notably the Southeast and Northwest parts of the country.[9]

Figure 1: Projected increase in "very large fire weeks" by midcentury (2041-2070) compared to 1971-2000



Source: Barbero, R.; Abatzoglou, J.T.; Larkin, N.K.; Kolden, C.A.; Stocks, B. 2015. Climate change presents increased potential for very large fires in the contiguous United States. International Journal of Wildland Fire.

The Role of the Power Sector in Wildfire Risk and Prevention

As the California situation has shown, the power sector can be expected to both cause wildfires and be susceptible to them. Although a wide variety of factors contribute to wildfire ignitions, electrical equipment has been a leading proximate cause of some of the most damaging wildfires in California, including the 2018 Camp Fire in California.[10] This can occur when distribution or transmission lines fail in high wind or other harsh weather conditions, igniting nearby vegetation and sparking rapidly spreading wildfires. However, wildfires can also be damaging to electric utility companies by causing physical damage to energy infrastructure, disrupting power service, and even leading to severe financial distress.

First, wildfires cause direct physical damage to utility infrastructure such as power lines and substations. But the risk to energy infrastructure from climate change is broader. A 2019 paper from BlackRock Investments details climate risks to the utility sector, noting that as a result of climate change, storm surge, high winds, and flooding from hurricanes pose increased risks to several categories of utility assets, including power plants and transmission and distribution networks.[11] The United States Department of Energy estimates that sea level rise is likely to cause storm-surge exposure increases of 12 to 40 percent for power plant assets and 18 to 44 percent for substations.[12]

Second, wildfires pose a threat to reliable electricity service. While the fires themselves can disrupt electricity service in the affected areas, a new and emerging trend has further underscored the problem: preventative power shutoffs. One of the tools California is now using to combat wildfire ignitions is its Public Safety Power Shutoff (PSPS) program, in which the state's utility companies preemptively shut off electricity service when high-risk weather conditions suggest a heightened possibility of electrical equipment wildfire ignition.

In an effort to reduce wildfire risk, utility companies have recently implemented these preventative blackouts, cutting power to millions of customers on several occasions in the fall of 2019. While it's not the focus of my testimony today, these preventative steps can have severe impacts on health and safety, as well as economic repercussions.

These events highlight the escalating costs of providing reliable electricity service in a country that is rapidly becoming more vulnerable to the negative effects of climate change. If customers are going to continue to demand the near 100 percent reliability of electricity service that they are accustomed to, large infrastructure investment will be required to reduce the damage caused by wildfires, sea level rise, and other climate-related events, and to make the electric grid and related assets more intelligent and more resilient.

Third, wildfires present a unique financial threat to US power and utility companies because they are the one type of climate-related disaster that such companies may be shown to have directly caused. In most states (with California as a notable exception), if a utility company is found to have operated its system prudently, any resulting property damage and other costs are typically borne by private insurance companies and property owners rather than the utility itself. If a utility is found to have operated its system imprudently, however, the company could be held liable for such damages, which are likely to be in the billions of dollars. Damages of this magnitude can bankrupt a utility company, as we've seen with PG&E. In either case, climate-change-driven wildfire activity will increase costs to utility-sector stakeholders, including investor-owned utilities, state and local governments, ratepayers, and taxpayers. These increased costs will in turn place financial stress on utility companies and crowd out essential investment in renewable energy and grid upgrades.

Other States Can Learn from California's Policy Response

In July 2019, California Governor Gavin Newsom signed into law a wildfire insurance package that is the first in the nation to address major utility financial risk resulting from increasing climate risk. The bill created a $21 billion insurance fund, capitalized through ratepayer contributions of $10.5 billion and another $10.5 billion shared proportionally among California's investor owned utilities. Separately, the legislation established a Wildfire Safety Advisory Board, staffed by industry and academic experts, to advise the California Public Utility Commission and to review utilities' implementation of specific safety requirements, including having an approved fire mitigation plan, establishing a fire safety committee, and tying executive compensation to safety culture.

Overall, California's policy response provides important lessons for designing comprehensive frameworks for allocating the costs from climate change across investors, ratepayers, and taxpayers. The legislative response, while not without its drawbacks, created a regulatory structure that is designed to balance accountability and increased oversight with maintaining

the financial health of the state's utilities. Ultimately, utility companies are central actors in making crucial grid upgrades and renewable energy investments over the coming years, and it is in no one's best interest for investor-owned utilities to file for bankruptcy every few years. At the same time, utility companies need to be held accountable for their wildfire ignitions and incentivized to make preventative investments. Our Columbia report discusses the nuances embedded in the California legislative response and outlines additional lessons other states can take away from the initiative.

What Steps Should the Federal Government Consider?

While much of electricity sector regulation is conducted through state legislatures and public utility commissions, the federal government can take steps to help prevent, mitigate, and adapt to the growing threats presented by wildfires and other climate-change-related disasters. Interestingly, this would not be the first time that electric-transmission-related incidents have led to congressional action. The Northeast Blackout of 2003—the worst US blackout of all time—was caused by a sagging transmission line in Ohio that came into contact with trees that had not been adequately trimmed.[13] Congress responded by enacting the Energy Policy Act of 2005, which strengthened the North American Electric Reliability Corporation reliability requirements and granted the Federal Energy Regulatory Commission (FERC) greater ability to levy penalties. Congress has an opportunity to take similarly transformative action today.

First and foremost, Congress should focus on the broad impact climate change will have on our environment, on people, and on our economy. The California wildfires are a vivid example of the devastation that climate change will increasingly bring. We are encouraged by the efforts of this committee to consider how we can bring together public and private sector leaders to address climate change and US greenhouse gas emissions, including the CLEAN Future Act framework introduced by Energy and Commerce Chairman Pallone, Environment and Climate Change Chairman Tonko, and Energy Subcommittee Chairman Rush that sets new targets to achieve a 100 percent clean economy by 2050. As my colleagues Dr. Noah Kaufman and Dr. Julio Friedmann have testified, we need all solutions on the table to decarbonize our economy and to achieve net-zero greenhouse gas emissions by 2050 to avoid the most catastrophic effects of climate change.[14]

In particular, researchers at the Center on Global Energy Policy have studied decarbonization options available to the federal government in great detail. In his recent testimony before the Subcommittee on Environment & Climate Change, Dr. Kaufman argued that a carbon price should be part of any comprehensive climate policy, as it encourages emissions reductions wherever and however they can be achieved at a low cost without needing to know beforehand what those opportunities will be. He has further studied the interaction of a carbon tax with other potential climate policies and recommends policies that are complementary rather than redundant to a carbon tax. These complementary policies include funding innovation, encouraging energy efficiency investment, and investing directly in low carbon infrastructure, among others.

Second, massive infrastructure investment will be required to modernize the grid to make it more intelligent and responsive to the demands of a rapidly changing electric sector and

to provide resiliency in the face of increasing threats from climate change. Although the government has an important role to play in this funding, ultimately this will require large amounts of private sector capital. Indeed, challenges of this magnitude cannot be solved without significant private sector investment, and Congress should examine ways that it can encourage such capital flows.

Public-private partnerships are one vehicle for infrastructure investment of this magnitude. Such partnerships can take many forms, but one mechanism my former colleagues at the Department of Energy and I have advocated is the creation of a National Infrastructure Bank. There is a long history with respect to this subject, and there are important legislative and administrative equities that need to be considered, but given the pressing infrastructure challenge facing the country, I would strongly encourage Congress to take a fresh look at the possibility of creating such an institution. The recent proposal to create a National Climate Bank is a positive step in this direction.

In addition, FERC could take steps to incentivize greater fire prevention and grid hardening investment in the utility sector. FERC regulates interstate electric transmission assets and in the past has used specialized profit incentives (often referred to as "ROE-adder" incentives) and accelerated cost recovery mechanisms to direct private capital toward preferred initiatives such as regional transmission organization participation and transmission enhancement projects.[15] Similar mechanisms could provide a financial incentive for utility companies to prioritize grid resiliency and fire prevention investments over other types of investments available to them.

A large amount of institutional capital is available to invest in infrastructure, and these investors want to invest in energy infrastructure projects if they can meet their risk and return objectives and their fiduciary responsibilities to their investors.

Third, Congress should support increased research, development, demonstration, and deployment funding for wildfire prevention methods and technologies and grid modernization. The Department of Energy and its 17 National Labs provide enormous technical capabilities that are currently being applied to meet these challenges for the nation. As a senior advisor to Lawrence Livermore National Laboratory, I am aware of the work they are doing to help the California Public Utility Commission in this area. Since wildfire and climate-related risks are nationwide risks, other national laboratories such as Idaho National Laboratory and the National Renewable Energy Laboratory have significant technical capabilities that they can also provide to the effort. Promising research is being conducted on sensor technology, high altitude wind forecasting, high performance computing for fire simulation and prediction, and underground wiring methods. However, much work remains to be done.

Conclusion

I would like to thank the Subcommittees for holding this hearing on the impact of wildfires on the domestic power sector and the environment. The California wildfires should be a call for action regarding the adverse impacts of climate change. As tragic as these events have been, one only needs to look at Australia to see the potential for even greater devastation to come as a result of wildfires and other climate-change-related disasters. Managing the adverse

impacts from climate change will require massive, sustained, and thoughtful investment in technology and infrastructure. The first climate change bankruptcy is an important test case for how our country is going to allocate the costs of preventing, mitigating, and responding to climate-change-related disasters among numerous stakeholders, including ratepayers, investors, and state and federal taxpayers.

Notes

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Mr. RUSH. Thank you, Mr. MacWilliams.

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

STATEMENT OF ANTHONY S. DAVIS, Ph.D.

Dr. 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 in 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 are 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 the 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 Dr. Davis follows:]

Written Statement of

Anthony S. Davis, Ph. D.
Interim Dean, College of Forestry at Oregon State University
Professor, Forest Engineering, Resources, and Management

Before the Subcommittee on Energy and Subcommittee on Environment and Climate Change
Of the Committee on Energy and Commerce
U.S. House of Representatives

"Out of Control: The Impact of Wildfires on our Power Sector and the Environment"

January 28th, 2020

Chairman Rush and Chairman Tonko, and Ranking Member Upton and Ranking Member Shimkus, thank you for the opportunity to testify today on the issue of wildfire in our western landscapes and the impacts on our environment and communities. I would also like to thank Representatives Schrader and Walden from Oregon and acknowledge their attention to the complex challenge of western wildland fire.

I am Anthony S. Davis, interim dean and professor in the College of Forestry at Oregon State University (OSU). Wildfire is an everyday focus of our integrated teaching, research, and extension programs, with broad recognition that protecting communities and sustaining forest values are among our primary forest management objectives of this century.

In 2018 and 2019, the College of Forestry convened two Fire Summits to address these very issues. The OSU College of Forestry partnered with the leaders of forestry programs at Universities of Idaho, Montana, and Washington, colleagues from federal and state agencies, and partners from NGOs and industries to discuss and highlight what current science and practice tell us about the emerging reality of wildfire across our Northwest USA forest landscapes. Through these sessions, scientists and practitioners focused on wildfire in the Northwest and its impacts on water, forests, and communities; the realistic role for fuel treatments to protect communities and sustain forest values; and the emerging reality of wildfire smoke and human impacts (Figure 1). Much of my testimony today has been informed by those collaborative and consultative discussions.

INTRODUCTION

The economic impact of the new Northwest fire reality is staggering. National post-fire costs move quickly beyond forests and rangelands and associated damage to the natural resource base including plants, animals, and landscapes, expanding into costs associated with health care, tourism, loss of business revenue, property loss, and too often, loss of human life. Perhaps the highest economic risk comes in the form of the drinking water of the west. Globally, many cities benefit from the water filtration forest systems provide every day. In that, wildfire places

a risk on providing water storage and filtration globally valued at more than $4 trillion per year (From Bladon et al. 2014).

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. We find ourselves continuously responding to the next emergency rather than acting on a broader, more strategic view of how to live with wildfires. It is particularly concerning when considering how the many negative effects of wildfire disproportionately impact lower income and at-risk populations. Existing science and experience with land management tell us there is a better path forward than the one our collective policies are pursuing today.

In my testimony, I will focus on addressing the following core points:

- Western wildfire matters for society broadly, not just for those directly affected by fire
- The current wildfire challenge is perpetuated by complex factors; improved understanding of the forest and fire ecosystem is essential to better focus resources on strategies to prevent or control fire
- Serious concerns for broad impacts from fire smoke necessitates adaptation
- We must better leverage science and history to inform policy and priorities for strategic actions to more effectively mitigate fire risk

NEED FOR ENHANCED PUBLIC UNDERSTANDING FOR MORE EFFECTIVE ENGAGEMENT

While we are in the off-season of wildland fire risk in the Northwest United States, Americans are currently watching closely the fires burning in Australia. Last fall, attention was on fires in the Brazilian Amazon. Whether public focus of concern is on the American west, the Amazon, or the koalas, the public often views wildfire as an annual cycle. Those living in fire-prone systems don't have that luxury. They face a new fire reality. For them, fire is now a constant concern. The broad public perspective highlights a critical disconnect between society's vantage point and the reality of our forested landscapes.

The new fire reality is that wildfire impacts are broad, lasting, and anything but annual in their cycles. While the short-term impacts are acute, they compound to chronic negative conditions. The effects are cascading and cumulative, and do not reset to "zero" each year. Furthermore, costs and impacts of fire are not limited to the fire itself. For instance, the long term and broad reach of smoke impacts nearly every home in the Northwestern U.S., and the threat of catastrophic fire exists for almost every urban water supply system across the region.

As we seek to find a path forward, those of us engaged with western fire from science to policy to practice must work to demystify public perceptions of some of the elements around fire in western systems.

FIRE CONTROL: FIRE MANAGEMENT PRACTICE IMPACTS WESTERN FIRE RISK

A first thing to consider in any discussion about wildfires in the Northwest is **wildfires are not new and that they are necessary**. Ecologically, they renew numerous critical processes. By doing so, they also self-regulate the total amount of fuel available for burning, as after a fire there is less material available to burn again. Millenia of fires across the western USA sculpted the landscape we see today. Understanding this fire history, from how Indigenous peoples used fire as a management tool to the frequency and intensity of burning, are critical sources of information in determining how we can be effective in understanding and addressing future fire behavior.

A second point is that the almost 100 years of fire suppression, during a period of cooler wetter climate, was successful in part because of the conditions in which fires were occurring. The landscape upon which wildfire suppression activities were initially launched was formed by the aforementioned millennia of regular fires and the industrialization of the western USA. Those prior fires had created vast fuel breaks which resulted in a horizontally disconnected forest landscape resulting in areas that were less susceptible to the spread of fire. Meanwhile, forest management introduced a network of roads and trails into forests and a need to respond in terms of resource protection. With that backdrop, our fire managers were highly successful in suppression.

Year after year of **effective control of fire, without a corresponding non-fire reduction in fuel load, has led to an increase in continuous biomass available to burn** across the forest landscape. Where periodic burns would create natural fire breaks, those are now filled with trees. A success by nearly any measure outside of the potential for burning. While the combination of harvesting, thinning, and extensive road building practices and a cooler wetter climate during the 20th century reduced wildfire impacts and largely gave society a respite from fire, wildfire occurrence today has increased dramatically.

Ultimately, this means that the use of managed fire and effective treatments on our landscapes will be critical in addressing wildfire and the cascading negative and direct influence on forest health, climate, air and water quality, and human well-being, but we also cannot look at the scale of the problem and cut our way out of fire adapted ecosystems.

CLIMATE IMPACTS RISKS & SEVERITY OF WESTERN WILDLAND FIRE

In understanding wildfire today, we must recognize **climate is a primary driver.** The changing climate drives us towards novel conditions that require research and corresponding adaptive responses. Fire severity (impact that fire actually has on the ecosystem) and total area burned is largely determined by a combination of climate, weather, topography, and fuels. The new Northwest fire reality is the fire season is now 30 days longer than it was in the 1980s (Westerling et al. 2006, Westerling 2016). Understanding the impact of climate is vital as the relationship between climate and fuels is a place where we may be best able to influence fire behavior.

CONCERNS FOR FIRE SMOKE NECESSITATES ADAPTATION

Smoke is the way most people interact with fire. Looking at wildfire and smoke issues, education, communication, and outreach are critical. We must not be ambiguous: Communities must adapt to fire-even those occurring 100s of miles away. Wildfire is going to happen, and it *will* impact urban, suburban, and rural communities. Fire and smoke will be a part of life in the Northwest – even with an aggressive treatment strategy at a scale which dwarfs what has been implemented to date. In adapting, communities must engage in a full suite of actions, taking steps to mitigate impacts from smoke associated with prescribed and uncontrolled wildfires.

Speaking directly to the issue of smoke, communities need to be prepared for this component of wildfires in the Pacific Northwest. Recent levels of wildfire smoke in the Pacific Northwest are unprecedented. They represent a health threat affecting broad swaths of the western U.S. population, having an indelible impact on communities. In 2017 and 2018, monitors recorded more than 3,500 instances where the current 24-hour health standard was exceeded. To put this in perspective, if those instances were evaluated under Clean Air Act standards, much of the West would be classified as "non-attainment" under the Act. It should be noted that of the 3,500 Clean Air Act health standard exceedances, only two were the result of prescribed fire.

Wildfire smoke differentially affects vulnerable groups, such as those with pre-existing respiratory and cardiac conditions, the elderly, the young, and pregnant women. Smoke impacts may be greater among poor populations due to exposure and a lack of access to indoor environments with air filtration systems. Beyond individual impacts, wildfire smoke significantly affects all segments of the outdoor economy, threatening small businesses that already operate on thin margins. Agricultural producers across the Northwest -- ranging from apple orchards to vineyards and canola farmers -- are repeatedly facing quality control issues arising from smoke exposure. Smoke threatens the commercial viability of crops across successive seasons and years. Collectively, the above groups are further at risk because existing public information systems lack consistent messaging regarding indices for smoke impacts and strategies to mitigate those impacts.

Further, there is an increasing convergence of people living in or near the wildlands, which has put new pressures on responsible agencies and funding to manage fire risk and suppression. More people live in the wildland-urban interface (WUI) than ever before, and growth rates for houses and people are higher in the WUI than national averages (Radeloff 2018). Over this time, the average number of structures lost to wildfire each year has tripled. One of the most telling numbers that highlights a disconnect between how people want to use the outdoors and how they actually do is that in Oregon, where sixty-eight percent of fires started in 2018 were human caused. While those fires may start in areas that are more readily controlled, they also divert resources and highlight a fundamental lack of understanding of the latent fire risk on the landscape.

BETTER LEVERAGE SCIENCE TO INFORM & PRIORITIZE ACTIONS TO MITIGATE FIRE RISK

The far reaching and cascading impacts of fire show us we need to prioritize and address those areas where we can make a needed difference – not in the annual cycle, but in adapting this new multi-year reality as it unfolds. Past management, current climate, and shifts in land use (including where people live), have left us with a landscape that has more trees, and more contiguous forest occupied by people, than ever before. Therefore, we must enlist our emerging knowledge of fire behavior, active management, and fire adaptation and education under a new fire reality. What we learned in the past may not fully inform our future actions.

