

**CLIMATE CHANGE: THE IMPACTS
AND THE NEED TO ACT**

OVERSIGHT HEARING

BEFORE THE

COMMITTEE ON NATURAL RESOURCES
U.S. HOUSE OF REPRESENTATIVES

ONE HUNDRED SIXTEENTH CONGRESS

FIRST SESSION

Wednesday, February 6, 2019

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OVERSIGHT HEARING ON CLIMATE CHANGE: THE IMPACTS AND THE NEED TO ACT

**Wednesday, February 6, 2019
U.S. House of Representatives
Committee on Natural Resources
Washington, DC**

The Committee met, pursuant to notice, at 10:07 a.m., in room 1324, Longworth House Office Building, Hon. Raúl M. Grijalva [Chairman of the Committee] presiding.

Present: Representatives Grijalva, Napolitano, Costa, Sablan, Huffman, Lowenthal, Cox, Neguse, Levin, Haaland, Van Drew, Cunningham, Velázquez, Clay, McEachin, Case, Horsford, Bishop, Gohmert, Lamborn, McClintock, Gosar, Westerman, Graves, Webster, Hern, and Fulcher.

The CHAIRMAN. Let me call the Committee on Natural Resources to order.

The Committee today is meeting to hear testimony on the impacts of climate change and the need for Congress and the Administration to act.

Under Committee Rule 4(f), any oral opening statements at hearings are limited to the Chairman and the Ranking Minority Member. Therefore, I ask unanimous consent that all other Members' opening statements be made part of the hearing record if they are submitted to the Clerk by 5 p.m. today.

Hearing no objection, so ordered.

Welcome, everyone, to the first hearing of the 116th Congress for the Natural Resources Committee, and thank you to our witnesses for appearing before us, as we begin to tackle one of the most urgent and pressing challenges of our time.

THE HON. RAÚL M. GRIJALVA, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF ARIZONA

The CHAIRMAN. The majority of Americans consider meaningful action on climate change to be a moral and economic imperative. They are absolutely right. And they have friends on this Committee, including myself and other colleagues who are here to work on solutions.

Climate change is real. The emissions we produce from burning fossil fuels are making it worse. It is a threat to our public health, national security, infrastructure, and natural resources. We are seeing the impacts now, and they will grow stronger unless we change course.

Our communities are paying the price for years of inaction on this issue. The massive and unprecedented storms, heat waves, fires, and droughts we are experiencing are not normal. They are being made worse by climate change, and if we don't take action now, we are only at the beginning of this process.

The last 4 years have been the 4 hottest years ever recorded. Ice sheets are melting far faster than previously thought. The coast of Alaska is literally disappearing into the ocean. Indigenous villages are already having to relocate.

We will see more climate refugees as time goes on. Parts of our planet where people currently live may very well become uninhabitable.

Every day that we fail to act increases the costs of addressing this crisis for future generations. Putting our heads in the sand puts people's lives at risk and our Nation's safety in jeopardy.

Today, we turn the page on this Committee from climate change denial to climate action. The Democratic Majority is here to listen to people, to work for people, to hear from Americans across the country from all walks of life whose experiences emphasize the need to address this crisis.

The rest of the world understands the urgent need to take action on climate change. The Trump administration chooses to mock science and mislead the public about what our country will look like if we do nothing.

As President Trump seeks to expand fossil fuel production on public lands, roll back the protections for clean air and clean water, suppress the role of science, and turn his back on international agreements, we have situations.

That is why states, local community leaders, businesses, and many others are stepping up. They can't wait for action from an Administration that appears not to care about their own well-being and of their constituents.

This is a great opportunity for American entrepreneurs to lead the way in creating and deploying new energy technologies the world will need. But with people's lives in imminent danger, we know that we need more than innovation; we need good policies.

Climate change is a matter of social justice. Communities of color and tribes are disproportionately impacted by climate change, and will continue to struggle unless we take action.

Along with testimony from our witnesses today, I invite the public to provide their climate crisis stories at www.naturalresources.house.gov. I would like to briefly share just one of the many stories we have already heard from the public. This is from a woman named Katie Davis, from Goleta, California.

"Last July on a freakishly hot night that broke records across Southern California, a fire suddenly broke out in our neighborhood due to hot winds, the likes of which I've never felt before, that pushed flames toward us rapidly. It was one of the most terrifying moments of my life. We ran out of the house with nothing, no time to prepare, and fled. Our house survived with minor damage, but on that anguishing night most of the houses on our street burned down. I look at the foundations of five burned down houses as I write this."

These are the stories we need to hear in this Committee and in this Congress. The best policies are informed by a combination of sound science and informed public input. These are the guideposts for this Committee, both in our hearing today and everything we do in the next 2 years. Climate change is an urgent problem. It

demands urgent action and a sense of purpose from Congress. This Committee will offer both.

And I want to thank you again to the witnesses. I look forward to your testimony.

[The prepared statement of Mr. Grijalva follows:]

PREPARED STATEMENT OF THE HON. RAÚL M. GRIJALVA, CHAIR, COMMITTEE ON
NATURAL RESOURCES

The Committee on Natural Resources will now come to order.

The Committee is meeting today to hear testimony on the impacts of climate change and the need for Congress and the Administration to act.

Under Committee Rule 4(f), any oral opening statements at hearings are limited to the Chairman and the Ranking Minority Member.

Welcome everyone to the first hearing of the 116th Congress for the Natural Resources Committee and thank you to our witnesses for appearing before us as we begin to tackle one of the most urgent and pressing challenges of our time.

The majority of Americans consider meaningful action on climate change a moral imperative. They're absolutely right. And they have friends on this Committee, including the Chairman, who are here to work on solutions.

Climate change is real. The emissions we produce from burning fossil fuels are making it worse. It's a threat to our public health, national security, infrastructure, and natural resources. We are seeing its impacts now, and they will only grow stronger unless we change course.

Our communities are paying the price for years of inaction on this issue. The massive and unprecedented storms, heat waves, fires, and droughts we are experiencing are not normal. They are being made worse by climate change, and if we don't take action now, we're only at the beginning.