With recognition that fire suppression success in the past century was a product of the landscape, climate, and deployment of the tools we had, we must realize we might not have the tools needed to achieve that same impact on wildfire and smoke hazards. The new reality requires us to prioritize locations and conditions for action. We must create a process that, through long-term effective deployment of a suite of physical and social tools – will seek to achieve the desired impact on securing lives, livelihoods, and landscapes.

Collectively, the impact and array of fuels treatments on the landscape can be tailored toward those community protection and forest values most at risk. But going-to-scale requires a vision of the landscape unconstrained by ownership boundaries. Effective treatments that protect communities from wildfire requires coordinated actions across international borders, federal lands, state lands, industrial, private non-industrial, and tribal lands.

Experience and emerging science can inform where on the landscape treatments should happen. I believe we are capable of overlaying this with our understanding of how fire responds in different circumstances, and in relation to important human values that are most at risk. We can use this knowledge to coordinate and position prescribed fires, managed fires, timber harvesting and other mechanical treatments across ownerships. Through research and education we aspire to offset the future cost of fire suppression, the loss of timber and recreational values, the loss of water quality, and most importantly the loss of lives and property. There is no single approach to all conditions. Treatments must include activities that are appropriately matched to the ecological and social landscape and unprecedented conditions. The type and configuration of those treatments will vary by forest type.

A critical point to note is treatments are interdependent and unending. Across the landscape and over time, there is no single intervention that will allow us to be done and move on. A reduction in fuel load is ephemeral, as trees grow back. So the use of thinning, for example, to reduce tree density may need to be followed at regular intervals by allowing unplanned fires or initiating planned fires should they not occur via natural start under extreme weather conditions. Near urban centers, this continued-engagement approach has shown the potential to allow for effective suppression in some ecosystems.

CLOSING

In closing, it is essential that policy solutions acknowledge what science and history tells us. Fire will never be eliminated from western forests; it is part of our future, and is an important part of the ecology of our forests. To achieve positive change, we must address issues such as the inherent conflict between clean air objectives and land management objectives.

The scale of the new Northwest fire reality is dramatic and there needs to be a coordinated effort to address it. The cost will be measured in billions of dollars and time in decades to begin to see a landscape level change. Failing to act now will 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.

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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, Ph.D.

Dr. 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, obvi-

ously, 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 hazards. 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 protection from the, quote-unquote, logging that so many people are concerned about. But, then, there are 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 a 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 a 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 Dr. Collins follows:]

Testimony of

Dr. Brandon M. Collins

Research Scientist

Center for Fire Research and Outreach, Berkeley Forests, University of California, Berkeley

Before the House Committee on Energy and Commerce's Subcommittee on Energy and Subcommittee on Environment and Climate Change

"Out of Control: The Impact of Wildfires on our Power Sector and the Environment"

January 28, 2020

Fire has been a part of many western U.S. forests for millennia, and its removal has slowly but markedly changed forests in unintended ways. The cumulative effects of removing fire for over 100 years are manifested in the large and uncharacteristically severe fires that are now happening annually. Additionally, the recent drought in California spotlighted another major vulnerability of California forests, large-scale tree mortality from bark beetles and possibly other yet-unseen insect and pathogen outbreaks. While climate certainly had a role in recent fire and tree mortality events, the current forest conditions are undoubtedly contributing to both. As stewards of a resource unique to our nation, our great challenge is to manage forests such that they can tolerate fire, even under more extreme weather conditions, and still retain their fundamental character. Further, we need to do this at a rate that exceeds the currently increasing rate of severe wildfire. This means proactive management using all appropriate approaches. In this testimony I present information on the altered condition of contemporary forests and the impacts of these conditions on recent wildfires. Additionally, I discuss different approaches for reducing wildfire hazard and restoring these fire-adapted forests.

For many western U.S. forests what we see today does not look at all like what existed in previous centuries. For the sake of brevity, I will simplify the findings from numerous studies to a handful of key points on how forests have changed relative to the historical period: large

increases in tree density (particularly in smaller size classes), greater amount of dead fuel on the forest floor, loss of large trees, greater proportions of shade-tolerant tree species, and homogenized vegetation patterns (e.g., Hessburg *et al.* 1999; Brown *et al.* 2008; Taylor *et al.* 2014; Stephens *et al.* 2015; Collins *et al.* 2017). Historical forests were shaped by frequent fire (every 10-15 years) that generally burned on the forest floor with occasional torching of individual trees, so called "low- to moderate-severity". One important point to emphasize is that these frequent fires did not result in uniformly low density, low fuel forest conditions. The variable nature of fire, interacting with moisture availability (controlled by topography, soil) created a mosaic of vegetation conditions across a landscape. This mosaic included patches of dense forests, shrubs, young regenerating trees, within a matrix of low to moderate density forests (Hessburg *et al.* 2005; Collins *et al.* 2015). This heterogeneity was particularly evident at larger spatial scales (>1000 acres), which has diminished considerably in contemporary forests (Lydersen and Collins 2018).

The changes in contemporary western U.S. forests are primarily attributed to the exclusion of fire for over 100 years and timber harvesting focused on large tree removal (Taylor 2004; Merschel *et al.* 2014). Fire exclusion over this amount of time removed a key regulating process that consumed dead fuel, limited tree establishment, and created spatial heterogeneity. Large tree removal opened a considerable amount of growing space, allowing for rapid tree establishment and growth. This response was welcomed by early foresters whose primary motivation was to generate a sustainable supply of wood to growing nation (Show and Kotok 1924). However, over the long-term these practices ultimately exposed contemporary forests to a very different pattern of wildfire effects from what they experienced historically (Hessburg *et al.* 2015). The most concerning characteristic of contemporary wildfires is not their overall size, but rather the size of

patches with complete (or nearly complete) tree mortality. These so-called "stand-replacing patches" have been increasing in size over the last couple decades in California (Miller and Safford 2012; Stevens *et al.* 2017). In forests historically adapted to frequent-fire the trees lack an ability to naturally regenerate large stand-replacing patches. As a result, these patches are commonly converted to shrublands, which dramatically changes the ecosystem function (e.g., habitat) and the services provided (e.g., timber, carbon sequestration).

In response to these trends in forest loss there has been a push to restore forest structure and composition to that akin to historical conditions. Forest restoration can be done by mechanically removing trees (with chainsaws or heavy equipment), with fire (either prescribed fire or intentional use of naturally ignited wildfire), or a combination of the two. The intent with these methods is reduce tree density by removing smaller and mid-sized trees, and in case of fire use, consume accumulated fuels on forest floors. The duel benefit achieved with forest restoration is wildfire hazard mitigation. The *Fire and Fire Surrogate Study* at Blodgett Forest (near Georgetown, CA) was initiated in order to study the effectiveness and overall ecological impacts of these different forest restoration/fire hazard reduction treatments (Stephens and Moghaddas 2005). Through the combined commitment of the forest managers and researchers at UC Berkeley, the study has been maintained continuously since its onset in 2001.While 18 years is a relatively short time frame relative to the lifespan of trees, the study is nonetheless a uniquely long-term look at forest management options and their effectiveness.

The Fire and Fire Surrogate study at Blodgett Forest is comprised of a network of twelve stands (35-70 acres each) that were randomly assigned to four treatments representing the basic range of forest restoration/fire hazard reduction options. The treatments were:

- Control: no active management.

- Mechanical-only: commercial timber harvest, which removed mid-sized trees, followed by mastication, which chipped/shredded smaller trees in place. Initial treatment was completed in 2002, with a second mastication done in 2017.
- Fire-only treatment: prescribed fires applied in 2002, 2009, and 2016
- Mechanical+fire treatment: same mechanical treatment described previously, followed by prescribed fire. Initial treatment was completed in 2002, with second mastication and prescribed fire applied in 2018.

The initial effects of the different treatments followed a somewhat expected pattern. Both treatments involving fire were quite effective at reducing modeled wildfire hazard, even under fairly extreme weather conditions. This was due to the high consumption of fuel on the forest floor (called surface fuel) and to the considerable reduction in small trees and low branches (called ladder fuel). The effectiveness of the mechanical-only treatment at reducing wildfire hazard was not obvious initially. While this treatment largely eliminated ladder fuels, it did so at the expense of augmenting surface fuels (from the masticated material left on site).

By 2009 it was apparent that the treatments were on distinct and somewhat surprising trajectories. The most surprising finding was that the augmented surface fuel in the mechanical-only stands was gone, presumably from natural decomposition. As a result, the modeled wildfire hazard decreased significantly (Stephens *et al.* 2012). Hence, the mechanical treatment "aged well" from the perspective of hazard mitigation. The second most surprising finding was the vigorous understory shrub response in the mechanical+fire stands. The increased light to the forest floor from the commercial thinning, coupled with the removal of surface fuels and the heat/smoke stimulus from fire allowed for rapid establishment of large stature shrubs, mainly *Ceanothus* species. The mechanical+fire treatment was still effective at reducing wildfire hazard

in 2009, but this was likely to be compromised as the shrubs grew taller and denser. The fire-only stands started to accumulate surface fuels as the small to mid-sized trees killed by the initial fire began to fall to the forest floor, hence the need for a second prescribed fire applied in the fall of 2009. This emphasized an important distinction between the two mechanical treatments and the fire-only treatment related to the fate of killed trees. It would take multiple "entries" to entirely remove those unwanted trees with fire alone; whereas with mechanical methods they could be removed immediately.

The distinction among treatments became even more interesting over time. Tree growth was accelerated in the mechanical-only stands. This was evident in diameter and crown expansion for overstory trees that remained after thinning, as well as for regenerating trees in the understory. This increased growth in overstory trees had a noticeable effect of increasing individual tree vigor relative to the other treatments (Collins *et al.* 2014). Tree regeneration in the understory was so strong that another mastication was warranted in 2017 to maintain low fire hazard. Similarly, the shrub growth in the mechanical+fire warranted another mastication before a second prescribed fire could be applied. This was done because it would have been difficult and quite risky to burn the shrubs effectively without torching the entire stand. The fire-only stands continued to "recruit" dead trees into the surface fuels, but an interesting phenomenon became apparent. After two burns the fire-only stands were developing a "patchy" pattern of tree clumps, openings with shrubs, and large isolated individual trees. This pattern appears to be a common characteristic of historical forests that experienced frequent fire. It is also thought to provide a suite of habitat types for wildlife species that are adapted to distinct structural/compositional environments. Recent research also suggests there may be additional benefits of this patchy tree/opening pattern tied to snow retention and water yield (Stevens 2017). The basic premise is

that more snow accumulates in the small openings, which melts out slowly because of shading from adjacent trees.

The state of California recently put forth some unequivocal statements on the need for large-scale forest restoration/fire hazard reduction. So, which treatments examined in this nearly 20-year study should be used in this effort? The answer that I offer is 'all of the above'. Each of the treatments studied had direct benefits for forest restoration/fire hazard reduction and several co-benefits (e.g., wood products, habitat improvement, water yield, reduced wildfire emissions, stabilizing forest carbon). The different land management, ownership, and societal constraints requires a diversified approach to forest restoration that includes prescribed burning, commercial thinning, and mastication. In fact, landscape-level restoration will also need to include managing naturally ignited wildfires (North *et al.* 2015), hand thinning (removing only small diameter trees), pile-burning, and grazing. The uncharacteristically high vulnerability to wildfire and drought exists at such great scale throughout many western U.S. forests that action is warranted *now*, even if our current scientific understanding is imperfect. Our current rate of forest restoration is falling woefully short of what is needed in these forests (North *et al.* 2012; Vaillant and Reinhardt 2017). We know enough from studies like the Fire and Fire Surrogate Study at Blodgett, and many others not highlighted here, to move forward competently with large-scale forest restoration. I recognize the need to continue studying treatment impacts on various ecosystem components and adjust future treatments. It is time to prioritize forest health and resilience, even over other resource concerns, in order to ensure their continued provisioning of services we depend on.

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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, DC, 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:]

CENTRAL ELECTRIC
COOPERATIVE, INC.

Testimony of Dave Markham
President & CEO of Central Electric Cooperative, Inc.
Before the United States House of Representatives
Committee on Energy and Commerce
and its Subcommittee on Energy
and Subcommittee on Environment & Climate Change

Hearing on: "Out of Control: The Impact of Wildfires
on our Power Sector and the Environment"

January 28, 2020

Good morning Chairmen Rush and Tonko, Ranking Members Upton and Shimkus and Members of the Subcommittees. I am Dave Markham, President & CEO of Central Electric Cooperative, headquartered in Redmond, Oregon. Central Electric is a member of the National Rural Electric Cooperative Association. I also serve as the Chairman of PNGC Power, a Portland, Oregon, based generation and transmission cooperative owned by 15 Northwest electric distribution cooperatives with service territory in 7 western states. I appreciate the opportunity and privilege of testifying today on the impact of wildfires on the power sector and the environment.

Since the 1930s, consumer-owned, not-for-profit electric cooperatives have served the rural areas of America. More than 900 cooperatives in 48 states provide electric service to 56 percent of the nation's landmass. In Oregon, there are 18 electric cooperatives that provide power to more than a half-million Oregonians across 65 percent of the landmass of the state. To put this in perspective, the geographical area served by Oregon's electric cooperatives is more than 6 times the size of the State of Maryland. Notably, Oregon's electric co-ops deliver electricity using more than 30,000 miles of transmission and distribution lines across service territory where much of the land is federally managed. To add to the complexity, this land is often mountainous, heavily forested and difficult to access.

Electric cooperatives, because of the commitment to the members we serve, work diligently to keep our rights-of-way cleared and transmission and distribution systems maintained. Our long history of exceptional service and system reliability is a testament to this commitment. Over the years, our commitment has not changed. However, it is the many things beyond our direct control that have impacted our ability to mitigate against wildfires -- notably our proximity to federal lands.

Oregon's electric cooperatives are proactively addressing increased wildfire risk by instituting Wildfire Mitigation Plans, which formalize the actions we have been taking voluntarily for years. For example, at Central Electric we upgraded 23 miles of transmission line, much of it through heavily-forested areas, and elected to replace wood poles with more expensive steel poles to reduce wildfire risk. We are also in the process of upgrading a distribution line in a forested area on federal land, installing taller poles and replacing existing four-foot cross arms with eight-foot cross arms. This allows us to space power lines farther apart to reduce the potential for a wildfire ignition from a falling tree limb coming into contact with a power line. But despite this advanced planning and significant investment, the fact remains that even the very best maintained electric systems have had pole fires, downed wires and equipment failures that have caused fires. Policymakers should not have an unrealistic expectation that a tree limb will never contact a power line or that equipment will never fail. This is an expectation that is too high to be achievable.

I have had the privilege of testifying before Congress on two prior occasions on the importance of streamlining vegetation management practices and to eliminate frustrating delays when seeking approval to conduct routine maintenance and upgrades of power lines and poles in utility rights-of-way on federal lands.

Following years of policy work to address these challenges, in the FY2018 Appropriations bill, Congress included key provisions to improve system reliability and reduce wildfire risk by addressing utility liability, streamlined vegetation management planning approval processes and removal of hazard trees. The legislation also included improvements to the National Environmental Policy Act ("NEPA"), as well as guidance and training for federal land management agency staff. I would like to thank Central Electric's Congressman, Greg Walden and Oregon Congressman Kurt Schrader for their leadership improving forest and vegetation management. America's electric cooperatives are very appreciative of their efforts. I also want to thank the House Natural Resources Committee for their leadership in passing this important legislation.

However, more work needs to be done and the regulations and guidelines for vegetation management must closely align with the underlying law. House Report 115-165 filed by the House Natural Resources Committee contains clear objectives for the law. The report states that the legislation "seeks to reduce wildfires, in part, by promoting federal consistency, accountability, and timely decision-making as it relates to protecting electricity transmission and distribution lines on some federal lands from hazard trees." It is imperative that the land management agencies establish procedures with robust timelines and milestones that promote efficiency, accountability and consistency between federal land managers and utilities.

This is especially important for Oregon's electric cooperatives. Central Electric's service territory comprises 5,300 square miles, 56 percent of which is federally-managed land. This requires us to work closely with the U.S. Forest Service, Bureau of Land Management, Council on Environmental Quality, and other federal agencies. While all parties are committed to protecting the nation's electrical infrastructure and preventing wildfires, the pathway forward is still fraught with unnecessarily time-consuming regulatory processes. Months slip away before authorization or permits are issued to perform work otherwise routinely done in days.

For example, last year, Central Electric identified 30 dead and dying trees, which needed to be removed or trimmed before the start of wildfire season. The trees were located on federally-managed land near the co-op's Black Butte Substation. Central Electric transmitted a request for permission to proceed to the federal land agency on February 14, 2019. The request sat idle and garnered no response until I raised the issue with CEQ and BLM representatives during a trip to Washington, D.C., in the last week of April. Shortly after my return, on May 6, 2019, the Notice to Proceed was issued. While three months passed before getting approval, it took only 3 days to remove the 30 dead and dying trees that posed a wildfire threat.

In a nearly identical situation with a neighboring land management agency district, Central Electric requested the removal of more than 50 trees and received almost immediate permission to proceed with removal of these trees. This situation highlights the inconsistent application of policies by local federal land managers. There should not be differing cooperation and responsiveness between neighboring district offices, especially when it comes to removing vegetation that can come into contact with electric lines and create wildfires.

Unfortunately, the delay associated with the project to remove the 30 dead and dying trees is not an isolated event. Currently, Central Electric is seeking approval to replace 131 aging power poles and remove encroaching vegetation along a 13-mile overhead power line route in the Camp Sherman area. The poles, initially installed in the 1940s, will be replaced with taller poles and longer cross arms to enhance reliability, resiliency, and reduce the risk of our infrastructure to wildfire ignitions. Central Electric also requested permission to remove every tree within ten feet of the centerline of the existing above-ground utility power lines, including dead snags, leaning trees, and limbs outside of ten feet, which could fall into contact with the power line. Replacing the poles and clearing the proper width within our established rights-of-way will help ensure public and employee safety, maintain fire precautions, prevent winter snow loads, and provide reliable power for our members.

In this case, Central Electric transmitted the Standard Form 299 Application to the federal land agency on April 17, 2019, to replace the poles and perform vegetation management. The application also expressed our desire to begin the work early this year, as weather permits, and to complete the work this spring. The window of opportunity in Camp Sherman to perform the job before the fire season remains limited due to heavy winter snow and wet spring months.

Between submitting the application and two subsequent meetings with district staff, eight months had elapsed before the federal land agency decided to post a Proposed Action to solicit public input, which includes a two-week comment period. The Proposed Action, announced on January 16, 2020, only occurred after multiple follow-ups with the district, including a personal visit by me. The delayed Proposed Action notice, the two-week comment period, and ongoing uncertainty as to when the district interdisciplinary team will complete their analyses jeopardizes whether the pole replacement and vegetation management can occur in time.

While sharing these stories helps to illustrate the practical challenges we face, my intention is not to come before you today and complain about the problems electric co-ops have encountered with the federal land agencies or denigrate the land management professionals. They work hard with the resources they have available. I am here to discuss solutions and communicate where the federal government can lend assistance through support and improvement of certain policies and practices.

The West is hotter, dryer and has more dead or dying trees on the ground than at any time in previously recorded history. Our wildfire season has become longer, and tree mortality now exceeds tree growth on U.S. Forest Service land as stated in their own inventory analysis.

If we remove power lines as an ignition source, we are still very much at risk of a forest wildfire. The California Department of Forestry & Fire Protection estimates that only 10 percent of its fires were caused by power lines. However, the deadliest and most destructive fire in California history was ignited by power lines, and now electric utilities and wildfires are linked in the public's mind. Electric cooperatives have always done our part to limit power lines as an ignition source; but given the changing climate and increase in tree mortality, additional actions must be taken.

Along these lines, we applaud the Administration's decision to direct the Council on Environmental Policy to reform its regulations for implementing the National Environmental Policy Act. These regulations have not been updated in more than four decades and are in need of modernization to facilitate more efficient, effective, and timely environmental reviews and approvals. The updated policy will ensure clarity and certainty and eliminate costly project delays for electric cooperatives when maintaining or upgrading transmission and distribution facilities on federal lands.

In Oregon, we are taking a unique approach to implementing the principles of the National Cohesive Wildland Fire Management Strategy. In March, Oregon electric co-op leaders will convene a workshop with state, regional and district land management agencies to develop methods by which all stakeholders can take increased actions to reduce wildfire risk within utility corridors and adjacent lands. We appreciate the strong support of the federal land management agencies to work collaboratively to implement the Cohesive Strategy principles. The workshop and its stated outcome of creating an agreement between the stakeholders will model the success similar to the Conservation Agreements with Assurances used in Oregon for the sage grouse.

These agreements, when completed, will be signed by Oregon's electric cooperatives and federal and state land management agencies. To ensure these agreements endure leadership changes at the local level, it is critical they have the support of the U.S. Department of the Interior and the U.S. Department of Agriculture. It would be a significant gesture of support for the Secretaries of Interior and Agriculture to lend their signatures to these agreements. Cabinet-level leadership will help to eliminate the differing cooperation and responsiveness we experience between district offices.

In closing, I would like to reiterate that while significant challenges remain, there is great opportunity to work collaboratively to better understand the practical risks and devise workable policy solutions that enable the steps electric cooperatives are already taking voluntarily to mitigate for wildfires. We appreciate the Committee's attention to this critical issue.

Thank you for the opportunity to testify. I would be pleased to answer any questions.

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

We have concluded the opening statements, and before we move to member questions, I want to be really 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's 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 med-

ical 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 years notifying everybody in California in our service area about the potential to have these PSPS events, and 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 dangerous 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 their 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 kinds 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 interfaces 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 [continuing]. 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 had 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 two 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 lines.

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.

Dr. 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?

Dr. DAVIS. How the fires are fought, but, also, the location of those forests.

Mr. WALDEN. Right.

Dr. DAVIS. The east side of the forests is drier than the 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 costs, 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.

Dr. 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 the 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?

Dr. 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.

Dr. 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.

Dr. 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.

Dr. 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?

Dr. COLLINS. Well, I wouldn't say impossible.

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

Dr. 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.

Dr. 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?

Dr. COLLINS. No, not on every acre. No, not at all.

Ms. DEGETTE. Right. Yes. OK. Thank you.

Thank you. I yield back.

Mr. RUSH. The gentle lady 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?

Dr. DAVIS. Absolutely.

Mr. SHIMKUS. And, Dr. Collins?

Dr. COLLINS. Yes.

Mr. SHIMKUS. OK. 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. OK. 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, and the other in 2025.

Mr. SHIMKUS. So, how much megawatts of 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, three 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. OK. 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? OK.

Mr. JOHNSON. The ratepayers.

Mr. SHIMKUS. That would be these three 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. OK.

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 [continuing]. 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 Chicago land 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 ten 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 cer-

tainly 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. OK. 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. We can work on, forest management. But you have heard throughout the hear-

ing so far that there have been efforts to distract us, to divert us over, by adding into some of the issues, 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, and 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?

Dr. 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 and 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?

Dr. 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.

Mr. PALLONE. 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, and 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.

Mr. PALLONE. 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.

Mr. PALLONE. All right. Dr. Davis, did you want to comment?

Dr. 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.

Mr. PALLONE. OK. 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 an interesting place here. It is one 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.

Mr. PALLONE. 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?

Dr. 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?

Dr. 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 they 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?

Dr. 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.

Dr. 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?

Dr. 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.

Dr. 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?

Dr. 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 gentle lady 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?

Dr. 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.

Dr. 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 are 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 expo-

sure. 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. OK. Do our constituents have tools to monitor this smoke and, more specifically, elevated levels of PM in the event of a large wildfire?

Dr. 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. If suspect 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 necessarily 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. OK. 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 the 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 gentle lady 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, and 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, and 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?

Dr. 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? Does anybody disagree with that notion?

Dr. 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 for 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 was talking about the issue involving the approval process that may include the Historic 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 a 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. OK. 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 right-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 shout out there.

And I thank the witnesses. Your testimony has been very helpful; a lot of good suggestions or recommendations. PG&E showed what was 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, is 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?

Dr. COLLINS. Are we talking about federal land?

Mr. MCNERNEY. Federal land.

Dr. 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?

Dr. 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?

Dr. 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?

Dr. 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?

Dr. 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 kinds 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?

Dr. 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?

Dr. 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 a 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?

Dr. 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. OK. 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 the 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?

Dr. 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 represent 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 historical 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?

Dr. 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 ten 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 are 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 ten seconds, to you both, if we continue on the current path, do forest fires become more prevalent or less frequent? Dr. Davis?

Dr. DAVIS. The models show us that they will be more prevalent.

Mr. KENNEDY. Dr. Collins?

Dr. 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, the 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. OK. 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. OK. 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 gentle lady 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, and 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. 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 gentle lady 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 prevent us from enjoying the all-important ecological benefits of a more resilient forest?

Dr. 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?

Dr. COLLINS. The challenges to just the general public or?

Mr. FLORES. Yes.

Dr. COLLINS. You mean in terms of mitigating it or——

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

Dr. COLLINS. When a wildfire happens?

Mr. FLORES. Yes. Fires from the smoke.

Dr. 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.

Dr. 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.

Dr. 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 are 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 are 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. OK. 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. OK. 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. OK. And did you have to cut off gas? OK, 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. OK.

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

Mr. FLORES. OK. 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. OK. 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; 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 economical, 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. OK. 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 on 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, and emphysema. And chronic exposure can decrease lung function, even in non-asthmatic children. So, lingering smoke is correlated with an 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, and 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?

Dr. 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?

Dr. 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?

Dr. 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?

Dr. 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 the 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, and 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 are 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. OK. 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. OK.

Mr. SCHRADER. You had asked to remove some hazardous fuel, and 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. OK. Actually, down in La Pine, it was with Midstate Electric Cooperative.

Mr. RUIZ. Right. Yes.

Mr. MARKHAM. And they had requested removal of a dangerous 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 costs 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 ten 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?

Dr. 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, or 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 gentle lady 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, industries, 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?

Dr. 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 the accumulation of surface fuel on the forest floor. But it did that in 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?

Dr. 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.

Dr. COLLINS. It is true.

Mrs. RODGERS. Thank you, Mr. Chairman.

Mr. RUSH. The gentle lady 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 appears at the conclusion of the hearing.]

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, and 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, and 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?

Dr. 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?

Dr. 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?

Dr. 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.

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

Mr. PETERS. OK.

Dr. 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, and 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 forestlands, 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 represents the entire coast of Georgia and goes all the way across, almost halfway across Georgia. So, I have the Georgia-Flor-

ida 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 the 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?

Dr. 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?

Dr. 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?

Dr. 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?

Dr. 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 gentle lady from California, Ms. Barragán, for 5 minutes.

Ms. BARRAGÁN. 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 areas 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. BARRAGÁN. What do you envision that carbon standard by the Congress would be like?

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

Ms. BARRAGÁN. OK. 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. BARRAGÁN. 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 gentle lady 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.

Dr. 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?

Dr. 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 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 the 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, of 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.

Dr. COLLINS. One thing I think you brought up, which is kind of interesting, is that we need to differentiate between the 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.

Dr. 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 economy. 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 is 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?

Dr. 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 at 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.

Dr. 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?

Dr. DAVIS. There is excellent research being conducted. I do believe that, if we reframed 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, and 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 gentle lady 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 strengthening 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, and 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 are 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 renewable 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 are 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 rooftops. 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 gentle lady 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, for 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 [continuing]. To keep the grid reliable?

Mr. MARKHAM. Yes, absolutely. Yes.

Mr. GIANFORTE. OK. 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 gentle lady 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, DC, 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 three, 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 ten 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 three 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. OK.

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 with 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—OK.

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, and 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 three 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 gentle lady'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 ten 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 gentle lady 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 [continuing]. 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 backcast 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, and 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. Cárdenas, for 5 minutes.

Mr. CÁRDENAS. 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. CÁRDENAS [continuing]. 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. CÁRDENAS. 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. CÁRDENAS. It is important.

Mr. JOHNSON. It is a year later.

Mr. CÁRDENAS. OK. A year later?

Mr. JOHNSON. Yes.

Mr. CÁRDENAS. OK. Now a year later to get an answer?

Mr. JOHNSON. Yes.

Mr. CÁRDENAS. It doesn't mean that a year later, you get the answer and they say, "OK, 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. CÁRDENAS. OK. 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?

Dr. DAVIS. It is a term that has really gained a lot in modern vocabulary, recognizing the size, the number of acres——

Mr. CÁRDENAS. Because there is a greater frequency of megafires today than perhaps we were recording decades ago?

Dr. DAVIS. Correct.

Mr. CÁRDENAS. Is what is going on in Australia, is that in any way categorized as a megafire?

Dr. 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. CÁRDENAS. So, when people say fires have been going on since the beginning of time, that is a fact.

Dr. DAVIS. Yes.

Mr. CÁRDENAS. 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?

Dr. 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. CÁRDENAS. 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?

Dr. 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. CÁRDENAS. 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?

Dr. DAVIS. I am not familiar with the situation.

Mr. CÁRDENAS. Anybody at the table?

[No response.]

OK. 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.

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 ten 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.]

[Material submitted for inclusion in the record follows:]

News

As Australia burns, the same ingredients for disaster are found in N.J.

Posted Jan 09, 2020

A member of the New Jersey Forest Fire Service works on a prescribed burn. (Photo courtesy of the New Jersey Department of Environmental Protection) Photo courtesy of the New Jersey Department of Environmental Protection

By: Michael Sol Warren | NJ Advance Media for NJ.com

Apocalyptic scenes from Australia — products of historic, sweeping wildfires in the country's southern region — have gripped the world's attention in recent weeks. Bushfires have killed 26 people since the burning began in October, according to The Guardian, and over 2,000 homes have been destroyed, according to a CNN report. Over 1 billion animals are believed to have been killed by the fires, according to a USA Today report. Images of the blazes have spread throughout social media, spurring mass sympathy and international calls for donations (here's a list of places you can give money to, compiled by The New York Times.)

matthew abbott
@mattabbottphoto

My last day of the decade felt like the apocalypse. Been covering the Australian bushfires for the last 6 weeks, but haven't seen anything like yesterdays fire that decimated the town of Conjola, NSW. #bushfirecrisis #AustralianBushfires #NSWisburning work for @nytimes

The threat of similar devastation has long existed in New Jersey's Pinelands. During a three-day stretch in April 1963, 37 major fires simultaneously burned in the Pinelands, killing seven people and scorching 193,000 acres. And just last year, the 11,000-acre Spring Hill fire struck a remote section Burlington County (no one was killed).

Greg McLaughlin, the chief of the New Jersey Forest Fire Service, said Wednesday that the fires in Australia are fueled by dense brush vegetation. In the Garden State, particularly in the Pinelands, similarly dense brush exists between the towering pine trees.

Some of the most striking images and stories from the Australian fires stem from urban areas threatened by the flames. Much of the inferno has burned in the province of New South Wales, which contains Sydney, the country's largest metropolis at more than 5 million people.

In New Jersey, the nation's most densely populated state, that threat is just as real. McLaughlin said that about 40% of New Jersey homes are in areas considered to be wildland-urban interface — a transition zone between unoccupied land and urban areas.

We know that we have many similarities," comparing New Jersey and Australia. "We know that bad things here can happen because of fire."

At the heart of the state's fire defense are prescribed burns: the practice of intentionally setting small, controlled fires to clear out the brush that may fuel future wildfires.

New Jersey has an annual goal to conduct controlled burns on 20,000 acres of land, McLaughlin previously told NJ Advance Media. The Prescribed Burn Act, signed by Gov. Phil Murphy in 2018, directs state agencies to facilitate more burns statewide.

"I don't think we are in a place where we would be subjected to the level of devastation that [Australia is] experiencing, because we take the measures that are necessary to prevent that kind of disaster," McLaughlin said.

McLaughlin also touted the state's ability to rapidly respond when fires do break out. He said that New Jersey experiences about 1,000 wildfires each year, but he estimates that up to 85% of those fires are kept to half-an-acre or smaller in size thanks to quick reaction from the NJFFS.

Climate change makes all of this trickier, however.
In Australia, there's a good chance that an ongoing drought — which likely would've

occurred naturally thanks to expected weather patterns — has been exacerbated by climate change, according to New Jersey State Climatologist David Robinson. The area in which most of the Australian fires are burning is expected to become drier as the planet warms into the future, Robinson said.

New Jersey's fire risk is also affected by climate change, but in a different way. For the most part, Robinson said, the Garden State is expected to become increasingly wetter and hotter.

Robinson also said that precipitation in New Jersey is expected to take on a more feast-or-famine color; the state experienced a flash drought last September, for example.

"Had we not had abundant rains return in October, we could've been faced with a fall fire season," Robinson said.

Those changes make it more likely for fires to burn in New Jersey throughout the year, Robinson said, rather than during the state's traditional fire season, which runs from mid-March through the end of May.

McLaughlin said he doesn't expect large fires like last year's Spring Hill Fire to become more frequent in New Jersey. But, he echoed Robinson in predicting that the Garden State's shifting weather patterns will make fires are more likely to occur at any time during the year rather than the traditional fire season.

McLaughlin said that climate change is reshaping the Pinelands in other ways as well. He noted the spread of new pests, like the Southern Pine Beetle, into New Jersey from the South as a threat, because the bugs kill trees. The dead trees then become prime fuel for a future life.

Michael Sol Warren may be reached at mwarren@njadvancemedia.com. Follow him on Twitter @MSolDub. Find NJ.com on Facebook

January 28, 2020

The Honorable Bobby Rush
Chairman, House Energy & Commerce Subcommittee on Energy
2125 Rayburn House Office Building
Washington, DC 20515

The Honorable Fred Upton
Ranking Member, House Energy & Commerce Subcommittee on Energy
2322 Rayburn House Office Building
Washington, DC 20515

The Honorable Paul Tonko
Chairman, House Energy & Commerce Subcommittee on Environment and Climate Change
2125 Rayburn House Office Building
Washington, DC 20515

The Honorable John Shimkus
Ranking Member, House Energy & Commerce Subcommittee on Environment & Climate Change
2322 Rayburn House Office Building
Washington, DC 20515

Dear Chairman Rush, Chairman Tonko, Ranking Member Upton and Ranking Member Shimkus:

Due to San Diego Gas &Electric's (SDG&E) extensive experience and our ongoing efforts to mitigate and prepare for wildfires, I thought it was important that we submit a statement for the record of today's hearing, "Out of Control: The Impact of Wildfires on our Power Sector and the Environment."

I am extremely proud to say that SDG&E is a recognized leader in wildfire risk management having received the prestigious Edison Award by the Edison Electric Institute for our work on grid resiliency. We also continue to collaborate and share what we have learned with other utilities in California and beyond.

SDG&E's journey began over a decade ago when the San Diego region experienced unprecedented levels of destruction from firestorms in October 2007. These fires were ranked among the most destructive in California's history at the time, with unprecedented weather

conditions and an historic drought as contributing factors. That experience was a game changer for our company, and it reinforced our focus on always maintaining a safe and reliable system.

Over the last 12+ years, we have concentrated on three main areas: 1) building situational awareness through technological innovation; 2) hardening our infrastructure; and 3) communicating and collaborating with the community. Among many innovative programs, we have upgraded more than 18,000 poles from wood to steel, have stepped up vegetation management efforts with approximately 463,000 trees trimmed and evaluated every year by a team of highly trained arborists, formed a new Wildfire Safety Community Advisory Council, and a Fire Science and Innovation Lab is scheduled to open later this year.

Our team made the conscious decision early on to invest in a meteorology team, a fire coordination team (comprised of former firefighters), a sophisticated weather monitoring network, and mountaintop cameras to help monitor fires in real-time, enhancing the collective situational awareness of SDG&E. Our network of more than 190 weather stations is the world's first utility network of its kind capable of providing reads on temperature, humidity and wind every 30 seconds, allowing us to make more precise, data-driven decisions to keep our communities safe. This data is then shared with the 50-plus fire agencies that serve our region.

However, building situational awareness through technological innovations is only one piece of the puzzle. We must ensure that our infrastructure can sustain extreme weather conditions. Back in 2007, poles were designed to withstand 56 mph wind speeds, per California Public Utilities Commission requirements. Through our meteorological data, we learned that there are areas in the San Diego backcountry that experience greater than 100 mph wind gusts. Over the past decade, SDG&E has strengthened 400 miles of our transmission system in our High Fire Threat District (HFTD) by replacing wood poles with more durable and weather resistant steel poles, upgrading to larger conductors and extending spacing between the conductors. As a result of extensive in-house analysis, our design standard is now 85 mph and 111 mph in our highest fire risk areas. SDG&E is also installing sensitive electronic protective equipment and deploying technology that will de-energize electric lines before they hit the ground should there be an event that would cause them to fall.

Furthering our weather hardening efforts is a vegetation management program like no other. Using a team of certified arborists, we developed a program to annually manage 463,000 trees by tracking their growth rate, species, proximity to electric lines, and height.

The third and last major piece is communicating and collaborating with the community. When we first introduced de-energization (Public Safety Power Shutoffs or PSPS) in 2008, we held

January 28, 2020

town hall meetings to directly communicate with residents in impacted areas and worked hard to build credibility and trust with our community partners. Those outreach efforts have expanded since then to include Wildfire Mitigation and Resiliency Fairs where customers have the opportunity to engage with SDG&E employees, including our meteorology, fire coordination and vegetation management teams, to ask questions about PSPS, emergency preparedness, and get a better understanding of what the company is doing to keep our community safe. Attendees also receive emergency kit backpacks, information about developing emergency plans, and ways of designing and modifying the space around their home to help resist wildfire.

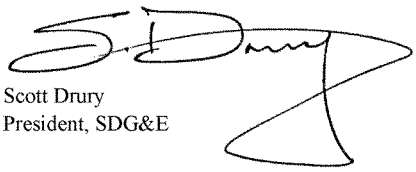
Last fall, a 10-member Wildfire Safety Community Advisory Council was formed to bring together a group of diverse local leaders from public safety, tribal government, business, nonprofit, and academic organizations, to collaborate on how we can continue to help protect the region from wildfires.