The last 4 years have been the 4 hottest years ever recorded. Ice sheets are melting far faster than previously thought. The coast of Alaska is literally disappearing into the ocean. Indigenous villages are already having to relocate.

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The rest of the world understands the urgent need to take action on climate change. The Trump administration chooses to mock science and mislead the public about what our country will look like if we do nothing.

President Trump seeks to expand fossil fuel production on public lands, roll back protections for clean air and clean water, suppress the role of science, and turn his back on international agreements.

That's why states, local community leaders, businesses and many others are stepping up. They can't wait for action from an Administration that doesn't care about their well-being.

There is a great opportunity for American entrepreneurs to lead the way in creating and deploying new energy technologies the world will need. But with people's lives in imminent danger, we know that we need more than innovation. We need good policies.

Climate change is a matter of social justice. Communities of color and tribes are disproportionately impacted by climate change and will continue to struggle unless we take action.

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These are the stories we need to hear in this Committee and in this Congress. The best policies are informed by a combination of sound science and informed public input. Those are the guideposts for this Committee, both in our hearing today and in everything we do for the next 2 years. Climate change is an urgent problem. It demands urgent action and a sense of purpose from Congress. This Committee will offer both.

Thank you again to the witnesses. I look forward to your testimony.
I now recognize Ranking Member Bishop for his opening statement.

The CHAIRMAN. I now recognize the Ranking Member, Mr. Bishop, for his opening statement.

**STATEMENT OF THE HON. ROB BISHOP, A REPRESENTATIVE
IN CONGRESS FROM THE STATE OF UTAH**

Mr. BISHOP. Congratulations, Mr. Grijalva, on your first Full Committee chairing. I know you had a Ranking Member chairmanship at the time, but that was a long, long time ago. I am happy to have you here, happy to be here for this particular discussion.

I know you have made February as Climate Change Month. I appreciate the fact that you picked the shortest month of the year to do that.

Also, it happens to be, of course, Black History Month, which I wish we could deal with some other things. Because in the last couple of years, this Committee has done some significant issues in the area of Federal lands and projects. I mean we have expanded the Martin Luther King home, historic site, as well as the Central High School in Little Rock, Arkansas, which I had the opportunity of going to this summer, and was amazed at how actually great that was, as a narrative history of what is going on here.

We will have, in the last package the Senate is pushing over, the establishment of the Medgar Evers National Monument, Camp Nelson National Monument. We also did the Kennedy-King Historic Area in Indiana this particular year, as well as the African-American Civil Rights Network, and re-authorizing historically black colleges and university preservation grant programs.

All of those are within the purview of this Committee. That is our jurisdiction, talking about those kinds of things would be very positive. In the ones I have just listed to you also there is a \$41 million maintenance backlog, just on the programs I just enunciated. Talking about that is in the jurisdiction of this Committee.

The Chairman has been very good in helping us come up with ways of funding that maintenance backlog creatively in the past. I hope that we can actually get to those kind of activities, which would be extremely important.

All right. Now, focusing to the topic of this particular meeting, it is my hope that what we do is coming up with ways we can actually help people.

Utah, for example, has had terrible air. It is part of the topography, especially in the winter time. But it is much better than the air that Representative Curtis and I grew up in in Utah, simply because of the actions of the state of Utah. EPA and other Federal agencies over the last 15 years haven't done squat, but the state has made major changes. And I hope that we can look at how we can do those types of changes.

I appreciate the fact that we have two governors here with us today. Thank you for being here. Once again, it would have been nice to have known some of the topics of this hearing, even though Rule 4(c) requires that to be in there, and transparency requires it. We did not have time to invite another governor. I would have loved to have a governor from the West come here and join you two, simply because they are, unfortunately, in the middle of our legislative sessions, or the beginning of their legislative sessions, and could not make it in such short notice. But they actually have Federal lands over which we have jurisdiction that would be an input.

But I hope that you guys can enlighten us, even though you are only governors. You are one of those peons that work in the outer hinterlands of America that really aren't as important as we here in the Federal Government.

[Laughter.]

Mr. BISHOP. So, we appreciate your groveling before us, because all of us and the agencies breathe the rarified air and drink the leaded water of Washington. Therefore, we know exactly what is right to do. And for you to actually come here on hands and knees, I appreciate that.

I hope, though, in the process, you can give us some ideas of what you all are trying to do in your states, how maybe permitting process—we can work with you easier to actually allow states to become partners with us, instead of being dominated by us, to find real solutions for real people. That, I hope, is the ultimate goal of what we are attempting to do.

As I said, Utah has amazingly bad air in the winter. It is part of the topography. When it is snowing on the ground, the mountains prohibit any kind of wind gust from cleaning out the atmosphere. We never have bad air in the summer, except for this year, which meant that as every forest burned in California, a week later we were breathing the air of the burned California. And that was unique.

And it is going to happen again, unless we actually can do something about that, which is why the frustration I had with the Senate using the filibuster to gut most of the forest fire reforms that we passed. That is one of the things that is in the jurisdiction of this Committee, and I wish we were talking about that.

If we actually were able to control forest fires by different managing systems that are experts, like Mr. Westerman, who has a doctorate in this area, that the experts from the Forest Service in both the Obama and Trump administrations told us they needed to do to manage the lands, we could actually help with the environment.

There is another one, too. Even though a lot of the people who are—well, carbon sequestration. If we actually want to get carbon out of the air, there are enough new studies that are being done, specifically in Portugal and Australia, and here in the United States, as well, that talk about the way of using carbon sequestration—to use plant life, which needs carbon, to suck it out of the air and put it into the ground where it could be useful for plant life, and then also help clean the air. That is the jurisdiction of this

Committee. And those are the kinds of things I hope we can do to talk about specific issues.

So, I have to mention I am at kind of a loss. I do not know where this hearing is going, or the other six hearings you planned, because you simply haven't told us where the goal is. At some point we may be asking, "Where are we going?"

What is the real legislation to help people that is supposed to come out of these hearings—to understand whether these hearings are simply for those of us around the horseshoe who are going to make legislation.

Or are these hearings designed for that group that is sitting at a table in the corner so they can write cute stories?

Once again, we have not been given the detail of where these hearings are going. We would like to know that in the future.