As you can see, the team at SDG&E has accomplished a great deal in the last decade. However, to truly appreciate our efforts, the best way is to see them in person. I would like to invite you, the members of your committee and staff to come to San Diego and spend some time in our Emergency Operations Center where you can observe in real-time what we do every day to protect our community.

Today our level of awareness and preparation is drastically different than on that first day in 2007 when the National Weather Service declared a Red Flag warning. I am truly proud of what we have already accomplished and am confident that we will continue to improve through the ongoing efforts of our employees and our community.

Thank you for the opportunity to submit these remarks and for your time and attention. I hope to see you in San Diego.

Sincerely,



Scott Drury
President, SDG&E

Edison Electric INSTITUTE

Power by Association

The Honorable Frank Pallone
Chairman
Committee on Energy & Commerce
U.S. House of Representatives
Washington, DC 20515

The Honorable Greg Walden
Ranking Member
Committee on Energy & Commerce
U.S. House of Representatives
Washington, DC 20515

Statement for the Record
Hearing on
The Impact of Wildfires on the Power Sector
January 28, 2020

The Edison Electric Institute (EEI) appreciates the opportunity to submit this statement on the impacts of wildfires on the electric power sector and efforts to mitigate wildfire risk and increase the resilience of the energy grid.

EEI is the association that represents all U.S. investor-owned electric companies. Our members provide electricity for more than 220 million Americans and operate in all 50 states and the District of Columbia. The electric power industry supports more than 7 million jobs in communities across the country and contributes $865 billion annually to U.S. gross domestic product, about 5 percent of the total.

EEI's member companies invest more than $110 billion each year to make the energy grid stronger, smarter, cleaner, more dynamic, and more secure; to diversify the nation's energy mix; and to integrate new technologies that benefit customers. Across the industry, there is strong evidence of their commitment to get as clean as they can, as fast as they can, while keeping reliability and affordability front and center, as always, for the customers and communities they serve.

We appreciate the Subcommittee on Energy and the Subcommittee on Environment and Climate Change holding a joint hearing on this important issue. EEI's member companies are focused on devising and implementing comprehensive programs to mitigate and manage the risks that electric transmission and distribution equipment may pose in an environment of heightened wildfire threats. These plans include expanding vegetation management cycles, improving emergency response capabilities, and making new infrastructure and technology investments.

Much attention obviously is focused on California, but communities throughout the West are facing increased wildfire threats, and wildfires occur in almost every state in the country. That is why our industry has elevated its wildfire risk mitigation and response efforts to a national level.

While the focus of this hearing is wildfires, it is important to note that the electric power sector takes an all-hazards approach to protecting the energy grid. This includes improving resilience in the wake of natural hazards like wildfires, severe weather, and earthquakes, as well as malicious threats like cyber and physical attacks on critical infrastructure.

The CEO-led Electricity Subsector Coordinating Council (ESCC) serves as the principal liaison between the federal government and the electric power industry, with the mission of coordinating efforts to prepare for, and respond to, national-level disasters or threats to critical infrastructure. The ESCC focuses on actions and strategies that help protect the grid, prevent various threats from disrupting electricity service, and develop capabilities that help the sector quickly respond and recover when major incidents impact the grid.

The ESCC includes CEOs and executives from electric companies, public power utilities, and electric cooperatives, as well as their trade association leaders, who represent all segments of the electric power industry. Through the ESCC, the industry works closely with its government partners, including senior administration officials from the White House, cabinet agencies, federal law enforcement, and national security organizations. Canadian electric company executives also are represented on the ESCC due to the international interconnection of the North American energy grid.

Given the risks and impacts associated with wildfires, the ESCC has made wildfire mitigation and response a priority. Specifically, this partnership is focused on deploying system hardening and resilience solutions while also improving operations and response processes, including:

- Developing improved practices for wildfire prevention, mitigation, and response through the EEI National Response Event framework and the Association of Edison Illuminating Companies.

- Working with the Department of Energy (DOE) and Grid Modernization Laboratory Consortium (GMLC) to expedite deployment of technology to mitigate the wildfire risks that electric equipment may pose, including sensing and detection technologies; enhanced situational awareness tools; modeling and analytical capabilities; and spark prevention solutions.

- Leveraging government and private-sector satellite imagery to identify priorities for risk mitigation and wildfire response.

- Supporting more aggressive vegetation management in rights-of-way, as well as improving access to federal lands to limit contact with power lines.

- Partnering with the Power Marketing Administrations, which operate electricity infrastructure throughout the West.

In addition to these industry-wide public-private partnerships, EEI and its member companies also are utilizing existing mutual assistance frameworks to expedite deployment and integration of system hardening technologies and solutions. These include selective undergrounding of high-priority lines, the use of covered conductor to limit sparking of broken lines, and expanded use of automatic reclosers with more sensitive settings to prevent sparking when debris blows into power lines.

The mutual assistance construct, a hallmark of this industry, can play an important role in responding and recovering from incidents. In fact, EEI's National Response Event framework and member companies' mutual assistance networks were used in November 2019 to marshal nearly 1,000 workers from across the country to support inspections and power restoration following a Public Safety Power Shutoff (PSPS) event in California.

The work of wildfire risk mitigation and response requires significant labor resources from the affected companies, the mutual assistance network, and the electrical contractor community. Ensuring these resources can be deployed quickly, with as few barriers as possible, can help expedite inspections, system hardening, and restoration work.

California's unique wildfire liability regime—which holds electric companies strictly liable for all damages resulting from any fires that may have been ignited by their equipment even if the company did not act negligently—makes it more difficult to provide mutual assistance. The entire electric sector is proud of the quick response that is always provided when help is needed to restore power, and concerns about liability are not an issue for mutual assistance efforts after storms and other disasters. EEI is working to try to address concerns that those companies who provide Good Samaritan assistance in California also may be held liable for damages. Customers in other states should not have to bear the burden of these strict liability damages because their local electric company stepped up to help.

As noted above, managing vegetation on electric transmission and distribution rights-of-way (ROWs) is another key part of our industry's efforts to reduce potential wildfire risks while protecting the security and reliability of the energy grid. Electric companies must have timely access to ROWs to perform necessary vegetation management, as well as routine operations and maintenance work. However, additional challenges arise when ROWs cross federal lands, where companies face significant delays in obtaining approvals from federal land management agencies to

implement comprehensive vegetation management programs, both within and abutting their ROWs.

With the increase in devastating wildfires, EEI and its member companies have sought to address vegetation hazards proactively and to resolve difficulties in accessing ROWs. For more than a decade, EEI has placed the issue front and center as a major policy issue for our membership. EEI members have testified before Congress on the importance of vegetation management and support legislation that would facilitate their ability to manage and mitigate potential wildfire risks. We also have worked extensively and consistently with the federal land management agencies on administrative pathways for implementing a more coordinated and cooperative approach to ROW vegetation management programs across the landscape.

In 2016, EEI and the federal agencies renewed our Memorandum of Understanding on Vegetation Management for Power Line Rights-of-Way (MOU) to facilitate cooperation and coordination among the parties within and immediately adjacent to existing and future power line ROWs and associated facilities. The MOU facilitates implementation of cost-effective and environmentally sound vegetation management plans, procedures, and practices for power line ROWs that will reduce adverse environmental and cultural impacts while enhancing the ability of electric companies to provide uninterrupted electricity to customers and to address public safety.

We appreciate the work done by Congress to develop and pass the vegetation management provisions for power line ROWs on federal lands in the FY 2018 Omnibus Appropriations Act (Act). Building on the success of the MOU, the legislation directs electric companies to prepare, and federal land managers to review and approve, comprehensive operating plans for their electric facilities on Bureau of Land Management (BLM) and National Forest System lands. The Act also authorizes electric companies to address imminent threats from "hazard" trees.

The goal of the 2018 legislation is to decrease case-by-case approvals for routine vegetation management and O&M activities. EEI is working closely with electric company vegetation managers and federal land agencies to ensure full and effective implementation of the Act; we appreciate Congress's ongoing interest in achieving that goal.

EEI filed comments in November 2019 on the Forest Service's proposal to implement the Act, requesting several clarifications and advocating for the necessary categorical exclusions to expedite approvals. We expect BLM to initiate a similar process soon. In the interim, both agencies have issued guidance to their field offices directing them to facilitate electric company vegetation management work in a timely manner to reduce the risk of wildfires and to ensure reliability.

Electric companies are taking steps to mitigate the risks that transmission and distribution equipment may pose in an environment of increased wildfire risks in California, the West, and throughout the country. While electric company equipment can spark wildfires, many other factors contribute to the increased risk. Local land use and planning may be outside the jurisdiction of this Committee and Congress, but federal legislators must encourage and incent states to develop comprehensive plans to mitigate overall wildfire risks.

These plans must address zoning and land use policy that allows continued development and redevelopment in the wildland urban interface (WUI). They also must address homeowner resilience efforts and building codes and standards, as well as appropriate insurance coverage for citizens who choose to live in high wildfire risk areas. In addition, states must better fund efforts to manage their own forest lands, as well as their own fire suppression efforts. Electric companies, whose employees live and work in the communities they serve, want to partner with states and localities to develop and implement these comprehensive wildfire risk and damage plans.

EEI appreciates the opportunity to submit this statement, and we look forwarding to continuing to work with the Subcommittees and others in Congress to address these important issues.

January 28, 2020

The Honorable Bobby Rush
Chairman, Energy Subcommittee
of the House Energy & Commerce Committee
2188 Rayburn House Office Building
Washington, DC 20515

The Honorable Fred Upton
Ranking Member, Energy Subcommittee
of the House Energy & Commerce Committee
2183 Rayburn House Office Building
Washington, DC 20515

The Honorable Paul Tonko
Chairman, Environment and Climate
Change Subcommittee
of the House Energy & Commerce Committee
2369 Rayburn House Office Building
Washington, DC 20515

The Honorable John Shimkus
Ranking Member, Environment and Climate
Change Subcommittee
of the House Energy & Commerce Committee
2217 Rayburn House Office Building
Washington, DC 20515

Dear Chairman Rush, Ranking Member Upton, Chairman Tonko, and Ranking Member Shimkus:

I founded a company, Jupiter Intelligence (Jupiter), that predicts risks from weather and climate change. Recently, Jupiter has updated its prediction services and tools to include fire risk.[1] I am writing to share some information on your important hearing topic of wildfire impacts on the power sector. I do not need to explain the causes of the recent wildfires in California or Australia, which will only be exacerbated by climate change over time.

What might be new and interesting are **Jupiter's technology, services, and particularly its newer applications for utilities and other entities/key stakeholders to help predict the risks of wildfires, with the obvious aim of helping to mitigate such risks and their impacts.**

Critical infrastructure sectors and government need to do more to enhance emergency preparedness, planning, and resilience, especially in programs related to infrastructure investment. Events such as Hurricane Katrina, Superstorm Sandy, Hurricane Harvey, Midwest flooding, and the California wildfires dramatically illustrate the need for improvement in planning for, predicting, communicating, and reducing the risks of impacts from extreme weather that touch nearly every urban and rural area of the nation.

[1] Jupiter's customers include some of the world's largest insurance companies and mortgage firms, power providers, resource companies and ports, large cities, the states of Florida, New York, and Texas, and globally.

Some of the Challenges

Costs for emergency response and disaster recovery are almost always more on the back end, especially in the long run, than proactive efforts to prevent the worst potential impacts of extreme events. Between FY 2013 and FY 2018, FEMA Disaster Relief Fund spending grew 140 percent – from $11.1 billion to $26.4 billion. Not only that, costs for emergency response and disaster recovery, especially from FEMA, actually are increasing much faster than GDP or government revenues.[2]

- In addition, electric utilities generally are not ideal candidates for new, innovative technologies, because they have more traditional business models and longer processes to work through their state utility commissions to get approvals for rate recovery on capital investments. The public sector similarly has different processes and profit motives for infrastructure investments.[3]

- The State of California is only now rolling out funding for technology investment and is just beginning to talk about this.

Jupiter's Solutions

Jupiter has created the ***world's most sophisticated wildfire risk platform, called FireScore™ Operations (FireScore).*** FireScore provides hyper-local probabilistic projections of wildfires on time horizons ranging from a few hours to a few days. This tool, as well as related tools that predict flooding, wind, and extreme heat events on critical time scales, from hours or decades, enable Jupiter to help its customers assess the vulnerability of systems and critical infrastructure. They then can make operational and planning decisions based on their unique set of assets, risk profile, and operational time horizons that improve their resilience.

More specifically, the FireScore tool integrates real-time and forecast weather data, fire spread modeling, and satellite observations into high-resolution, hyper-local wildfire risks, conditions, and likely behavior that is significantly clearer, and more granular, timely, and accurate than all other products. Public and private sector decision makers, such as emergency managers and electric utility executives – already among Jupiter's customers – can have access to (identical) information that can enhance their situational awareness regarding threat levels, which, in turn, can increase lead time, and improve and accelerate their ability to make critical decisions regarding evacuations, or where and when grid de-energization may be warranted, due to the likelihood of outage-producing winds.

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[2] FEMA, *Disaster Relief Monthly Report*, updated May 8, 2019, available at: https://www.fema.gov/media-library/assets/documents/31789.

[3] Lerman, Rachel, "Why tech has been slow to fight wildfires, extreme weather," Washington Post, January 22, 2020, available at: https://www.washingtonpost.com/national/energy-environment/why-tech-has-been-slow-to-fight-wildfires-extreme-weather/2020/01/22/da0afd72-3d77-11ea-afe2-090eb37b60b1_story.html.

To elaborate further, FireScore enables fire fighters, public safety and emergency management agencies, and others to:

- Assess probable wildfire risk during events, including those driven by wind (e.g., Santa Ana) conditions;
- Pre-position and optimize resources;
- Monitor new ignitions; and,
- Predict fire spread for evacuation planning and fire suppression strategies.

For example, in the case of a utility that has transmission lines and/or other equipment spread over land that is increasingly dry and flammable, Jupiter can help it undertake steps to reduce risk by understanding: the most immediate risks from factors like temperature, wind and precipitation, as well as non-weather variables, such as the wildland-urban interface.

In the course of a recent interview, I stated that "[i]n many cases, companies don't even understand their current risk, let alone their future risk. We can go to a company and say, `You know, for this multi-billion-dollar power plant or this set of distributed transmission equipment, we'll tell you how great the risk is today. And if you want, we'll give you an emergency plan response system that you can integrate into your operations as well.'"[4]

Relatedly, Jupiter also has developed a HeatScore™ tool that predicts the number of extreme temperature days per year above a certain threshold over specified time frames at the asset level. It also can project heat stress parameters that may include humidity and wind.

This analysis enables entities, such as utilities, to:

- Based on a more localized examination of peak capacity and demand, better forecast and plan future loads and needs for different networks and rate critical equipment, such as transformers, particularly across extensive service territories where surface temperatures might vary greatly;

- Evaluate the representatives of existing weather data and metrics to help improve situational awareness and emergency response capabilities; and,

- Optimize capital spending to align expenditures with site-specific, anticipated operational degradation of equipment.

[4] Katz, Neil, "Climate Corner Office: Rich Sorkin, Jupiter Intel CEO, Believes Climate Predictions Will be Big Business," The Weather Channel, September 11, 2019, available at: https://features.weather.com/collateral/climate-corner-office-rich-sorkin-ceo-jupiter-intel/.

Policy Recommendations

1) Encourage the development of an extreme weather and climate vulnerability and risk assessment tool to assist relevant agencies and private sector entities in measuring how the risks associated with extreme weather events or climate change affect networks, systems, installations, facilities, and other assets, as well as operational or recovery plans and capabilities.

2) Where appropriate, consider adding to relevant planning and related efforts, the use of: "data and tools to assess risk-based vulnerabilities, potential impacts and disruptions to transportation systems, and cost-effective strategies to improve resilience."

3) With respect to evaluation efforts, consider ensuring that this evaluation tool also facilitates the evaluation of risk-based vulnerabilities, as well as the use of data and forecasting tools to optimize investments and minimize adverse impacts to transportation assets.

4) Increase opportunities and collaboration through public-private partnerships, so the private sector can continue to expand its innovation by leveraging and enhancing public sector investments.

Additional Background on Jupiter Intelligence

Jupiter uses the National Oceanic and Atmospheric Administration's (NOAA) and other federal weather prediction and climate models as inputs to its risk assessments. Its success is based on using dynamic modeling combined with Artificial Intelligence (AI), cloud computing, risk analytics, engineering, and complex models run on the latest computer hardware. Not only that, its models also are continuously fine-tuned using petabytes of constantly refreshed data from millions of ground-based and orbital sensors. Moreover, it offers an easy-to-use customer experience, with simple interactive visuals that look much like Google Maps, that allow users to zoom down to the city block or asset level to get a better sense of the potential risks they face from wildfires or other extreme events. Thus, Jupiter provides services that go far beyond what is available from the government or universities.

WIRED recently wrote: "If you run a business, or maintain a city, or plan power plants or highways or bridges, you'd like to know how bad things are, and how bad they're going to get. . . . Jupiter explicitly incorporates climate change into its models for catastroph[ic] risk, both proprietary and public, and then offers that knowledge to the kind of people who might lose money when the floods, fires, storms, and heat waves really kick in."[5]

[5] Rogers, Adam, "Companies Can Predict Climate Catastrophes for You – as a Service," *WIRED,* April 29, 2019, available at: https://www.wired.com/story/companies-can-predict-climate-catastrophes-for-you-as-a-service/.

Conclusion

A continued commitment from the National Weather Service, NOAA, the U.S. Department of Energy (DOE), and other federal entities to provide open access to model output and observational data is critical to enabling the private sector to do what it does best: provide consumable and actionable information to broad economic sectors. Jupiter understands many of the private sector's needs with respect to risk and climate information and can be helpful in identifying new roles for the public, private, and academic sectors.

Jupiter and other innovative technology companies can offer tremendous additional services to the United States with significant return on investment to the U.S. economy. The innovation that the private sector has demonstrated in technology, efficiencies, and advanced analytical techniques has not yet been fully applied to the weather and climate communities. Enhanced and thoughtful collaborations between the public and private sectors are likely to allow for unprecedented advances that will help secure the infrastructure, economy and people of the United States. Jupiter looks forward to Congressional support of these public-private collaborations to help improve national and resource security for the future.

Please let me know if I can be a further resource at any time. I can be reached at: rich.sorkin@jupiterintel.com.

Sincerely,

Rich Sorkin
CEO
Jupiter Intelligence

WESTERN GOVERNORS' ASSOCIATION

DOUG BURGUM
GOVERNOR OF NORTH DAKOTA
CHAIR

KATE BROWN
GOVERNOR OF OREGON
VICE CHAIR

JAMES D. OGSBURY
EXECUTIVE DIRECTOR

January 27, 2020

The Honorable Bobby L. Rush
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Subcommittee on Energy
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The Honorable Fred Upton
Ranking Member
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The Honorable Paul Tonko
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The Honorable John Shimkus
Ranking Member
Subcommittee on Environment and Climate Change
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2322-A Rayburn House Office Building
Washington, DC 20515

Dear Chairman Rush, Ranking Member Upton, Chairman Tonko, and Ranking Member Shimkus:

In advance of the Subcommittees' January 28, 2020 joint hearing, Out of Control: The Impact of Wildfire on Our Power Sector and the Environment, attached please find four Western Governors' items related to vegetation and wildfire management in utility corridors:

- An April 3, 2017 letter to the Chairman and Ranking Member of the House Natural Resources Committee requesting their expedited consideration of legislation supporting responsible vegetation management practices;
- Western Governors' Association (WGA) Policy Resolution 2017-10, National Forest and Rangeland Management, which addresses vegetation management in section B, paragraph 9;
- A copy of the Shared Stewardship Memorandum of Understanding executed between WGA and the U.S. Department of Agriculture (USDA) in December 2018, and;
- A December 11, 2019 letter to U.S Department of the Interior Secretary David Bernhardt and U.S. Department of Agriculture Secretary Sonny Perdue describing the next steps in an effort under the MOU to improve vegetation management in and near transmission and distribution corridors to reduce the likelihood of wildfire.

I request that you include these documents in the permanent record of the hearing, as they articulate Western Governors' policy positions and recommendations on this important issue.

Thank you for your consideration of this request. Please contact me if you have any questions or require further information. In the meantime, with warm regards and best wishes, I am

Respectfully,

James D. Ogsbury
Executive Director

Attachments

WESTERN GOVERNORS' ASSOCIATION

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Dennis Daugaard
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April 3, 2017

Honorable Rob Bishop
Chairman
House Natural Resources Committee
1324 Longworth House Office Building
Washington, D.C. 20515

Honorable Raul Grijalva
Ranking Member
House Natural Resources Committee
1329 Longworth House Office Building
Washington, D.C. 20515

Dear Chairman Bishop and Ranking Member Grijalva:

We understand there are plans to reintroduce bipartisan legislation – the Electricity Reliability and Forest Protection Act – that would, if enacted, help ensure reliable electricity service and reduce the risk of fires and fire hazards that result from inadequate vegetation management on power line rights-of-way. Western Governors supported such legislation in the 114th Congress (H.R. 2358) and urge the Committee to give such legislation expedited review upon its reintroduction.

Western Governors recognize the importance of appropriate fire management and proactive wildfire mitigation. Additionally, we are committed to safeguarding and enhancing the reliability of the region's electric transmission grid. Western Governors' Association (WGA) Policy Resolution 2016-06, *Wildland Fire Management and Resilient Landscapes*, and the 2013 WGA Ten-Year Energy Vision further elaborate on these priorities. Legislation such as that advanced by the House last year can play an important role in realizing these imperatives.

Governors support legislation that recognizes the need for efficient cross-jurisdictional coordination and enables utilities to take necessary actions to enhance grid reliability and reduce the threat of wildfires to and from electric transmission and distribution rights-of-way. We suggest that the legislation include the following key elements:

- Provide electric utilities defined authority to remove dangerous trees even if they exist outside a designated right-of-way and allow pruning or removal of trees;

- Require that rights-of-way be developed in coordination with the right-of-way holder;

- Minimize the need for case-by-case or annual agency approval for routine vegetation management activities to facilitate inspection, operation and maintenance of the right-of-way and for activities necessary to control so-called "hazard trees" within or adjacent to the right-of-way;

- Require prompt review of vegetation management, facility inspection and operation and maintenance plans; and

- Require the relevant federal agency to apply National Environmental Policy Act categorical exclusion to plans developed in line with the legislation and on existing transmission and distribution rights-of-way.

Thank you for your leadership in advancing this important legislation, which seeks to provide another important tool for improving forest health across the West.

Respectfully,

Steve Bullock
Governor of Montana
Chair, WGA

Dennis Daugaard
Governor of South Dakota
Vice Chair, WGA

cc: House Natural Resources Committee Members

Western Governors' Association
Policy Resolution 2017-10

National Forest and Rangeland Management

A. BACKGROUND

1. The American West encompasses a huge landmass representing 2.4 million square miles or over two-thirds of the entire country. Over 112 million people live in these states and they reside in large, densely populated cities, smaller cities and towns and in rural areas.

2. Perhaps more than any other region, terrain, forces of nature, and land ownership patterns in the West underscore the purpose and vital need for a more active federal role in forest management. Western states include more than 75 percent of our national forest and grassland system. These public lands serve as critical economic drivers, and they provide numerous conservation benefits, water supply, and recreational opportunities for Western communities and the nation.

3. States have a particular interest in improving the active management of federal forest lands. State governments have trust authority over water, wildlife and forest resources, along with primary authority and expertise to protect community health and safety. Poorly managed forests can have significant and broad impacts on the landscapes and communities of the West, including negative impacts to air quality and public health, degradation of rivers and streams and associated water quality (including drinking water), reduced forage for domestic livestock, impaired habitats for wildlife and fish, and the loss of forest products and associated jobs.

4. Relative to decades past and other forest landowners, forest managers today operate under a constrained decision space as they work to address contemporary issues such as climate change, invasive pests and diseases, habitat diversity, fuel build-ups and fire risk, and legacy impacts. Adding to this challenge are concerns about the economic and social vitality of rural communities that experience impacts from reduced timber supply and compromised forest health. Displaced workers, declines in school enrollment, aging demographics, property loss, business closures and revenue impacts due to wildfire, and high unemployment are not uncommon to these communities.

5. States are managers as well, and many Western states own extensive public land holdings that require forest products infrastructure to achieve community vitality and land management goals, including ecological restoration objectives and healthy and resilient forests.

6. The U.S. Forest Service business model has historically been based on a combination of federal appropriations that were supplemented with revenue from resource sales and fees. Until the early 1990s, the Forest Service was a net contributor to the Federal Treasury. Over the past 20 years, timber sales have dramatically declined.

7. In addition, the last decade has seen several large, very expensive wildfires, which have increased the U.S. Forest Service wildfire suppression costs from 13 percent of the agency's FY 1991 budget to nearly 50 percent over the last several fiscal years. Consequently, under the current agency budgeting framework, forest management, hazardous fuels reduction, habitat improvement, and outdoor recreation programs have been negatively impacted across national forests and Department of Interior lands.

8. An April 2015 study by the U.S. Forest Service, the *Collaborative Forest Landscape Restoration Program 5-Year Report, FY 2010 – 2014*, found that the past century of wildfire suppression and legacy management practices have contributed to forests being overstocked and primed for larger and more intense blazes, and that changes in land use and increasing social pressures make it difficult for the agency to let fire play its natural role of clearing the forest understory in certain forest types. Active forest management has historically played a pivotal role in the growth and mortality cycle of forests to manage fuel loading, which in turn can reduce fire-fighting costs and improve habitat resilience. Today, the U.S. Forest Service estimates that roughly 90,625 square miles – an area larger than Utah – is at high or very high risk of severe wildfire and in need of treatment.

9. Insect infestation and disease have damaged many of the forests throughout the West. Severe drought conditions that are impacting western states, particularly California, have only exacerbated insect infestations and tree mortality. The impacts go well beyond fire risk, and timber and fiber production are negatively impacted, threatening the viability of the surviving forest product infrastructure. The significant decline in forest health has also created serious threats and challenges to watershed integrity, wildlife and fisheries habitats, recreational uses, businesses and tourism. All of these impacts present substantial challenges for forest-dependent communities across the West.

10. The dire forest conditions, unmet management needs, and the failure to provide lasting protections for some landscapes have brought diverse stakeholders together to find solutions. Community collaboration on forest health projects is robust in numerous places across the West forging broad agreements among diverse stakeholders on projects that encompass fuels reduction, fiber production, habitat restoration, long-term protection for critical areas, and other community objectives. It is not uncommon to find mill owners, hunters and anglers, loggers, small business owners, conservationists, and local elected leaders working together around the table.

11. Collaborative planning and project implementation across National Forests and state and private forest lands on a larger scale allows for more diverse interests to address their particular needs for a landscape or a watershed. Taking a broad look at a landscape for planning purposes minimizes the challenges associated with managing lands for the benefit of a particular species or to address a specific need. Well-planned projects that are strategically placed across a landscape can result in a higher level of benefits than those that are more randomly or opportunistically placed. Processes associated with planning and implementing a project have become so time consuming and expensive for National Forests in particular that a disincentive often exists for their managers to proceed with management actions that are needed to attain desired ecological, social, and economic objectives.

12. Collaborative efforts have shown initial successes in reaching consensus, but there is a shortage of formal mechanisms that encourage their creation in areas with conflict or reward their success within the context of public process. Further, there is little to no formal incentive for the management agencies and collaboratives to ensure collaborative work happens in a timely and efficient manner that achieves a pace and scale of management that matches the ecological, social, or economic needs of public and private forestlands and surrounding communities.

13. Despite this good work the full benefits of these collaborative efforts have not been realized on the land. Working constructively with collaborators requires resources to be productive and the federal agencies often lack the necessary staff and funding. In addition, the federal agencies have sometimes been reluctant to embrace collaboration, because they either have unclear legal authority to favor collaborative efforts or don't welcome the input.

14. Further, and even when collaborative forest health projects enjoy broad support from diverse stakeholders and the agencies, administrative objections and litigation remain a too frequent outcome. One result is that community collaborative efforts become fatigued, and future opportunities are lost. Another outcome is that Forest Service restoration projects often go through exhaustive, time-consuming analysis, driving up costs and preventing the agency from scaling up management to meet the scope of the problem.

15. Today the costs associated with planning and implementing a management project on National Forest lands are significantly more than those of the private sector. This cost, along with the time associated with drafting, analyzing, incorporating public involvement, and responding to appeals and/or litigation at the project level, lead many federal managers to focus their limited staff, funds and time on projects with the least likelihood to be challenged. This approach does not adequately address the larger socio-economic and ecological needs of our National Forests and dependent communities.

16. The 2014 Farm Bill provided the Forest Service with several new tools to accelerate forest restoration. A Governor could nominate landscapes substantially affected or threatened by insects and disease to the Secretary of Agriculture for designation as Priority Areas for expedited NEPA and administrative process and judicial review. 16 Western Governors nominated areas for this designation, the vast majority of which were approved by the Secretary of Agriculture.

17. In addition, the new Farm Bill authorities provided for a categorical exclusion (CE) for insect and disease projects on areas as large as 3,000 acres that are the product of a collaborative effort. The new CE has the potential to greatly magnify the role of collaboration and strengthen the results of those efforts, and to reduce the time and cost for forest health projects, resulting in on-the-ground restoration work that is accomplished more quickly and across a larger landscape. Not yet in wide use, the Farm Bill also added expanded "Good Neighbor" authority that enhances the ability of states to partner with the Forest Service and implement projects on federal land.

18. The shortcomings of federal forest management have also impacted local governments directly. In 1908, when Congress created the National Forest System, it also passed the National Forest Revenue Act in 1908 directing the Forest Service to share 25 percent of gross revenues with local governments. Then in 1976, Congress passed "Payments in Lieu of Taxes" (PILT) legislation providing federal payments to local governments regardless of gross revenues that result from timber harvest and other forest management activities. After revenues from the sale of timber dropped substantially, Congress passed the Secure Rural Schools and Self Determination Act (SRS) in 2000, allowing counties to choose between a payment based on historical average and the 25 percent revenue share. SRS has expired several times, and PILT has been subject to funding uncertainty as well. Western Governors support efforts to ensure counties and states continue to receive payments under the Secure Rural Schools program, and that these payments should be based upon historic federal land management receipts. These payments are vital to providing state and county public goods and services, such as roads, emergency response, and wildlife and natural resources protection in communities adjacent to federal lands.

19. There have been several efforts in Congress to reform federal forest management, and recent legislation reflects the continued frustration of Congress as it attempts to find a path forward to address this issue in a productive, bipartisan manner.

B. GOVERNORS' POLICY STATEMENT

1. Western Governors support sound forest management policies that maintain and promote ecologic, economic and social balance and sustainability.

2. Today, the Forest Service's forest management program is primarily a byproduct of restoration projects intended to reduce wildfire risk and/or improve forest resilience, water quality, watershed health, key wildlife habitat, and/or intrinsic value. Western Governors recognize and support these forest values, but also believe it is reasonable to expect that some portion of the federal landscape will be focused on long-term, ecologically-sound forest management — where jobs, forest products, and revenues are priorities and generated through sound stewardship.

3. Western Governors encourage the Forest Service to develop and help fund new technologies and wood based markets for some non-traditional products. USDA's Forest Products Laboratory is a hub for research and innovation. We should continue to encourage the application of their knowledge and experience in a practical way in the western United States so that some of the federally funded infrastructure that develops from such efforts could first be demonstrated on private lands. Also, since federal forests are now more focused on large landscape forest health projects, there is a good opportunity to ensure we have a broader suite of outlets, in addition to traditional sawmills and existing biomass facilities.

4. We can achieve sustainable forest management across every acre of our federal and nonfederal forestlands while including an equitable mix of uses to meet many ecological, social, and economic needs.

5. Western Governors believe that our citizens are capable of rolling up their sleeves and working together with the federal agencies to address difficult issues such as forest management, and that not enough is done to incent and reward the current collaborative work that is occurring across the West.

6. It is important to retain citizens' rights to question governmental decisions through administrative and legal means. However, there are situations where the threat of litigation is a key factor resulting in either delay of agency activity and progress or the stifling of productive collaborative work. The lack of funding and resources for federal agencies is also a significant factor. Western Governors believe an effort needs to be made to better understand the scope and scale of this problem. There may be an opportunity to further streamline appeals and litigation associated with National Forest decision making in association with other changes designed to incent collaboration and provide more certainty as to outcomes.

7. The 2014 Farm Bill authorities are significant expansions of Forest Service authority and are powerful new tools to boost forest management, promote collaboration, and limit the impacts of administrative objections and litigation. Western Governors encourage federal agencies to fully implement the tools provided in the 2014 Farm Bill.

8. Western Governors are on record as strong supporters of ending the practice of fire borrowing, and Congress should pass legislation to fund federal wildfires off-budget as many states already do, and ensure the Forest Service budget for forest restoration, recreation, road maintenance, hazardous fuels reduction, and wildlife/watershed protection is fully restored.

9. Western Governors believe clear, coordinated and consistent application of federal vegetation management practices is integral to maintaining the health of western forests, preventing dangerous and damaging fires, and maintaining grid reliability. The Governors support effective and efficient cross-jurisdictional coordination that enables utilities to undertake necessary vegetation management actions on federal transmission rights-of-way – and to do so without fear of strict liability imposition for necessary vegetation management actions taken adjacent to transmission rights-of-way.

10. Western Governors are well-suited to engage in a productive and bipartisan dialogue on the broader topic of federal forest management reform, engaging westerners and examining on the ground realities across western landscapes. Western states are land owners and managers and well understand the challenges associated with forest management under changing social, economic and environmental conditions.

11. A meaningful and successful discussion of forestry reform in the West will require a transparent and inclusive process that engages those diverse interests who have a direct stake in forest management outcomes. The impacts of forest management are felt most directly by those who live, work and recreate in and adjacent to those forests, so the discussion needs to begin there. This is perhaps where Western Governors can provide the most productive bipartisan contribution to this national discussion. Our nation's forests belong to all Americans, and in the end and through their elected representation all Americans will determine the scope and success of any efforts to reform forest management.

12. There is significant dissatisfaction in the West among many stakeholders with the current level of National Forest management. There is a general sense that the current level of forest management is not meeting anyone's needs, whether it's putting logs on trucks, protecting water quality, addressing fire risk, protecting key habitats and landscapes, providing for recreation, or other important community needs. Successful forest management reform will achieve a balance among all of these important objectives, and provide the opportunity for certainty such that diverse interests will be encouraged to work together to achieve shared outcomes.

13. It is time to reconsider the business model of the U.S. Forest Service. Western Governors believe it may be possible to reform the Forest Service business model in a manner that reduces project planning costs, sources funds from non-federal partners and recognizes that the agency no longer generates large revenues from commodity programs.

14. Any discussion of forest management reform must include consideration of the financial relationship between the Federal and local governments, the existence of PILT, and the limited tax base for counties with significant federal ownership.

15. Western Governors support the recommendations identified over the course of the WGA National Forest and Rangeland Management Initiative, and incorporate the recommendations into this resolution by reference.

C. GOVERNORS' MANAGEMENT DIRECTIVE

1. The Governors direct the WGA staff, where appropriate, to work with Congressional committees of jurisdiction and the Executive Branch to achieve the objectives of this resolution including funding, subject to the appropriation process, based on a prioritization of needs.

2. Furthermore, the Governors direct WGA staff to develop, as appropriate and timely, detailed annual work plans to advance the policy positions and goals contained in this resolution. Those work plans shall be presented to, and approved by, Western Governors prior to implementation. WGA staff shall keep the Governors informed, on a regular basis, of their progress in implementing approved annual work plans.

Western Governors enact new policy resolutions and amend existing resolutions on a bi-annual basis. Please consult http://www.westgov.org/resolutions for the most current copy of a resolution and a list of all current WGA policy resolutions.

MEMORANDUM OF UNDERSTANDING
Between
THE WESTERN GOVERNORS' ASSOCIATION
And The
UNITED STATES DEPARTMENT OF AGRICULTURE
19-MU-11132001-027

This Memorandum of Understanding (MOU) is hereby made and entered into by and between the Western Governors' Association, hereinafter referred to as "WGA," and the United States Department of Agriculture (USDA), Forest Service, hereinafter referred to as the "Forest Service."

Background:

WGA is an instrument of the Governors of 19 western states and three U.S. Pacific territories for bipartisan policy development, information exchange, and collective action on issues of critical importance to the West. Governors possess primary decision-making authority for management of state resources, including many resources on federal lands.

The mission of the Forest Service is to sustain the health, diversity, and productivity of the Nation's forests and grasslands to meet the needs of present and future generations. The Agency manages 193 million acres of public land, works with tribal governments, state and private landowners, and maintains the largest forest research organization in the world. Being a "good neighbor" is an essential component in all of the Agency's work.

I. PURPOSE

The purpose of this MOU is to establish a framework to allow the Forest Service and WGA to work collaboratively to accomplish mutual goals, further common interests, and effectively respond to the increasing suite of challenges facing western landscapes. Federal, state and private managers of forests and rangelands face a range of urgent challenges, among them catastrophic wildfires, invasive species, degraded watersheds, and epidemics of insects and disease. The conditions fueling these circumstances are not improving. Of particular concern, are longer fire seasons, the rising size and severity of wildfires, and the expanding risk to communities, natural resources, and firefighters. To address these issues, the Forest Service announced a new strategy outlining plans to work more closely with states to identify landscape-scale priorities for targeted treatments in areas with the highest payoffs.

The Forest Service will partner with state leaders and work shoulder-to-shoulder to co-manage risks, and identify land management priorities, using all available tools to reduce hazardous fuels, including mechanical treatments, prescribed fire, and management of unplanned fire in the right place at the right time, to mitigate them.

A key component of the Forest Service's new shared stewardship strategy is to prioritize investment decisions on forest treatments—in direct coordination with states—using the most advanced science tools to increase the scope and scale of critical forest treatments that protect communities and create resilient forests and rangelands.

As the chief elected officials of states, Governors expect to engage with federal officials on the formulation and execution of public policy. Governors also have specialized knowledge of their states' environments, resources, laws, culture, and economies that is essential to informed federal decision-making. By operating as authentic collaborators, the states and federal government can improve their service to the public by creating more efficient, effective, and long-lasting policy.