With that, we are ready to get started on this wonderful new adventure in a month that has only 28 days. But I would like Rule 4(c) to be instituted so that we actually can have greater understanding and preparation so we can participate fully with you in these hearings.

And governors, thank you for joining us. Thank you for groveling before us. I am looking forward to your testimony.

I yield back.

The CHAIRMAN. Thank you, Mr. Bishop. And I can assure you that, in terms of all the areas of jurisdiction, and on this particular topic that I think has significance and consequences over all our jurisdictions that this Committee is under, that we will aptly be able to—and adroitly, as well—chew gum and walk. We can do all these things.

Mr. BISHOP. Are you saying that because I am chewing gum?

The CHAIRMAN. Yes.

Mr. BISHOP. OK, fine.

The CHAIRMAN. Thank you. I would like to introduce our first panel, our distinguished panel, which consists of the governor of North Carolina, the Honorable Roy Cooper, and the governor of Massachusetts, the Honorable Charles Baker. I appreciate them being here, taking the time—in particular, bringing an insight.

I don't know if it is so much a question of groveling, but setting an example where, across party lines, people confront the issue of climate change, the effect on their constituents, and begin to take action. I think that is an important example that we need to remind ourselves, that we are not impotent to do nothing about this. We can, and we should. And the point is that we have elected executives here, governors, who can speak to those issues today, and I welcome them.

I want to particularly thank Governor Baker for scheduling the Patriots' victory parade yesterday so that he could be here, and it wouldn't conflict with this hearing. I very much appreciate it.

Under our Committee Rules, oral statements are limited to 5 minutes, but your entire statements will appear in the hearing record.

The lights in front of you will turn yellow when there is 1 minute left in the presentation, and red when time is up.

After the governors have testified, Members will be given the opportunity to ask them questions.

I would like to inform the members of the Committee that, due to commitments, the governors can only be here—we have a hard stop of 11:30 a.m. So, depending on how many Members are here, we may need to shorten the time each Member has to ask questions.

With that, the Chair now recognizes Governor Cooper of North Carolina for his testimony.

Welcome, sir. The floor is yours.

STATEMENT OF THE HON. ROY COOPER, GOVERNOR, STATE OF NORTH CAROLINA, RALEIGH, NORTH CAROLINA

Governor COOPER. Thank you, Chairman Grijalva, for your hospitality. Thank you, Ranking Member Bishop, for your expression of humility through humor. Thanks to all of the other members of the Committee. We are grateful to be here today.

As a lifelong resident and now it is governor, I know that North Carolina is a fantastic place to live, grow a family, and have a business. Between our majestic mountains, miles of coast land, and scenic tourist venues, a visit to North Carolina is bound to be the time of your life.

But just like many places in our country and across the globe, we are beginning to feel the harsh effects of climate change on our communities and on our economy. Scientists have found that climate change makes weather more erratic. It makes storms larger and more powerful. And it intensifies heavy rainfalls and drought.

North Carolinians, unfortunately, know about this the hard way. We have weathered two so-called 500-year floods within 2 years, and three of them within 20 years.

In the western North Carolina mountains, erratic weather has caused mudslides, damaged infrastructure, cost apple growers valuable crops, and forced ski areas to close mid-season, hurting local businesses and putting jobs in jeopardy.

In central North Carolina, soaring summer temperatures have killed poultry and crops, costing farmers critical income. Fort Bragg and military ocean terminal Sunny Point, two of the most important military installations in our country that are located in North Carolina, are listed at current and future risk for wildfires and recurrent flooding, respectively, in the U.S. Department of Defense report on the effects of our changing climate.

And the worst damage has been in eastern North Carolina, where we now are more vulnerable than ever to devastating storms and floods.

In September, just 2 years after our state was deluged by Hurricane Matthew, Hurricane Florence slammed into North Carolina. Its powerful winds and storm surge decimated coastal communities and crushed coastal tourism and fisheries. The storm stayed for days, dropping trillions of gallons of rain, inundating communities, drowning crops, and bringing rivers to historic flood levels. Hurricane Florence caused at least \$17 billion in damage, and tragically took 43 lives.

Then, a month later, Tropical Storm Michael took additional lives and caused millions more in damage. But for the survivors of these storms, the true cost is incalculable.

I have traveled to hard-hit communities and listened to North Carolinians whose lives are changed forever; tireless first responders who kept showing up to work, even though their own homes were destroyed; children who went weeks without schools; families whose livelihoods were washed away.

I spoke with an elderly woman who was pulled from flood waters by a first responder, bringing with her only a few possessions that she could carry. When I saw her in the shelter I told her how sorry I was, and she looked at me and said, “I thank God I am alive. I thank God for that firefighter who pulled me to safety. And I thank God for these volunteers here in this shelter. Many of them have had their own homes flooded. I am going to make it.”

Well, as governor of North Carolina, I have a responsibility to help her make it. I have a responsibility to keep all of our people safe. I told them we have to do everything we can to rebuild our state smarter and stronger, and we are pursuing unprecedented recovery and resiliency plans to help North Carolinians get back on their feet.

We are also making a difference together. I am pleased that members of our congressional delegation and Federal agencies are helping provide meaningful relief to North Carolinians hit hard by the storm, and I look forward to continuing to work together with you on the Federal appropriations process.

But when storms are becoming more fierce, it is not enough just to pick up the pieces. We must take action to prevent this kind of devastation in the future. I urge Congress and all of our Federal partners to match the level of determination brought to recovery efforts in our fight to reduce the effects of climate change.

We in North Carolina are doing our part to address those effects. I have signed an executive order that sets a goal for our state to achieve a 40 percent reduction in greenhouse gases by 2025. North Carolina is second in the country in solar energy, and my order directs more use of renewable energy.

It also orders state agencies to begin using more zero emission vehicles in our motor fleet. It orders a clean energy plan and better state building efficiency. It also directs our state department of commerce to grow our strong clean energy economy by supporting the expansion of clean energy business, service providers, and companies with commitments to using clean energy.

In 2017, I ordered that North Carolina join the U.S. Climate Alliance, a bipartisan group of states focused on reducing our pollution and protecting our environment.