In consideration of the above premises, the parties agree as follows:

II. STATEMENT OF MUTUAL BENEFIT AND INTERESTS:

The Forest Service and WGA seek to proactively carry out projects to reduce hazardous fuels and improve forest and rangeland conditions in western states. To achieve landscapes that are more resilient to fire and other disturbances, the Forest Service and WGA will take a more integrated approach to prioritizing investments where they will have the greatest impact, and will work together to set priorities that address risk across broad landscapes. A collaborative approach that addresses risk across different ownership boundaries and habitat types will have direct and positive effects on land management practices and the constituents of western states.

III. WGA SHALL:

A. Identify a key staff member within WGA to act as a coordinator/liaison in this relationship.

B. Facilitate the involvement of western states and stakeholders in working with the Forest Service to achieve the purposes of this MOU.

C. Collaborate on mutually agreed upon projects and other work in the pursuit of this MOU's overarching goals. Such projects may be defined within separate agreement(s).

D. Meet with representatives of the Forest Service to identify strategic areas for collaboration and develop proposals to meet the purpose of this MOU.

E. Encourage the development of projects and initiatives that promote collaboration in mutually-identified priority areas, including habitat conservation, water quality protection, restoration of wildfire and insect and disease-affected ecosystems.

F. Evaluate risk through a joint commitment to examining options for managing western cross-boundary landscapes and providing a forum for state officials to collaborate with the Forest Service on actions to take.

IV. THE FOREST SERVICE SHALL:

A. Work collaboratively with states to share decision space to reach agreements on priority areas that require treatments.

B. Collectively evaluate risk through a joint commitment to examining options for managing risk and deciding with WGA what actions to take.

C. Make reasonable efforts to: achieve consistency and avoid conflicts between federal and state objectives, plans, policies, and programs; and address and resolve all issues and concerns raised by states unless precluded by law.

D. Collaborate on mutually agreed upon projects and other work in the pursuit of this MOU's overarching goals. Such projects may be defined within separate agreement(s).

E. Consider and incorporate state and local data and expertise, including socioeconomic data, in development and analysis of federal actions.

V. IT IS MUTALLY UNDERSTOOD AND AGREED BY AND BETWEEN THE PARTIES THAT:

A. The Forest Service and WGA are bound by all applicable federal, state, and local statutes and regulations.

B. Both parties will communicate on a regular basis to enhance and develop the institutional arrangements necessary to facilitate the above activities.

C. The Forest Service and WGA will jointly identify a list of initial projects, prioritized by greatest potential effect to meet the purpose of this MOU, with a target of summer 2019. The list should emphasize projects that can be successfully initiated during fiscal year 2020.

D. The Forest Service, WGA and relevant state agency officials will conduct business pertaining to this agreement by means of in-person meetings, conference calls, or other means. In each calendar year, the Forest Service and WGA will meet at least once in person.

E. PRINCIPAL CONTACTS. Individuals listed below are authorized to act in their respective areas for matters related to this agreement.

Principal Cooperator Contacts:

Cooperator Program Contact	Cooperator Administrative Contact
Name: Bill Whitacre Address: 1600 Broadway, Suite 1700 City, State, Zip: Denver, CO 80202 Telephone: (303) 623-9378 Email: bwhitacre@westgov.org	Name: Dan Baer Address: 1600 Broadway, Suite 1700 City, State, Zip: Denver, CO 80202 Telephone: (303) 623-9378 Email: dbaer@westgov.org

Principal Forest Service Contacts:

Forest Service Program Manager Contact	Forest Service Administrative Contact
Name: Debbie Pressman Address: 1400 Independence Ave., Suite 202W City, State, Zip: Washington, DC 20250 Telephone: 202-720-7173 Email: Debbie.Pressman@osec.usda.gov	Name: Erin Connelly Address: 201 14th Street SW City, State, Zip: Washington, DC 20250 Telephone: 202-205-1676 Email: econnelly@fs.fed.us

A. NOTICES. Any communications affecting the operations covered by this agreement given by Forest Service or WGA is sufficient only if in writing and delivered in person, mailed, or transmitted electronically by e-mail or fax, as follows:

To the Forest Service Program Manager, at the address specified in the MOU.

To WGA, at WGA's address shown in the MOU or such other address designated within the MOU.

Notices are effective when delivered in accordance with this provision, or on the effective date of the notice, whichever is later.

B. PARTICIPATION IN SIMILAR ACTIVITIES. This MOU in no way restricts the Forest Service or WGA from participating in similar activities with other public or private agencies, organizations, and individuals.

C. ENDORSEMENT. Any of WGA's contributions made under this MOU do not by direct reference or implication convey Forest Service endorsement of WGA's products or activities and does not by direct reference or implication convey the cooperator's endorsement of the Forest Service products or activities.

D. NONBINDING AGREEMENT. This MOU creates no right, benefit, or trust responsibility, substantive or procedural, enforceable by law or equity. The parties shall manage their respective resources and activities in a separate, coordinated and mutually

beneficial manner to meet the purpose(s) of this MOU. Nothing in this MOU authorizes any of the parties to obligate or transfer anything of value.

Specific, prospective projects or activities that involve the transfer of funds, services, property, and/or anything of value to a party requires the execution of separate agreements and are contingent upon numerous factors, including, as applicable, but not limited to: agency availability of appropriated funds and other resources; cooperator availability of funds and other resources; agency and cooperator administrative and legal requirements (including agency authorization by statute); etc. This MOU neither provides, nor meets these criteria. If the parties elect to enter into an obligation agreement that involves the transfer of funds, services, property, and/or anything of value to a party, then the applicable criteria must be met. Additionally, under a prospective agreement, each party operates under its own laws, regulations, and/or policies, and any Forest Service obligation is subject to the availability of appropriated funds and other resources. The negotiation, execution, and administration of these prospective agreements must comply with all applicable law.

Nothing in this MOU is intended to alter, limit, or expand the agencies' statutory and regulatory authority.

E. USE OF FOREST SERVICE INSIGNIA. In order for WGA to use the Forest Service insignia on any published media, such as a Web page, printed publication, or audiovisual production, permission must be granted from the Forest Service's Office of Communications. A written request must be submitted and approval granted in writing by the Office of Communications prior to use of the insignia.

F. MEMBERS OF U.S. CONGRESS. Pursuant to 41 U.S.C. 22, no U.S. member of, or U.S. delegate to, Congress shall be admitted to any share or part of this agreement, or benefits that may arise therefrom, either directly or indirectly.

G. FREEDOM OF INFORMATION ACT (FOIA). Public access to MOU or agreement records must not be limited, except when such records must be kept confidential and would have been exempted from disclosure pursuant to Freedom of Information regulations (5 U.S.C. 552).

H. TEXT MESSAGING WHILE DRIVING. In accordance with Executive Order (EO) 13513, "Federal Leadership on Reducing Text Messaging While Driving," any and all text messaging by Federal employees is banned: a) while driving a Government owned vehicle (GOV) or driving a privately owned vehicle (POV) while on official Government business; or b) using any electronic equipment supplied by the Government when driving any vehicle at any time. All cooperators, their employees, volunteers, and contractors are encouraged to adopt and enforce policies that ban text messaging when driving company owned, leased or rented vehicles, POVs or GOVs when driving while on official Government business or when performing any work for or on behalf of the Government.

I. FOREST SERVICE ACKNOWLEDGED IN PUBLICATIONS, AUDIOVISUALS AND ELECTRONIC MEDIA. WGA shall acknowledge Forest Service support in any publications, audiovisuals, and electronic media developed as a result of this MOU.

J. NONDISCRIMINATION STATEMENT – PRINTED, ELECTRONIC, OR AUDIOVISUAL MATERIAL. WGA shall include the following statement, in full, in any printed, audiovisual material, or electronic media for public distribution developed or printed with any Federal funding.

> ***In accordance with Federal law and U.S. Department of Agriculture policy, this institution is prohibited from discriminating on the basis of race, color, national origin, sex, age, or disability. (Not all prohibited bases apply to all programs.)***
>
> **To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 1400 Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.**

If the material is too small to permit the full statement to be included, the material must, at minimum, include the following statement, in print size no smaller than the text:

> ***"This institution is an equal opportunity provider."***

K. TERMINATION. Any of the parties, in writing, may terminate this MOU in whole, or in part, at any time before the date of expiration.

L. DEBARMENT AND SUSPENSION. WGA shall immediately inform the Forest Service if they or any of their principals are presently excluded, debarred, or suspended from entering into covered transactions with the federal government according to the terms of 2 CFR Part 180. Additionally, should WGA or any of their principals receive a transmittal letter or other official Federal notice of debarment or suspension, then they shall notify the Forest Service without undue delay. This applies whether the exclusion, debarment, or suspension is voluntary or involuntary.

M. MODIFICATIONS. Modifications within the scope of this MOU must be made by mutual consent of the parties, by the issuance of a written modification signed and dated by all properly authorized, signatory officials, prior to any changes being performed. Requests for modification should be made, in writing, at least 30 days prior to implementation of the requested change.

N. COMMENCEMENT/EXPIRATION DATE. This MOU is executed as of the date of the last signature and is effective five years past the date of its signature at which time it will expire.

O. AUTHORIZED REPRESENTATIVES. By signature below, each party certifies that the individuals listed in this document as representatives of the individual parties are authorized to act in their respective areas for matters related to this MOU.

In witness whereof, the parties hereto have executed this MOU as of the last date written below.

U.S. Department of Agriculture

Date: 12/13/2018 **By:** Sonny Perdue
Sonny Perdue
Secretary of Agriculture

Western Governors' Association

Date: 12/13/2018 **By:** David Ige
David Ige
Governor of Hawai'i
Chair, Western Governors' Association

Date: 12/13/2018 **By:** Doug Burgum
Doug Burgum
Governor of North Dakota
Vice Chair, Western Governors' Association

WESTERN GOVERNORS' ASSOCIATION

DOUG BURGUM
GOVERNOR OF NORTH DAKOTA
CHAIR

KATE BROWN
GOVERNOR OF OREGON
VICE CHAIR

JAMES D. OGSBURY
EXECUTIVE DIRECTOR

December 11, 2019

The Honorable David Bernhardt
Secretary
U.S. Department of the Interior
1849 C Street, N.W.
Washington, DC 20240

The Honorable Sonny Perdue
Secretary
U.S. Department of Agriculture
1400 Independence Avenue, S.W.
Washington, DC 20250

Dear Secretaries Bernhardt and Perdue:

In December 2018, the Western Governors' Association (WGA) and the U.S. Department of Agriculture (USDA) signed a Memorandum of Understanding (MOU) to establish a framework for the U.S. Forest Service (USFS) and WGA to work collaboratively to accomplish mutual goals, advance common interests, and effectively respond to the increasing suite of challenges facing western landscapes. The MOU has helped Western Governors and USDA identify shared priorities and collaborative projects to increase active management on western forests and rangelands. Included is an effort, announced by WGA and USDA in June 2019, to improve vegetation management in and near transmission and distribution corridors to reduce the likelihood of wildfire.

As an initial step in the vegetation management effort, WGA assembled a work group of state and federal wildfire experts, land managers, and utility sector leaders to help identify potential improvements to current processes and practices to promote fire-resilient landscapes and communities across the region. At its first meeting in October 2019, the group recommended that WGA facilitate a conversation between USFS, the Bureau of Land Management (BLM), states, and the utility sector regarding key issues and specific actions to improve vegetation management practices in utility corridors. These included:

- The implementation of Section 512 of the Federal Land Policy and Management Act, as enacted by section 211 of Division O of the Consolidated Appropriations Act, 2018 (FY18 Omnibus).

- USFS's recently issued proposed rule on Land Uses; Special Uses; and Procedures for Operating Plans and Agreements for Vegetation Management within and along Powerline Rights-of-Way (FS-2019-0019).

- The FY18 Omnibus Bill's language encouraging USFS and BLM to develop training programs on vegetation management decisions relating to electrical transmission and distribution systems. The work group emphasized the need for any such training programs to be developed with input from the utility sector.

- The FY18 Omnibus Bill's direction to USFS to pair the Wildfire Hazard Potential index and map with spatial data, in consultation with state and federal partners, for use at the community level. The utility sector has access to spatial data on structures and powerlines that could prove invaluable in these efforts. The group emphasized the need for improved data sharing, accessibility and standardization.

- An examination of the use of Good Neighbor Authority and Stewardship Contracting Authority and other authorities or actions to better leverage the resources of public and private partners (including utilities) to complete necessary wildfire mitigation work on federal lands.

Several western states are already working with federal agencies and electric utilities on projects to reduce the risk of wildfire in utility corridors, including policy reviews, task forces, and pilot projects. These efforts have established a substantial body of work on vegetation management improvements and, where relevant, should be incorporated into WGA's and USDA's work under the MOU. Greater collaboration on vegetation management in utility corridors can also benefit other areas of land management, including the increased control of invasive species in corridors to further reduce risk of wildfire and improve habitat quality.

Western Governors appreciate the engagement of USDA through the MOU on this important land management priority, affecting about 3,000 transmission lines on USFS lands. We also appreciate the involvement of BLM in this effort, as the agency administers nearly 17,000 utility rights-of-way on public lands. Your active engagement with states through the USDA Shared Stewardship MOU will result in more effective USFS and BLM policy and improved collaboration between states and the federal government.

Western Governors look forward to continuing this important discussion on vegetation management and are eager to make progress on this important issue. Thank you for your attention to the urgent need to reduce the incidence of uncharacteristic wildfire in the West.

Sincerely,

Doug Burgum
Governor of North Dakota
Chair, WGA

Kate Brown
Governor of Oregon
Vice Chair, WGA

cc: Vicki Christiansen, Chief, U.S. Forest Service
William Perry Pendley, Acting Director, Bureau of Land Management

The New York Times | https://nyti.ms/2B1lKob

For the Most Vulnerable, California Blackouts 'Can Be Life or Death'

As the widespread outages in the state continued for a second day, fears grew for sick and older residents and those who rely on medical equipment.

By Thomas Fuller

Oct. 10, 2019

MORAGA, Calif. — When Ben Faus went to bed at his home in the foothills above the Monterey Bay, he knew there was a chance his power would go out but he didn't know exactly when. About 3 a.m. on Thursday he was jolted awake because his sleep apnea breathing machine stopped working.

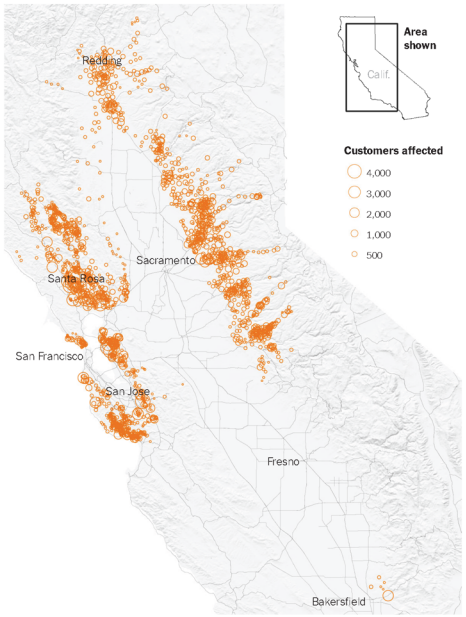
"All of a sudden, I was like, 'I can't breathe,'" he said.

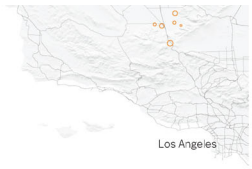
The decision to turn electricity off for large areas of Northern California inconvenienced and frustrated hundreds of thousands of residents, but it became increasingly dangerous for people like Mr. Faus and the state's most vulnerable.

Around 600,000 customers were still without power on Thursday afternoon and there was no clear indication of when it might be restored. That uncertainty heightened residents' anger as food spoiled and businesses and schools stayed closed.

PG&E Public Safety Power Shut-Offs in California

As of 2:15 p.m. Pacific on Thursday.





Source: California Office of Emergency Services • By Jugal K. Patel

But the biggest fears were for the sick and older residents and those who rely on medical devices and equipment like electric wheelchairs.

“For people with disabilities it can be life or death,” said Sunday Parker, who uses a wheelchair and lives in Oakland, parts of which were affected by the shutdown.

Although many medical facilities said they had prepared for the outage — ordering extra oxygen tanks and installing generators, for example — the uncertain timing of the blackout spawned confusion. Pacific Gas & Electric, the utility that turned off the power, wavered on when it would start the blackout a number of times before the second stage of power cuts finally came late on Wednesday. The first stage, which had cut power for around 500,000 residents, had come earlier that day.

Most of the concern was focused on people living on their own at home. The California Department of Public Health said about 39 hospitals and 103 skilled nursing facilities had been affected by the blackout, as of Thursday evening.

Jan Emerson-Shea, a spokeswoman for the California Hospital Association, a trade group, said none of the hospitals have reported any significant effects on their patient services.

Hospitals in the state are required to have backup generators, which usually start running within seconds of a power failure, Ms. Emerson-Shea said.

Across the region, the power shut-off made for odd juxtapositions. In some places, a road separated those with power and those without. At the Sequoias in Portola Valley, a retirement home in the hills above Silicon Valley, only one phone was functioning and the facility had only partial power from a generator. Cellphone service was down. But in the valley below, tech companies like Google and Apple operated with full power.

And in Woodside, a wealthy suburb above Silicon Valley, residents used generators to keep their wine collections cool and sent out notices offering to store their neighbors’ best bottles.

On a gusty day when a number of wildfires were reported across the state, firefighters remained on alert. The combination of strong winds and dried-out vegetation after the long California summer has brought on peak fire season. It was during similar conditions two years ago that fires tore through wine country north of San Francisco.

Steve Anderson, a meteorologist with the National Weather Service, said average wind gusts in the San Francisco Bay Area reached 40 to 60 miles per hour on Wednesday and Thursday. But Friday, he said, would bring relief.

“Winds will be dying down dramatically,” Mr. Anderson said.

More gentle winds are a key factor in reducing fire hazards, allowing Pacific Gas & Electric to turn the power back on. But the company says it may take five days before the power lines are completely re-energized, and it remains unclear how long some people will have to wait to fully regain electricity.

PG&E’s power shut-offs are part of the company’s wildfire safety program, which the utility developed in response to state requirements put into place after the wine country fires.

Strong winds and dry conditions have been implicated in several major California wildfires started by PG&E’s equipment. The company has said that one of its transmission lines probably started the state’s largest wildfire known as the Camp Fire, which killed 86 people and destroyed the town of Paradise in November last year.

Although PG&E and at least one other utility have carried out these so-called preventive power cuts previously, this week’s shut-off was by far the largest.

Thousands of customers in parts of Los Angeles, Ventura, San Bernardino and Kern Counties were also without power Thursday afternoon after Southern California Edison, the state’s second-largest investor-owned utility after PG&E, began implementing planned outages.

Nearly 174,000 customers across nine counties in Central and Southern California have been notified about possible shut-offs, said Mary Ann Milbourn, a spokeswoman for the utility.