And while local and state action is critical, Federal partners must join us in taking action to protect our people from the growing harm of climate change. We need Federal legislation and regulations that promote emission reductions, preservation of forests, marshes, barrier islands, and other national infrastructure. We need Federal leadership to work with global partners to fulfill and strengthen our international agreements. We need consistent Federal action that meets the urgency of our global climate problem. Our communities, our economy, and our future depend on it.

Thank you very much.

[The prepared statement of Governor Cooper follows:]

PREPARED STATEMENT OF THE HONORABLE ROY COOPER, GOVERNOR OF
NORTH CAROLINA

Chairman Grijalva, Ranking Member Bishop and members of the Committee:

As a lifelong resident and now its governor, I know North Carolina is a fantastic place to live, grow a business and raise a family. Between our majestic mountains, miles of coastline and scenic tourist areas, a visit to North Carolina is bound to be the time of your life. But just like many places in our country and across the globe, we're beginning to feel the harsh effects of climate change on our communities and our economy.

Scientists have found that climate change makes weather more erratic. It makes storms larger and more powerful and intensifies heavy rainfalls and droughts. North Carolinians unfortunately know this the hard way. We've weathered two so-called 500-year floods in 2 years and three in fewer than 20 years. In the Western North Carolina mountains, volatile weather has caused mudslides, damaged infrastructure, cost apple growers valuable crops and forced ski areas to close mid-season, hurting local businesses and putting jobs in jeopardy. In central North Carolina, soaring summer temperatures have killed poultry and crops, costing farmers critical income. Fort Bragg and Military Ocean Terminal Sunny Point, two of the many important military installations we're proud to have located in our state, were recently listed at current and future risk for wildfires and recurrent flooding, respectively, in a U.S. Department of Defense report¹ on effects of our changing climate. And the worst damage has been in eastern North Carolina, which is now more vulnerable than ever to devastating storms and floods.

In September, just 2 years after our state was deluged by Hurricane Matthew, Hurricane Florence slammed into North Carolina. Its powerful winds and storm surge decimated coastal communities and crushed coastal tourism and fisheries. The storm stayed for days, dropping trillions of gallons of rain, inundating communities, drowning crops and bringing rivers to historic flood levels. Hurricane Florence caused at least \$17 billion in damage and tragically took 43 lives. One month later, another tropical storm, Michael, took additional lives and caused millions more in damage.

For survivors of a storm like Florence or Hurricane Matthew before it, the true cost is incalculable. I've traveled to hard-hit communities and listened to North Carolinians whose lives are forever changed: Tireless first responders who kept showing up to work even though their own homes were destroyed; children who went weeks without school; families whose livelihoods were washed away. I spoke with an elderly woman who was pulled from floodwaters by a first responder, bringing with her only the few possessions she could carry. When I saw her in a shelter, I told her how sorry I was. She said, "I thank God I'm alive, I thank God for that firefighter who rescued me and I thank God for all of these volunteers helping in this shelter. Many of them had their own homes flooded. I'm going to make it."

As governor of North Carolina, I have a responsibility to help her make it. I have a responsibility to help keep all our people safe. I've told them we have to do everything we can to rebuild our state smarter and stronger and we're pursuing unprecedented efforts to help North Carolinians get back on their feet.

Weeks after Florence, I announced the new North Carolina Office of Recovery and Resiliency (NCORR), which is administering U.S. Department of Housing and Urban Development-funded Community Development Block Grants for Disaster Recovery for Hurricane Matthew recovery efforts. NCORR is also planning for additional Federal funding for residents hurt by Florence and will develop and implement strategies to protect North Carolina from future storms. We've continued to invest in the North Carolina Flood Inundation Mapping and Alert Network (FIMAN), a state-of-the-art flood mapping technology that helps indicate where to direct first responders and which communities remain most at risk during disasters, as well as the safest locations to rebuild. I've worked together with members of the North Carolina General Assembly to appropriate state relief, including \$65 million to help our state draw down Federal disaster recovery dollars and \$200 million to fund the North Carolina Farmer Recovery Reinvestment Program.

We're also making a difference together. I'm pleased that members of our congressional delegation and Federal agencies are helping provide meaningful relief to North Carolinians hit hard by the storm. We've approved over \$1 billion in State and Federal recovery resources, including over \$100 million in individual housing assistance from FEMA, over \$550 million in estimated claims paid through the

¹ <https://www.americansecurityproject.org/wp-content/uploads/2019/01/DoD-Effects-of-a-Changing-Climate-to-the-Department-of-Defense.pdf>.

National Flood Insurance Program and more than \$380 million in low-interest loans for homeowners, renters and business owners from the U.S. Small Administration.

While we've come a long way, we have much more work to do. I'm submitting two documents for the record: The first is a damage and needs assessment related to Hurricane Florence produced by the North Carolina Office of State Budget and Management²; the other is North Carolina's request to Congress for assistance in the aftermath of Hurricane Florence,³ which I shared with the North Carolina delegation and Federal appropriators in November. I look forward to continuing to work with Members of Congress throughout the Federal appropriations process.

But when storms are becoming more destructive, it's not enough to pick up the pieces. We must take action to prevent this kind of devastation in the future. I urge this Congress and all our Federal partners to match the same level of determination brought to disaster recovery in our fight to reduce the effects of climate change.

We in North Carolina are doing our part to address those effects. I've signed an executive order that sets a goal for our state to achieve a 40 percent reduction in greenhouse gas emissions by 2025, increase state building efficiency and get at least 80,000 zero-emission vehicles on the road in North Carolina. North Carolina is second in the country in installed solar capacity and my order directs the development of a state clean energy plan to ensure a continued transformation of the power sector away from fossil fuels and toward clean energy. My executive order also directs state agencies to begin using more zero-emission vehicles in our state motor fleet. Further, it directs our state Department of Commerce to grow our strong clean energy economy by supporting the expansion of clean energy business, service providers and companies with commitments to using clean energy. North Carolina is a national leader in clean energy and technology innovation and we're taking steps to promote the growth of energy efficiency, solar, land-based and offshore wind, storage and other clean energy resources.

In 2017, I ordered that North Carolina join the U.S. Climate Alliance, a bipartisan group of 20 governors committed to uphold the goals of the Paris Agreement on climate change, including by collectively achieving our share of the U.S. emission reduction target. The Alliance represents 47 percent of the U.S. population, over half of the national GDP and 1.5 million clean energy jobs. Alliance states are tackling climate change and growing our economies at the same time. We're working across party lines to share best practices and defend our Nation's most important environmental, energy and climate policies.

I've also worked with coastal community leaders and business owners to fight seismic testing and offshore drilling, two activities that endanger the health and economic success of our coast.

While local and state action is critical, Federal partners must join us in taking action to protect our people from the growing harm of climate change. State and local governments, researchers and the public rely on Federal data, research and analysis to inform policy decisions. Federal funding fuels critical scientific research and drives innovation that can help solve our climate crisis.

We need Federal legislation and regulations that promote emission reductions and the preservation of forests, marshes, barrier islands and other natural infrastructure that protect communities from the worsening effects of storms. We need Federal leadership to work with global partners to fulfill and strengthen international agreements. We need consistent Federal action that meets the urgency of our global climate problem. Our communities, our economy and our future depend on it.

QUESTIONS SUBMITTED FOR THE RECORD TO THE HONORABLE ROY COOPER,
GOVERNOR OF NORTH CAROLINA

Questions Submitted by Rep. Cunningham

Question 1. Do you support my beforementioned bill, H.R. 291, the Coastal Economies Protection Act?

1a. If yes, why?

1b. If no, how could we work together to change that?

² https://files.nc.gov/ncosbm/documents/files/Florence_Report_Full_rev20181016v10.pdf.

³ <https://files.nc.gov/governor/documents/files/Hurricane%20Florence%20Appropriation%20and%20Leadership%20Request%2011-28-18.pdf>.

Answer. I support amending the Outer Continental Shelf Lands Act to place a 10-year moratorium on oil and gas preleasing, leasing, and related activities. I would recommend adding language to specifically state that the moratorium applies to oil and gas seismic air gun testing.

Question 2. Governor Cooper, last year the Republican Mayor of Nags Head, Ben Cahoon, testified before the Committee and spoke in opposition to offshore oil and gas development. Why is opposition to offshore oil and gas drilling a bipartisan issue in your state?

Answer. North Carolinians, regardless of party affiliation, love and depend on the natural beauty and resources of our state. Offshore drilling and damaging seismic testing threaten North Carolina's coastal economy and environment yet offer little economic benefit to our state. These oil and gas activities present an unacceptable and unnecessary risk to our coast, which depends upon vibrant tourism and fishing industries.

My comment letter, dated March 9, 2018, in response to BOEM's Draft Proposed Program (see attached) lists in detail the economic and natural resources that could be impacted by drilling off North Carolina's coast:

- Coastal tourism, which generates \$3.4 billion annually and supports 35,000 jobs in the region.
- Commercial and recreational fishing, which contribute nearly \$2 billion to the state's economy.
- Approximately 300 miles of ocean beaches, 614,000 acres of submerged lands and waters within the state's 3nm Territorial Sea, 22 barrier islands, 2.5 million acres of estuarine waters, and more than 10,000 miles of estuarine shoreline.
- Department of Defense mission capability which, as the state's second largest economic sector, contributes \$66 billion in gross state product, and \$34 billion in personal income.
- 12 Division of Parks and Recreation units and recreational areas located adjacent to ocean waters or the sounds, which welcome 5.2 million visitors annually.

The items listed above provide jobs, recreational opportunities, and homes for North Carolinians and people who travel here from around the world. Protecting these resources is a bipartisan issue.

Question 3. Aside from the risks of an offshore oil spill, what other harmful impacts might result—either onshore or offshore—from opening the Atlantic Outer Continental Shelf to oil and gas development?

Answer. Here are potential risks broken down by issue.

Geological

- One location in North Carolina's coverage area in the National Outer Continental Shelf Oil and Gas Leasing Program has overlapping geologic plays located directly off Cape Hatteras. Known geologic hazards could induce failure in safety measures, as was determined when Mobil evaluated the Manteo block in 1987 or induce submarine landslides.
- The known underwater landslides offshore of North Carolina could impact underwater wellheads and trigger disastrous results in each of the six geological plays off our coast.
- The U.S. Geological Survey (USGS) identified three major slides: the Currituck Slide that extends from the northern border of the state; the Cape Lookout Slide that extends from the Outer Banks; and the Cape Fear Slide that extends from the southern border of the state.
- If oil- and gas-related activities destabilize these slides, a tsunami could result.
- A slide destabilization could also undermine the wellhead where blowout preventers are located.
- The unique physical oceanographic area off Cape Hatteras at the confluence of the two major surface currents of the western Atlantic Ocean—the Gulf Stream and the Labrador Current—present significant complications for sub-surface resource development due to the instability of the marine floor and severe surface weather.

- According to the National Parks Service’s Cape Hatteras National Seashore, these natural elements, including devastating hurricanes and Nor’easters “form a navigational nightmare that is feared as much as any in the world.” It is estimated that over 1,000 vessels have been lost near Cape Hatteras.

Marine Fisheries and Habitats

- The South Atlantic Fishery Management Council, acting through the National Marine Fisheries Service, designated several areas offshore of North Carolina as Essential Fish Habitat; a subset of these areas is designated as Habitat Areas of Particular Concern. Habitat Areas of Particular Concern are designated where they are considered particularly important for managed species or species complexes due to the importance of the ecological functions they provide and where they are at risk due to their rarity or sensitivity to human degradation. These designated areas include The Point, Ten Fathom Ledge, Big Rock and the shoals of Cape Hatteras, Cape Lookout and Cape Fear.
- Essential Fish Habitat is important to migratory species such as king and Spanish mackerel, dolphin, tuna, and cobia, as well as the snapper grouper complex. Due to the importance of these species to the state’s economy, it is vital that Essential Fish Habitats are protected from direct, indirect, and cumulative impacts associated with oil and gas drilling and development in the Outer Continental Shelf waters off North Carolina.
- Deep waters of the Blake Plateau in the Southeast harbor some extremely unusual and valuable marine ecosystems. A deep water coral wilderness stretches from North Carolina to Florida, including ancient reefs—some documented as more than a million years old—of slow-growing *Lophelia* corals. An area encompassing 23,000 square miles of these reefs has been designated as Habitat Areas of Particular Concern under Federal essential fish habitat provisions by the South Atlantic Fisheries Management Council. Deep water methane seep communities are just now being discovered; the one that is well documented on the Blake Ridge was also protected in the same action by the South Atlantic Fisheries Management Council (SAFMC).
- The SAFMC Habitat and Environmental Protection Advisory Panel also identified further unexplored areas where deep water coral discoveries are likely to be made.