On Thursday afternoon, as Santa Ana winds whipped through Southern California, a wildfire erupted in Calimesa, about 75 miles east of Los Angeles in Riverside County, and bore down on the Villa Calimesa Mobile Home Park. The authorities issued mandatory evacuation orders, and warned of a threat to the power grid and a nearby railway line. There were also several other smaller fires burning in Southern California.

The blaze in Calimesa "is burning a lot of structures," said Scott McLean, a spokesman for the California Department of Forestry and Fire Protection, or Cal Fire. He said there were "numerous medical emergencies" inside the mobile home park.

"It's multiple little fires everywhere, because the winds are throwing embers," Mr. McLean said.

In Northern California, both households and businesses were hoping the power shut-off would end before they were forced to throw away food.

A stone's throw from the shores of the Monterey Bay, uncertainty about when power might return fueled frustration and anxiety at businesses on the Central Coast.

At the New Leaf Community Market in the coastal town of Aptos, large refrigerated trucks were brought in to offload and temporarily store perishables.

At the Seascape resort, the owner of Hong Kong Garden restaurant said he regretted placing an order last night for fresh shrimp, scallops and lettuce from local suppliers, only to worry that he would have throw everything away the next day.

After a generator blew early Thursday at El Patio Grocery in La Selva Beach, the store's manager, David Castillo said he was concerned that items like milk and deli meats might go bad. He juggled which products to keep cold.

"We haven't had ice in two days," said Mr. Castillo, whose power at his home across the street was still on.

While it is too early to calculate the total economic cost of the shutdown, Michael Wara, a climate and energy expert at Stanford University, has come up with some estimates.

Mr. Wara, who lost power at his home in Mill Valley at 2 a.m. on Wednesday and has no hot water, internet connection or cellular service, estimated that the disruption could cost the state anywhere from $65 million to $2.5 billion.

Whatever the outcome, the outage will probably make only a small dent in California's multitrillion-dollar economy.

"It's a manageable loss," Mr. Wara said. "It's definitely a lot smaller than the losses that have been caused by wildfires in Northern California over the last couple of years."

But even beyond the economic cost there was the nuisance of canceled meetings, spotty cellular service and intersections without traffic lights.

At the University of California, Berkeley, much of which was running on emergency power Thursday, researchers worried about keeping laboratory animals alive and well.

Faculty, students and nonessential staff generally were asked to stay home, but some staff members were tasked with looking after lab specimens and chemicals, said Randy Howard Katz, the vice chancellor for research.

"Beyond life safety being our highest priority, the campus's highest research priority is to protect our research animals," Professor Katz said.

Professor Katz called the power shutdown "enormously disruptive."

Many in the region braced for the days ahead.

At Moraga Royale, an assisted-living facility in Moraga, a town in the San Francisco Bay Area, the motion sensor doors didn't work, the lights were dim and televisions were inoperable because of the power cut. A generator provided minimal electricity but not enough to keep all of the facility's food cold. But Dianne Wilson, the director, said residents were adapting.

"They are handling it better than the young people with all their cellphones," she said.

Reporting was contributed by Lauren Hepler from San Jose, Calif.; Carol Pogash from Berkeley, Calif.; Tim Arango from Los Angeles; and David Yaffe-Bellany, Anemona Hartocollis, Aimee Ortiz and Nicholas Bogel-Burroughs from New York.

PUBLIC HEALTH

California's Preemptive Blackouts Put A Strain On People With Home Medical Needs

November 1, 2019 · 10:26 AM ET

MARK KREIDLER

FROM KHN

During recent blackouts in California, people like Fern Brown (left) and her sister, Lavina Suehead, came to a pop-up community center at the Auburn, Calf., fairgrounds to use electricity. Brown, 81, needed a treatment for her chronic lung condition.

Mark Kreidler/California Healthline

Fern Brown, 81, sat in the rear of a tent on the windswept fairgrounds of the historic Gold Rush town of Auburn, Calif., this week, drawing deep breaths through the mouthpiece of a nebulizer plugged into a power strip atop a plastic folding table.

Afflicted for years with asthma and chronic obstructive pulmonary disease, Brown uses the nebulizer twice a day to avoid flare-ups that can be life-threatening. It turns her medicine into a fine mist that she can inhale.

Her machine runs on electricity, and when Pacific Gas & Electric Co. shuts off the power in the region amid wildfire scares, as it did earlier this week, Brown must scramble to find a place where she can administer her treatment.

> "That is the real travesty of this PG&E plan: As the dominoes fall, it's the poor and the disabled who are the most affected by this."
>
> Sandy Jay, Nurse Practitioner, Sonoma County, Calif.

She knows the makeshift "resource center" she visited on Tuesday afternoon, one of several set up by PG&E, is not a viable long-term fix — especially now that this month's power outages and the uncertainty that comes with them seem likely to be a more frequent feature of California's fall fire season.

ENERGY
Are Blackouts The Future For California?

"I could rent a generator. Or can you rent to own?" Brown asked. "They're expensive. But that's probably what I'll do. We just want to be ready for the next time."

"That is the real travesty of this PG&E plan," said Sandy Jay, a nurse practitioner at Santa Rosa Memorial Hospital in Sonoma County, about 130 miles southwest of Auburn. "As the dominoes fall, it's the poor and the disabled who are the most affected by this."

Jay supervises a program that for 20 years has sent teams of workers throughout the Santa Rosa area to bring medicine and treatment to those whose conditions prevent them from leaving home or keep them bedbound.

Without power, though, almost all of those patients need help immediately, she said. Air-pumped mattresses, used to prevent chronic bedsores, begin to deflate. Ventilators and nebulizers cease to function. Electric wheelchairs don't respond. And many of the affected people are reachable only by landline telephones, which aren't all reliable when the power's out.

"It's just kind of unconscionable," Jay said.

Hardened by experience of shut-offs imposed by their utility company, many residents of this region — and others up and down the state — have concluded they must prepare for future power cuts.

SHOTS - HEALTH NEWS

Smoke And Power Outages Near California Wildfires Hit Farmworkers Hard

ENVIRONMENT

For Some California Residents, Latest Wildfires Are A Tipping Point

PG&E confirmed that notion in an emailed statement, saying all its customers should "have an emergency plan to be prepared for any extended outages due to extreme weather or natural disasters." Extended outages, even planned ones, can mean up to a week without electricity, Californians in some areas have been dismayed to discover.

PG&E's statement referred customers to the utility's website page on wildfire safety, adding that local county emergency offices may also offer help.

The PG&E outages that have affected some 1.8 million Californians in the past few weeks, amid nerve-wracking warnings of wind and fire, have only affirmed the company's message.

For those with home medical needs, the quest for a durable fix has taken on real urgency.

Steve Bast, who lives in a rural section of Auburn in the Sierra foothills, has Type 2 diabetes, and his insulin needs to be refrigerated. Bast has been forced to deal with previous outages, both weather-related and PG&E-driven, some lasting several days.

Now, he said, he keeps ice packs in his freezer and puts them on the insulin containers as soon as his power goes down. He then stores the medication inside a soft cooler that zips closed and goes back in the refrigerator for as long as the unit remains cold.

Bast also uses a CPAP machine for his sleep apnea, and it must be plugged in, so he said his next move is to buy a small, personal generator. He notes however, that he would still need to find an open gas station for fuel to keep the generator running during an outage. Gas stations rely on electricity to run their pumps.

Then there's the cost: A personal generator sells for between $400 and $1,000, meaning it could be out of reach for people of limited means.

PG&E's temporary resource centers, of the type Fern Brown visited, are small, tented areas where up to 100 people at a time can power up devices of all kinds and get free bags of ice, cases of water and snacks. The centers are set up when an area is plunged into a utility-ordered shut-off, and they close once power is fully restored to that area.

But such centers cannot solve the bigger problems. During the last power shut-off a few weeks ago, Debrah Vitali went to check on her neighbor, 88-year-old Joan Casper. She and Casper have become close friends in their neighborhood in Santa Rosa, and Vitali knows that Casper wears an emergency calling device around her neck, which she can use to alert medics if she needs help.

The device is tied to Casper's landline, but what neither woman realized was that the landline operates through her internet connection. When the power went out, so did the internet — and with it Joan's ability to summon help.

"I couldn't believe it," Vitali said. "So we've just agreed as a group of neighbors to take turns checking on her, because she'd have no way to let anyone know she was in trouble."

California's Health and Human Services Agency this week established an ongoing, nonemergency hotline (833-284-3473) to help residents find health services in their communities during any power shut-off.

Gov. Gavin Newsom, meanwhile, has announced a $75 million fund that state and local government leaders can tap to help purchase generators and other backup energy sources that would keep local emergency services going in their communities.

For people whose medical treatment begins at home, however, the solutions also need to begin there.

At the PG&E center in Auburn, Fern Brown completed her 30-minute treatment before speaking. She said that her asthma and COPD have become worse over the past couple of years and that skipping a nebulizer session is not an option.

Brown and her sister, Lavina Suehead, who cares for Brown, drove a half-hour from their home in the remote town of Foresthill to reach the resource center at Auburn's Gold Country Fairgrounds. They said they would be seeking another solution, both for Tuesday night's treatment and beyond.

"We'll have to do something," Brown said. "We're out of power a lot."

This story was produced by Kaiser Health News, which publishes California Healthline, an editorially independent service of the California Health Care Foundation. KHN is not affiliated with Kaiser Permanente.

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southern edison california power outages california fire climate change and health pg&e disaster relief

Australia's indigenous people have a solution for the country's bushfires. And it's been around for 50,000 years

By Leah Asmelash, CNN

Updated 6:46 PM ET, Sun January 12, 2020

The fires in Australia have been burning for months, consuming nearly 18 million acres of land, causing thousands to evacuate and killing potentially millions of animals.

They're showing minimal signs of slowing down. The Australian state of New South Wales, where both Sydney and Canberra are located, declared a state of emergency this week, as worsening weather conditions could lead to even greater fire danger.

But a 50,000-year-old solution could exist: Aboriginal burning practices.

Related Article: Australia's deadly wildfires are showing no signs of stopping. Here's what you need to know

Here's how it works.

Aboriginal people had a deep knowledge of the land, said historian Bill Gammage, an emeritus professor at Australian National University who studies Australian and Aboriginal history. They can feel the grass and know if it would burn well; they knew what types of fires to burn for what types of land, how long to burn, and how frequently.

"Skills like that, they have but we don't know," Gammage said.

Aboriginal techniques are based in part on fire prevention: ridding the land of fuel, like debris, scrub, undergrowth and certain grasses. The fuel alights easily, which allows for more intense flames that are harder to fight.

The Aboriginal people would set small-scale fires that weren't too intense and clear the land of the extra debris. The smaller intensity fires would lessen the impact on the insects and animals occupying the land, too, as well as protect the trees and the canopy.

A firefighter manages a controlled burn near Tomerong, Australia, set in an effort to contain a larger fire nearby.

And though current fire fighters on the ground still use some fuel control and hazard reduction techniques, Gammage said it's not enough.

"Some of it is being done, but not skillfully enough," he said. "We don't really take into account plants and animals that might be endangered by fire. And secondly, we don't really know what's the best time of year, how much burn, how to break up a fire front."

It's not like they know nothing, Gammage said, especially the firefighters on the ground. But he said it's not enough to make Australia safe.

Why Aboriginal techniques are so difficult to implement

Setting smaller, low-intensity fires to prevent larger bushfires may sound like common sense. In practice, though, it's really hard.

It comes down to knowledge, Gammage said. When do you a start a fire? What time of the year? What time of day? How long you want it to burn? What plants are there? What's the weather like — is there a drought like now?

"You have to have a lot of local skill," Gammage said.

A firefighters backs away from the flames after lighting a controlled burn near Tomerong, Australia.

He cited an example. In Australia, fires that are too hot actually allows the flammable undergrowth to germinate more. When early Europeans tried to copy Aboriginal techniques by lighting fires, they made the fires too hot, and got even more of the flammable scrub. So, they tried again. And again.

"Even though people can see the Aborigines doing the fire control, and could see the benefits, they couldn't copy it," he said.

Now, the juxtaposition is clear.

"Where the Aboriginal people are in charge, they're not having big fires," Gammage said. "In the south, where white people are in charge, we are having the problems."

As climate change worsens, so will the fires

The bushfires in Australia are never going to go away but will get worse. That's according to Justin Leonard, a researcher dedicated to understanding bushfires and land management. Bushfires are ignited both naturally and by humans, but Leonard called them "inevitable."

Climate change only worsens the conditions for fires, he said. Droughts and hotter weather only make for more intense fires and longer fire seasons — changes that are already being observed, he said.

Under worsening conditions, fires are harder to put out: They grow too big to get to safely, and even aerial suppression isn't necessarily possible because of the wind.

So, what does that mean for indigenous fire techniques?

They'll still help, Leonard said. Areas that have undergone preventative burning lead to less intense fires.
But the problem is, under the worst of conditions, the fire will still be able to burn straight through the land burn straight through the land. despite any preventative measures.

A resident throws a bucket of water onto a smoldering tree on his property in Wingello, Australia.

Which means that towns are still in danger.

"We need to solve that inevitability by effective township design," Leonard said.

In other words, indigenous burning techniques aren't enough on their own. Communities will need to properly manicure adjacent forests, landscape their own private property, and have effective house design and maintenance, Leonard said.

Aboriginal techniques require more money. The cost might be worth it

The most common way fires are handled now is with medium-intensity fires, Leonard said. It's similar to these smaller, more frequent fires, except it burns a little hotter, covers more land and is just a little more intense.

Basically, it's more bang for your buck. And that's what this comes down to.

I have to "use limited budget on what will be the most prolific way" to prevent fires, Leonard said.

It takes a lot of labor to ignite small frequent fires everywhere — even just using these tactics near towns can be labor intensive, Leonard said.

Gammage noted that cost is a common concern when it comes to transitioning completely to Aboriginal fire practices. But he said he's not impressed by that argument.

"It's costing much more (to fight these fires)," he said. "Fires that destroy 2.5 million acres, which is what's happening now, it's shameful. It's a disgrace that anyone could let such terrible fires run amok."

A view of the landscape after a bushfire on Mount Weison, 74 miles (120 km) northwest of Sydney.

What Australians should really learn from the Aboriginal people is custodianship over the land, Leonard said. The way Aboriginal people deeply know and care for the land is something Australians should ponder and embrace.

Gammage pointed to an incident on Tuesday, when a local fire brigade managed to steer a bushfire around their community, despite being told their town was "undefendable," according to the Sydney Morning Herald.

The brigade, using their knowledge of the land, stayed behind while others evacuated. And rather than burn right through their town, the brigade was able to save houses and prevent deaths.

It just shows the importance of knowing local fire conditions, Gammage said. Knowing the land -- just

JOSH HARDER
10TH DISTRICT, CALIFORNIA

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COMMITTEE ON
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November 14th, 2019

The Honorable Frank Pallone
Chairman
Energy and Commerce Committee
2125 Rayburn HOB
Washington, DC 20515

The Honorable Greg Walden
Ranking Minority Member
Energy and Commerce Committee
2322 Rayburn HOB
Washington, DC 20515

Dear Chairman Pallone and Ranking Member Walden:

I write today to request a hearing on wildfires and the need for public utilities, such as Pacific Gas and Electric (PG&E), to invest in climate resilient infrastructure to help prepare for natural disasters. California is on the tip of the tip of the spear when it comes to the effects of climate change as well as the failure of our existing infrastructure. Although we're dealing with the most immediate effects of these problems, other states will soon face the same issues. It's important that Congress takes this seriously and begins to devise solutions.

California is only midway through its fire season. While the fires we've experienced so far have been less destructive compared with the last two years, we've seen an unprecedented number of power outages issued by PG&E with more than 1.5 million Californians without power at one point. The impacts of climate change, including the severe winds toppling trees and arid temperatures are all factors that increase the severity of wildfires, but decades of mismanagement and lack of infrastructure investments have also contributed to this problem.

The wildfires and power outages are disrupting vitally important services my constituents and other Californians rely on every day – hospitals need power for surgeries, laboratory exams, and radiology treatments for patients; schools need power to maintain the food that feeds our children and; last but not least, air quality monitors need power to operate – at a time when we should be the most concerned about air quality, these monitors are being compromised due to power outages. According to reports, this year's wildfires will cost California $80 billion in total damage and economic losses ravaging more than 260,000 acres of the state. Clearly, the cost of inaction is too great.

As climate change continues to worsen and our electrical infrastructure falls further into disrepair, we will see more and more deadly electrical events across the country. It's time for Congress to start leading. Holding a hearing on this and calling in the relevant parties to answer for inaction is a critical first step.

I urge you, Chairman Pallone and Ranking Member Walden, to hold a hearing on this vitally important issue. Thank you for your attention to this letter.

Sincerely,

Josh Harder

Josh Harder
United States Representative (CA-10)

U.S. House Subcommittee on Energy and the Subcommittee on Environment and Climate Change of the Committee on Energy and Commerce
January 28, 2020 Hearing: "Out of Control: The Impact of Wildfires on our Power Sector and the Environment."
Questions for the Record Submitted to Mr. William Johnson

Questions from Congresswoman Anna Eshoo (D-CA)

1. During the Public Safety Power Shutoff (PSPS) events last fall, PG&E was reluctant to share its list of critical facilities with Santa Cruz County officials and when it did, the list was incomplete. Notably, the list excluded a local hospital. What steps has PG&E taken to ensure these lists are accurate?

   PG&E RESPONSE: In response to last year's PSPS events, the California Public Utilities Commission (CPUC) set forth newly expanded definitions of "Critical Facilities". To comply with these new definitions, as well as prepare for outreach with cities and counties regarding their critical facilities, PG&E conducted an extensive multi-stage review and update of our existing critical customer lists. PG&E is currently in the process of sharing these results with local governments and tribes, while complying with customer privacy laws and regulations, to gain feedback from those entities on PG&E's critical facilities list in their associated jurisdictions.

   These exchanges stem from PG&E's efforts, in 2020, to provide more transparency by sharing the exhaustive lists of currently designated critical facilities by jurisdiction. In 2019, for privacy reasons, PG&E did not share the expansive list of critical facilities by jurisdiction, and only sought feedback from agencies to identify facilities that they had determined meet the CPUC criteria of critical facility, which PG&E then reviewed and updated its records accordingly.

   Furthermore, given the current pandemic, we have been meeting weekly with the California Hospital Association's Hospital Council to ensure close coordination with emergency hospitals throughout the year and with a focus on wildfire season.

2. In your written testimony, you wrote that PG&E intends to harden 7,100 circuit miles of equipment in high fire risk areas, of which PG&E has completed 188 circuit miles or less than 3 percent. In your oral testimony, you said this system hardening was not deferred maintenance but a new project. Why did PG&E wait until California suffered two of its worst wildfire seasons back-to-back before making necessary improvements to its infrastructure in high risk areas?

   PG&E RESPONSE: PG&E and utilities across the country are adapting to a changing environment. Over the past decade, California experienced a severe and prolonged drought, heat waves, changing Diablo winds, and unprecedented tree mortality in which, according to the U.S. Forest Service, over 147 million trees in the state died between 2010 and 2018.

   In 2012, only 15 percent of PG&E's service area was designated by California regulators as having an elevated wildfire risk. Between 2013-2017, PG&E responded to the tree mortality crisis and drought by investing $1.6 billion in its vegetation

management activities, to address the threat of vegetation coming into contact with our infrastructure that can cause power outages and wildfire ignitions.