Commercial and Recreational Fishing

- The commercial fishing industry in 2016 supported an estimated 7,410 jobs, \$166 million in income, and a \$388.32 million economic impact for the state. In the same year, approximately 1.4 million recreational anglers embarked on approximately 5.4 million trips in North Carolina’s coastal waters. Coastal recreational fishing activity supported an estimated 15,069 jobs, \$621 million in income, and \$1.57 billion economic impact to the state economy. Combined, commercial and recreational fishing activities support an estimated 22,500 jobs, \$787 million in income, and \$1.96 billion in annual economic impact.
- Oil and gas development off our shores, including oil platforms, could severely limit the areas within which our state’s fishermen could fish for certain species.

Historic Resources

- North Carolina has earned the nickname “Graveyard of the Atlantic” for the thousands of ships lost off the Outer Banks, from Native American dugouts to colonial-era ships to Civil War ironclads and WWII U-boats. Other submerged historic resources include downed military aircraft. Many of these sites have the potential to contain human remains and may legally be considered graves subject to state, Federal, and international law. While some of these resources have known locations for avoidance and planning purposes, other archaeologically sensitive locations are unknown or unexpected.
- Both pipeline excavation and dredging are likely to affect submerged historic resources within both state and Federal waters. Additionally, pipeline connections onto shore for resource transportation by land and construction of additional port infrastructure have the potential to affect archaeologically sensitive areas or nearby historic districts.

Military

- Military exercises conducted in North Carolina and from North Carolina-based military installations are vital not only to national defense and security, but also to the economies of North Carolina and the Nation. Oil and gas leasing and development off North Carolina's coast could jeopardize both military readiness and the North Carolina economy.
- The normal operations of oil and gas development in the region would be enough to hinder military training exercises off the North Carolina coast.
- The presence of multiple shipping and exploratory sea vessels and oil derricks pose a risk of obstructing visibility and encroaching on existing flight paths.
- Because the military is the second largest sector of North Carolina's economy, adverse impacts from oil and gas development would be felt throughout the state economy. North Carolina has the fourth-largest active and reserve military population in the Nation. The military contributes \$66 billion in gross state product and \$34 billion in personal income. More than 575,000 individuals are either directly employed by the military or work in the private sector providing goods or services that support the military's presence in North Carolina.

Renewable Energy

- Development of oil and gas resources off North Carolina's coast would jeopardize renewable energy opportunities in the same general area.
- The Kitty Hawk Wind Energy Area is located in the same offshore region that BOEM proposes for oil and gas drilling and development in North Carolina's Outer Continental Shelf waters.
- Co-locating two separate incompatible large-scale energy projects increases the potential for user conflicts and environmental impacts.
- The best way to mitigate these potential use conflicts is to remove North Carolina's Outer Continental Shelf waters from further consideration in the Federal oil and gas leasing program.

Commercial Shipping

- Potential navigation and safety impacts to commercial shipping along the East Coast.

Question 4. Governor Cooper and Governor Baker, while we're discussing the threats and impacts associated with climate change, there's an obvious connection to opening vast new areas of the Atlantic Ocean to oil and gas development. At a time when our country needs to confront the reality of climate change, what does the Trump administration's desire to open the Atlantic coast to unfettered fossil fuel development tell you about their priorities about environmental protection?

Answer. The most prudent actions the U.S. Department of the Interior could take on this topic are to exclude the Atlantic Coast from its forthcoming Proposed Plan for the National Outer Continental Shelf Oil and Gas Leasing Program for the years 2019–2024 and to deny permit applications for oil and gas seismic air gun surveying off North Carolina's coast. Offshore drilling and seismic testing unnecessarily threaten North Carolina's coastal environment and economy.

Question 5. Did either of you have conversations with former Secretary Ryan Zinke about his decision to unilaterally exempt Florida from offshore oil and gas development, but no other states that have equally as valuable and vibrant fishing and tourism industries?

5a. Why do you think former Secretary Zinke tried to exempt Florida, but no other state?

Answer. In February 2018 a bipartisan group of local officials and I met with former Secretary Zinke in Raleigh. We asked Mr. Zinke to exempt North Carolina's coast from the offshore drilling plan, just as he had putatively exempted Florida. We emphasized that like in Florida, coastal tourism is important to North Carolina. And like Florida, North Carolina has bipartisan opposition to drilling, an ecologically fragile shoreline, and the potential for catastrophic accidents.

I don't know why Mr. Zinke purported to exempt Florida, but the Department of the Interior still has the ability to remove water off North Carolina's coast and the rest of the Atlantic Ocean from consideration for the 5-year offshore leasing plan.

5b. Do you believe former Secretary Zinke potentially violated Federal laws when he made the snap decision to exempt a single state from his oil and gas leasing plan without going through the required public process?

Answer. I can't speak to whether or not Secretary Zinke violated the law in the Florida process, but I did tell him during the February 2018 meeting that if the final 5-year offshore leasing plan includes coastal waters off North Carolina, he could expect to be involved in a lawsuit.

Question 6. Why do your administrations oppose offshore oil and gas development, and are your positions in line with your state's coastal communities and coastal businesses?

Answer. Simply put, offshore oil and gas development off North Carolina's coast is a bad deal for the state. Please refer my responses to Questions 2 and 3 above for an explanation of why North Carolina opposes seismic air gun testing and offshore drilling.

North Carolina's coastal communities and businesses strongly oppose seismic air gun testing and offshore drilling in the Atlantic. Nearly 40 coastal governments have passed resolutions in opposition to oil and gas exploration and development activities off the coast. So too have North Carolina business interests passed resolutions in opposition to oil and gas exploration and development, including the tourism development authorities in Carteret, New Hanover, and Dare counties; the Carteret County, Outer Bank, and Wrightsville Beach chambers of commerce; the Outer Banks Home Builders Association; and the Outer Banks Association of Realtors.

In addition, other business and key stakeholders, including the NC Association of Resort Towns and Convention Cities, the NC Council of Churches, and NC Interfaith Power and Light, submitted comments in opposition to offshore oil and gas activities. These positions in opposition taken by communities and business organizations echo the message we've heard from our state's residents and the editors' desks of our major news organizations. In August 2017, following BOEM's renewed call for a new 5-year leasing plan, the NC Department of Environmental Quality hosted three public hearings on the coast and solicited feedback from the public on the Federal proposal. In total, 465 people attended the hearings in Wilmington, Morehead City, and Manteo. Of the 104 people who made remarks at the hearings, 96 spoke against oil and gas exploration off North Carolina's coast.

Question 7. Do you support seismic air gun blasting that is a precursor to oil and gas development?

Answer. North Carolina is opposed to seismic air gun blasting. Research indicates that the proposed seismic surveys off of North Carolina's coast would harm marine mammals. Our state has a higher diversity of marine mammals than anywhere else along the East Coast or in the Gulf of Mexico. The disruption of North Carolina's critical marine resources by allowing seismic testing represents a critical threat to North Carolina's coastal communities and economy.

My administration has taken numerous steps to oppose seismic surveying. I have signed onto two letters that include multiple East Coast governors in opposition to oil and gas exploration and development in the Atlantic Ocean. The most recent letter—dated December 20, 2018, and submitted to the Secretaries of the Department of the Interior and Department of Commerce—was signed by a bipartisan group of 10 governors. On July 21, 2017, my administration submitted regulatory comments to the National Oceanic and Atmospheric Administration asking that it deny applications to incidentally harass marine mammals off the North Carolina coast.

Additionally, after new scientific studies regarding potential impacts of Geological and Geophysical (G&G) activities on marine resources were published, the N.C. DEQ's Division of Coastal Management sent letters to four companies on December 22, 2017, asking them to re-open the consistency determinations pursuant to 15 CFR 930.66 and submit additional information about proposed seismic surveying for offshore oil and gas resource development. On March 13, 2018, N.C. DEQ's Division of Coastal Management sent a letter to the U.S. Bureau of Ocean Energy Management asking it to refrain from issuing permits to seismic companies, as the requested information for the supplemental consistency determinations was never received.

My administration continues to have concerns about the potential impacts of seismic testing on marine resources that could severely impact North Carolina's commercial and recreational fisheries. We cannot afford to endanger the natural resources that serve as the foundation of our tourism industry and coastal economy.

Question Submitted by Rep. Bishop

Question 1. Governors, you both stated your opposition to offshore oil and gas development in Federal waters. Governors, do you believe that states should have the right to control offshore energy development in Federal waters adjoining their coasts?

Answer. Comments from the governors of coastal states should be of paramount importance given that states and communities have the best understanding of the environmental, social, and economic implications of offshore energy exploration and development and that they are the most likely to be directly affected. Overwhelming state opposition to oil and gas exploration and development requires significant consideration under Federal law, namely the Outer Continental Shelf Lands Act (OCSLA) and the Coastal Zone Management Act (CZMA).

The OCSLA requires that as part of the 5-year plan review process, the Secretary of Interior must solicit and consider comments from the governors of affected states. At least 60 days prior to publication of the program in the Federal Register, the Secretary must submit the program to the governor of each affected state for further comments and for the governor to consult with local government leaders. Additionally, when the Secretary submits the program to Congress and the President, that submission must include an explanation for accepting or rejecting any specific recommendations made by a governor, per 43 U.S.C. 1344.

In addition, section 307 of the Federal CZMA affords states an important role in decision making regarding offshore energy development based on potential impacts to a state's coastal resources and uses, even when that development activity takes place in adjacent Federal waters.

ATTACHMENTS

January 17, 2018

The Honorable Ryan Zinke
Secretary
U.S. Department of the Interior
1849 C Street NW
Washington, DC. 20240

Dear Secretary Zinke:

We write today to express our joint opposition to the leasing, exploration, development and production of oil and gas in the Atlantic Ocean as proposed by the 2019–2024 Outer Continental Shelf Oil and Gas Leasing Program. We also write to request that our states and the Atlantic Coast be exempt from this program.

Like Florida, each of our states has unique natural resources and an economy that is reliant on tourism as an essential driver. We support the notion of energy diversity, but the environmental and economic importance of the Atlantic Ocean must be weighed against the potential unintended consequences of these types of activities.

More than one hundred and forty (140) local communities passed resolutions opposing offshore drilling in the Atlantic. They have also been joined by tourism associations, convention and visitors bureaus (CVB's), businesses, trade groups, and legislators from both sides of the aisle.

Not only are ocean and oceanside resources at risk, but also nearby bays, estuaries, coastal communities, iconic natural areas, and ports. The irreversible impact on ecosystems including marine mammals, fish, sea turtles, and other aquatic life that inhabit the ocean offshore is gravely concerning, as is potential risk and harm to our state's economies, our natural resources, our military installations, and our residents.

We appreciate the emphasis that you have placed on public input and urge you to grant our request to be exempt from this program.

Sincerely,

Governor Larry Hogan
Maryland

Governor Dannel P. Malloy
Connecticut

Governor John C. Carney
Delaware

Governor Roy Cooper
North Carolina

Governor Charles D. Baker
Massachusetts

Governor Gina M. Raimondo
Rhode Island

Governor Ralph S. Northam
Virginia

December 20, 2018

The Honorable Wilbur L. Ross, Jr.
Secretary
U.S. Department of Commerce
1401 Constitution Ave., NW
Washington, DC. 20230

The Honorable Ryan Zinke
Secretary
U.S. Department of the Interior
1849 C Street NW
Washington, DC. 20240

Dear Secretary Ross and Secretary Zinke:

As the governors of 10 states on the Atlantic seaboard, we write to reiterate our strong opposition to seismic airgun surveys and oil and gas drilling off our coasts. These activities pose an unacceptable and unnecessary threat to our coastal ecosystems and coastal economies. We emphatically disagree with the recent decision by the Department of Commerce to issue incidental harassment authorizations (IHAs) for seismic airgun surveys in the Atlantic Ocean. We urge the Department of the Interior to deny permits for seismic airgun surveys in the Atlantic. In addition, we adamantly oppose the inclusion of any Atlantic Ocean region in the final 2019–2024 National Outer Continental Shelf Oil and Gas Leasing Program.