Today, over 50 percent of PG&E's service area is designated as having an elevated wildfire risk, more than a tripling in the identified wildfire risk in under a decade. The percentage of PG&E's service territory with elevated fire risk is anticipated to continue growing in future years.

This changing environment requires a new risk-based approach addressing both drivers and consequences of failure that goes beyond standard, historical, reliability-based operating practices. PG&E initiated the Community Wildfire Safety Program in 2018, which consists of programs designed to reduce the wildfire threat (i.e., Enhanced Vegetation Management, System Hardening, System Inspections and Public Safety Power Shutoff), going beyond existing regulatory requirements to address the new normal, as outlined in our 2020 Wildfire Mitigation Plan. This work is currently being done on a scale at PG&E that the industry has never seen before.

3. At the hearing, you suggested that system hardening is not a problem of deferred maintenance. However, the cause of Camp Fire was identified as a nearly 100-year-old PG&E transmission tower that was 25 years past the end of its useful life. Additionally, the California Public Utilities Committee found on October 23, 2019, that 14 percent of work orders were not completed on time as required by State law. These facts suggest PG&E still has significant deferred maintenance to address. How will PG&E ensure that it complies with the law and perform necessary maintenance on time?

PG&E RESPONSE: In 2019 PG&E finished an unprecedented process to inspect all of the components of our electric system that pass through the high-threat fire areas. PG&E inspected more than 700,000 transmission, distribution and substation assets in those areas. PG&E climbed towers and poles, used drones, and ultimately completed about 18 months of work in 4 months.

All of the highest-priority conditions found through the 2019 inspections in distribution, substation, and transmission structures have been repaired or made safe. Repairs for all other conditions are scheduled for completion as part of PG&E's routine work execution plan.

Continuing in 2020, we are accelerating our inspection cycles beyond compliance with regulations to align with wildfire risk. The updated System Inspections Program incorporates fire risk considerations and inspection methodologies developed through the 2019 Wildfire Safety Inspection Program into PG&E's regular maintenance and repair program to promote general safety and reliability throughout our service territory.

As part of PG&E's ongoing efforts to further reduce wildfire risks and keep customers and the communities it serves safe, PG&E submitted its 2020 Wildfire Mitigation Plan to the CPUC in February 2020. The plan, which is awaiting final

approval from the CPUC, expands and enhances the company's comprehensive Community Wildfire Safety Program and is designed to address the growing threat of extreme weather and wildfires across its service area.

The 2020 Wildfire Mitigation Plan will continue expanded key safety work including:

- New grid technology;
- Hardening of the electric system;
- Enhanced inspections of electric infrastructure;
- Enhanced vegetation management around power lines; and
- Real-time monitoring and situational awareness tools to better understand how severe weather can impact PG&E's system.

Over the past decade, PG&E invested more than $24 billion in our electric system and spent an additional $10 billion on system maintenance. During that period, PG&E's reliability performance improved by 30 percent in terms of the average duration of outages per customer in minutes, and also improved in the average number of outages per customer.

4. In your written testimony, you noted that PG&E will continue "upgrading and strengthening approximately 7,100 miles over the next 12 – 14 years," but in your oral testimony, you said 100% of the grid would be hardened in five to seven years. Which statement is more accurate and why are the estimates so different?

PG&E RESPONSE: Wildfire risk reduction activities are planned to take place on all of our assets in high fire-threat districts over the next 5 to 7 years. These activities include enhanced asset inspections and repairs of identified risks, vegetation management, installation of sectionalization devices and other activities that serve to reduce the risk of wildfires. However, only a portion of our assets will be completely rebuilt as "hardened" facilities during that time. The hardening work is targeted to cover 7,100 of the highest wildfire risk circuits over the next 12 to 14 years.

5. What steps has PG&E taken to improve communication and coordination with local governments during future PSPS events?

PG&E RESPONSE: We are listening and incorporating feedback from our customers, local, state and tribal officials and wildfire safety experts as we prioritize and implement wildfire safety work. Following last year's PSPS events, we met in-person with more than 36 county and tribal offices of emergency services for a PSPS listening session (11 other counties declined our offer for a meeting).

Based on the feedback we received, we are now providing the following resources to help jurisdictions prepare for PSPS:

- Working sessions with county and tribal offices of emergency services to further partner with local governments and prepare for wildfire season and PSPS events. Through May 21, 17 of these county-level sessions have been

completed with more scheduled and some remaining on hold due to COVID-19 response limitations.

- Direct outreach to public safety partner customers (e.g. hospitals, telecommunications providers and water agencies) to provide local planning information;
- Working with counties and tribes to identify critical facilities to assist with prioritizing restoration (as feasible) during an event;
- Information regarding progress of local field work (e.g., system hardening, enhanced vegetation management);
- Access to the PSPS Agency Portal in order to share additional customer information quickly during an event;
- Improved sample notifications and planning maps;
- Avenues to provide PG&E with feedback where feasible to ensure agencies have information and procedures to proactively plan for and respond to a PSPS event; and
- Coordination regarding identification of permanent Community Resource Center (CRC) locations to utilize during an event.

PG&E continues to work closely with officials to be better coordinated for PSPS events and ensure better information sharing. Specific improvements for this year include:

- Additional Liaison availability before, during and after a PSPS event.
- Standardized Emergency Management System (SEMS) trainings for PG&E teams.
- Regular briefings between Liaisons and PG&E's Emergency Operations Center (EOC).
- Once-daily cooperator calls for public safety partners to receive consistent situational updates from EOC.
- Improvements to the PSPS secure information-sharing portal.

6. Has PG&E done an after-action review of its handling of last year's PSPS events and if so, will you share it with the public?

PG&E RESPONSE: Yes, in November 2019, PG&E hosted an After-Action Review meeting with officials from the CPUC, the Governor's Office of Emergency Services (Cal OES) and CAL FIRE. During the meeting, the group identified the following opportunities for growth:

- The scoping process: Limiting the amount of scope changes resulting from changing conditions.
- The quality of our data: Working to ensure PG&E is providing data which accurately identifies affected customers and communities.
- PG&E communication of Estimated Times of Restoration: Providing more timely and accurate Estimated Times of Restoration to public safety partners.

- The quality of our maps: Developing more granular maps of affected areas to help public safety partners and customers better prepare for a potential PSPS event.
- PG&E coordination of external communications: Decreasing the time it takes to notify public safety partners, customers and the public about a potential PSPS event.
- PG&E staffing of the PG&E EOC to prevent fatigue. PG&E is working to expand the bench of its staff for the EOC and providing them with better training and support during PSPS events lasting 24 hours or more.

All of PG&E's after-action reports with the CPUC regarding PSPS events are publicly available. A report from the November 2019 After-Action Review is attached and can be accessed at www.pge.com/psps.

Further, as noted above, PG&E conducted listening sessions with counties, tribal governments, customers and other key stakeholders impacted by 2019 PSPS events. These sessions provided an open forum for PG&E to listen to concerns, gather important feedback and identify ways to improve coordination and partnership with local communities going forward. The feedback is being used to guide improvements to its PSPS processes and procedures and help prioritize key focus areas for 2020.

Some examples where the company is taking feedback and acting on what it learns, include:

- Improved, parcel-level PSPS maps
- More detailed PSPS notifications including estimated time of restoration earlier in the lead-up to an event
- Retraining of all EOC personnel to ensure alignment with state and federal Incident Command processes
- Additional informational resources, including videos, brochures and online tools, to help customers and communities prepare.
- Making it easier for eligible customers to join the Medical Baseline program.
- Additional outreach and resources for customers in the Medical Baseline program, those with Access and Functional Needs (AFN) and Master Meter customers to address specific preparedness topics, including launching the new Disability Disaster Access and Resources Program.
- Localized informational webinars to give customers and communities opportunities to ask questions and provide feedback.
- Hosting a series of county webinars to detail the progress of the numerous actions that are part of PG&E's Community Wildfire Safety Program and to share how any needed PSPS events in 2020 are expected to be smaller in scope, shorter in duration and smarter for customers.
- Optimizing the translated communications provided to customers on its website and direct-to-customer notifications

7. When did PG&E first communicate with telecommunications companies about potential PSPS that could impact their operations (e.g., cell towers)?

PG&E RESPONSE: PG&E understands the critical interdependencies between the electricity and the telecommunications sectors and the related hardships associated with PSPS events. Recognizing these hardships that PSPS events can entail, PG&E has engaged extensively with the telecommunication carriers since the establishment of the PSPS program in 2018 to encourage preparedness and to collaborate on ways to ensure effective coordination during a PSPS event.

Starting in early 2018, PG&E initiated outreach with carriers to educate them on the PSPS program, verify appropriate points of contact at each carrier to contact in advance of and during a PSPS event, set expectations for potential duration and locations of outages and encourage preparedness for power outages from a PSPS event.

In October 2018, PG&E hosted an in-person workshop for carriers. Four companies participated: Verizon, AT&T, Sprint and Comcast. During this workshop, PG&E committed to various agreed-upon actions to be completed before the 2019 wildfire season, most of which focused on improving communications with carriers immediately before and during PSPS events. Specifically, PG&E committed to the actions below (all of which were completed before the 2019 wildfire season):

- Explore process for issuing an "all clear" after a PSPS event;
- Explore setting up a bridge or direct outreach with telecommunications providers during an event;
- Explore updating notification process for carriers to prevent sending multiple or duplicative emails;
- Inform them about the CPUC High Fire-Threat District map; and
- Explore sharing Fire Index Area maps and referencing these index areas in pre-event notifications.

In June 2019, PG&E hosted an online webinar for carriers to discuss changes to PG&E's 2019 Wildfire Safety Plan, notably the expansion of the PSPS program to all transmission and distribution lines in Tier 2 and Tier 3 High Fire-Threat Districts and the resulting expectation of power outages lasting up to five days. The webinar also included a discussion of the Critical Infrastructure Lead role in PG&E's EOC, a review of mapping resources available to the carriers, the type and cadence of notifications in advance of a PSPS and information on backup power resources. Attendees included AT&T, Verizon, Comcast, Sprint, T-Mobile, Zayo and CenturyLink.

These telecommunications-specific workshops supplemented significant one-on-one outreach that PG&E initiated with the carriers starting in early 2019. As part of this outreach, PG&E shared with carriers a small and large business checklist regarding preparation for outages and its "Power Resilience Playbook," which contained

information and additional resources on backup electric power and other tips for businesses and commercial facilities.[1]

For the top five carrier accounts by usage (AT&T, Verizon, T-Mobile, Sprint and Comcast), PG&E completed nearly 200 phone calls, in-person interactions and e-mails specifically on PSPS preparedness between January 2019 and November 2019. Through this outreach, PG&E verified with all five of these top accounts PSPS contact information and confirmed participation in at least one workshop. Carriers verified their emergency preparedness plans in their reports to the Federal Communications Commission (FCC).

Following the 2019 wildfire season, PG&E has engaged each carrier to discuss continuous improvement opportunities heading into the 2020 season. Building upon these individual conversations, PG&E has established a forum with all of its telecommunication carrier customers through quarterly meetings to identify and act on areas for improved coordination and communication and to allow PG&E to share information about its grid enhancements, weather modeling and other PSPS improvements that will help inform each carrier's resilience planning for the 2020 wildfire season. Thus far, the group has met twice in 2020 and is expected to meet twice more before wildfire season, including anticipated participation in PSPS preparedness exercises later this summer. In addition, PG&E has included carriers in County OES PSPS workshops per the carriers' request.

8. What information was provided to telecommunications companies about each PSPS? How long before each PSPS did PG&E share this information?

PG&E RESPONSE: As discussed in question 7, PG&E recognizes the hardships that PSPS events can entail, and as such PG&E has been in extensive communication with carriers since 2018 to share information and encourage preparedness for possible PSPS events. Carriers are considered critical infrastructure customers, and therefore PG&E places special emphasis on providing carriers detailed, advanced information about PSPS events, in accordance with State requirements.

On July 12, 2018, the CPUC adopted Resolution ESRB-8, which included requirements for all investor-owned electric utilities (IOUs) for customer notification of PSPS events. As detailed in the resolution, every effort must be made by the California's Investor-owned utilities (IOUs) to provide notice of potential de-energization as early as the IOUs reasonably believe de-energization is likely. At a minimum, notification to public safety partners must occur when a utility activates its EOC in anticipation of a de-energization event or whenever a utility determines that de-energization is likely to occur, whichever happens first. In addition, the IOUs must provide notice when a decision to de-energize is made, at the start of a de-

[1] Pacific Gas and Electric Company, "Power Resilience Playbook," https://www.pge.com/pge_global/common/pdfs/safety/electrical-safety/electric-generator-safety/Power-Resilience-Playbook.pdf.

energization event, when re-energization begins, and when re-energization is complete.

As noted above, PG&E strives to inform public safety partners and priority customers, including carriers, as much as 72 hours in advance of an event. While fluctuations in weather forecasts often preclude notifications on precisely the timeline noted above, PG&E begins notifications when possible and follows the established sequence of notifications. Based on requirements by the CPUC, PG&E first notifies the California Office of Emergency Services (CalOES) of potential PSPS events. Following the notification to CalOES, PG&E then notifies the county-level OES for any potentially affected counties. It is at this stage in the cadence of communications that PG&E notifies critical infrastructure customers, including carriers. Individual customers are then notified. As an example, for the October 9, 2019 PSPS event, notification to carriers began around 3:00am PT on October 7; non-critical customers were notified starting around 1:00pm PT on October 7; and the first phase of de-energization began shortly after midnight on October 9.

Carriers will receive the alert through three unique paths (phone, text and email) based on the contact information provided by the carriers. Notification alerts are then sent to up to three identified points of contact, as verified by PG&E during its pre-PSPS coordination, for each impacted location. In 2020, carriers will have access to the PSPS Public Safety Partner portal, which will serve as secure location for carriers to access impacted site lists, maps, and situation reports. Improvements to the portal in 2020 include:

- Developing a live, interactive map that will show anticipated outage areas at a parcel level, as well as locations of critical facilities and Medical Baseline program customers.
- Providing circuit-level maps of the electric infrastructure serving specific communities, as well as updated PSPS planning maps that highlight those areas more likely to experience a PSPS event.
- Enabling the ability to update event-specific information after real-time event decisions are made, ensuring portal users have the latest event-specific information.
- Enabling the ability to access portal information via mobile phones

In addition, maps of the areas potentially affected by a PSPS event are posted to the PG&E website. Following the initial notification communication, PG&E's Critical Infrastructure Lead, stationed in the company's EOC, will reach out to the carrier points of contact for PSPS events to ensure they received the alert and to invite the carrier to reach out to the Critical Infrastructure Lead at any time. PG&E's EOC operates 24/7 during activations with staff working on 12-hour rotations and "warm" hand-offs between shifts.

Given the dynamic nature of weather events, the scope and timing of a PSPS event can change following the first notifications to carriers. If weather conditions change, PG&E may alter the scope of the event, which could remove customers from scope, and less often, add customers to the scope. Typically, when PG&E first notifies

carriers approximately two to three days in advance of a possible PSPS event, there remains some uncertainty about the exact location, severity, and timing of the forthcoming weather event. In order to provide maximum notification to any customers who may be impacted, the initial scope of an event is often larger than the number of customers ultimately de-energized. This is because as the weather event draws closer, the level of certainty regarding the location, severity, and timing of the event increases. A parallel example could be how communities in the "cone of uncertainty" with hurricane forecasts typically begin preparations days in advance, recognizing that the hurricane's path will become more certain with time.

If a customer is removed from scope, PG&E sends a notification with the updated information as soon as PG&E determines with strong certainty that de-energization is no longer necessary in the area. If a customer is added to scope, PG&E similarly sends a notification informing them as soon as the possibility exists.

Should a carrier have questions about timing of de-energization or restoration or wish to identify preferences for restoration prioritization, the carrier has access to the Critical Infrastructure Lead. During the October 2019 PSPS events, PG&E's Critical Infrastructure Lead engaged in over 95 unique messages and requests from the carriers.

9. When considering PSPS, does PG&E consider the impact to telecommunications infrastructure?

PG&E RESPONSE: The decision to de-energize is not a responsibility we take lightly; it is a decision that is made only when severe weather threatens a portion of the electric system and in the interest of public safety. As the criteria we use to determine the need for a PSPS are weather- and environmentally-driven, the absence of presence of specific customers, like carriers, within the footprint of a PSPS event does not influence PG&E's decision to de-energize. The decision to undertake a PSPS event is solely driven by safety.

However, while carriers are ultimately responsible for the resiliency and reliability of their network, PG&E understands the critical interdependencies between the electricity and the telecommunications sectors. We are therefore committed to working collaboratively with all stakeholders to improve the way we conduct PSPS events, as well as to make PSPS events smaller in size, shorter in length and smarter for customers.

Specific to carriers, following the 2019 wildfire season, PG&E engaged each carrier to discuss continuous improvement opportunities heading into the 2020 season. Building upon these individual conversations, PG&E established a forum with all of our carriers which meets quarterly to identify and act on areas for improved coordination and communication and to allow PG&E to share information about PSPS improvements that will help inform each carrier's resilience planning for the 2020 wildfire season. Thus far, the group has met twice in 2020 and is expected to meet twice more before wildfire season, including a tabletop exercise.

At the federal level, PG&E is also engaging utility, carrier and FCC stakeholders that will facilitate a broader discussion of emergency events and help shape mutual support and overall enterprise risk management for the most vulnerable assets. Of note, PG&E is an active participant in the Cross-Sector Resiliency Forum, which was recently established by the Edison Electric Institute (EEI) and the Cellular Telecommunications Industry Association (CTIA). PG&E looks forward to continuing to discuss ways to jointly improve communication and to collaborate more successfully with the carriers in support of customers and communities.

10. I understand that your company lobbied this committee and its California members in an effort to prevent San Diego Gas and Electric from testifying. My understanding is that SDG&E wanted to share its experience and lessons learned from dealing with wildfires a decade ago. That seems like a pretty valuable perspective for Members to hear, yet it appears your company didn't want us to hear it. Why did PG&E, seek to block another California utility, San Diego Gas and Electric, from testifying at this hearing?

PG&E RESPONSE: PG&E understands and appreciates the important role of congressional hearings, including gathering unique and diverse viewpoints to create a robust hearing record. PG&E has been invited on a number of occasions throughout the years to serve as a hearing witness in the House and Senate, on a range of issues important to its customers. The January 28, 2020 Energy and Commerce Subcommittee hearing was of great interest to PG&E, and we were honored to participate and share our experience and policy solutions to reduce the wildfire threat and increase overall grid and climate resilience.

PG&E is proud of its long history of collaboration with SDG&E, Southern California Edison (SCE) and other utilities throughout the nation. We have appeared numerous times in multiple venues alongside SDG&E and SCE on this topic and others, and as noted in the testimony from the hearing, have benefitted from their expertise in developing our wildfire safety strategies. PG&E looks forward to continuing to collaborate across a number of stakeholders, partners and peers at the local, state and federal level in this important work of continuing to tackle the critical and growing wildfire risk facing our customers.

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