The coastal economies in each of our states depend upon vibrant tourism and fishing industries. The IHAs would allow five companies to conduct seismic airgun surveys in the Atlantic Ocean, despite peer-reviewed evidence portending significant harmful impacts to marine mammals and fisheries, including endangered species. Seismic airgun surveying can cause acute, cumulative, and chronic negative impacts on the ability of marine mammals to send and receive signals that are essential for feeding, reproduction, raising offspring, and navigation. The repeated, loud noises from airgun blasts also risk diminishing essential fish stocks for commercial and recreational fishing communities in our states.

The seismic survey restrictions in the IHAs do not ensure that such activities will have a negligible impact on affected species. These restrictions, for example, fail to account for the ability of seismic airgun pulses to travel over long distances, the correct exposure thresholds for changes in species behavior, and the cumulative impacts of conducting multiple seismic airgun surveying operations at once. As a result, conducting seismic surveys under these authorizations can lead to mortality and permanent injury of fish and marine mammals, including endangered species such as the North Atlantic right whale.

The Atlantic Coast's ocean economy generates more than \$98 billion in gross domestic product, an economic impact that would be jeopardized by seismic airgun surveys and offshore oil and gas drilling. More than 200 local governments have passed resolutions opposing seismic airgun surveying and/or offshore drilling in the Atlantic Ocean. Tourism associations, convention and visitors bureaus, businesses,

trade groups, and elected officials from both sides of the aisle also have voiced opposition to these activities.

State and local leaders in our states have voiced consistent, bipartisan opposition to seismic airgun surveys and offshore drilling. We ask that you respect our request and concerns by denying all permit applications and issuing no further IHAs for seismic airgun surveys in the Atlantic Ocean. In addition, we request that you exclude the Atlantic Ocean from the 2019–2024 National Outer Continental Shelf Oil and Gas Leasing Program for offshore drilling and deny any future activities whose purpose is to support offshore drilling in the Atlantic Ocean.

Sincerely,

Roy Cooper
Governor of North Carolina

Henry McMaster
Governor of South Carolina

Dannel Malloy
Governor of Connecticut

Andrew Cuomo
Governor of New York

Larry Hogan
Governor of Maryland

Charlie Baker
Governor of Massachusetts

John Carney
Governor of Delaware

Ralph Northam
Governor of Virginia

Gina Raimondo
Governor of Rhode Island

Phillip D. Murphy
Governor of New Jersey

The CHAIRMAN. Thank you very much, Governor, much appreciated.

Let me now turn to Governor Baker for your testimony. The floor is yours, sir.

**STATEMENT OF THE HON. CHARLIE BAKER, GOVERNOR,
STATE OF MASSACHUSETTS, BOSTON, MASSACHUSETTS**

Governor BAKER. Thank you, Chairman Grijalva and Ranking Member Bishop, for those warm, welcoming remarks. And I want to thank the members of the Committee for being here, as well, and inviting me to testify on the approach that Massachusetts has taken to deal with the very real challenge associated with climate change.

In Massachusetts, climate change is not a partisan issue. While we sometimes disagree on specific policies, we understand the science and know the impacts are real because we are experiencing them firsthand.

Shortly after I took office in January 2015, the snow started falling hard. And it didn't end for months. Last winter, we saw four major Nor'easters, setting record flood levels and causing significant damage to natural resources and property. Rising temperatures have led to warmer winters, impacting weather-dependent industries like skiing and agriculture. Climate change is also warming our coastal waters and threatening some of the Nation's most important commercial fisheries.

While many of these challenges are not new, they are more frequent and more damaging than before. While rising temperatures and warmer winters have impacted weather-dependent industries like skiing, local businesses like Berkshire East have adapted to these challenges by diversifying their business to

include non-winter activities, which now account for 60 percent of the mountain's revenue. Berkshire East has also become the first ski mountain in the world to be 100 percent powered by renewable energy.

The magnitude of the impacts from climate change requires all of us at the Federal, state, and local levels, to work together. That is the path we have taken in Massachusetts. Massachusetts, via bipartisan legislation, was one of the first states in the Nation to establish a long-term requirement to reduce carbon emissions by at least 80 percent below 1990 levels by 2050, while also setting interim targets. We are well on our way to reaching our 2020 goal of a 25 percent reduction in emissions.

The Regional Greenhouse Gas Initiative, a cap and trade program encompassing large electric generators across nine northeast states, also provides a stable policy to reduce emission and allow states to invest in cost-effective energy efficiency programs. The investments from this initiative has saved ratepayers across the RGGI states an estimated \$8.6 billion.

We have also developed regional partnerships with New England states, the Canadian provinces, and the Federal Government. Utilizing the comparative strengths of different regions allows us to obtain competitive pricing on projects like hydropower from Quebec.

In 2016, we competitively bid and selected an offshore wind project on a Federal lease area that will save ratepayers money over the next 25 years. This would not have been possible without our partnership with the Federal Government, and I applaud Congress for providing a predictable investment tax credit for this industry, and also the Trump administration's Bureau of Ocean Energy Management for working with us to quickly review the project and build a new industry here in the United States off our eastern shores.

We have also been preparing for the ongoing impact of climate change. Our administration recently completed a state hazard mitigation and climate adaptation plan. Leveraging Federal Emergency Management Agency money, the plan is the first in the Nation to fully integrate Federal hazard mitigation planning requirements with a proactive approach to addressing the impacts of climate change.

Our administration has also sought to work closely with our local communities. Our municipal vulnerability preparedness program provides grants and technical assistance to cities and towns, so they can assess their vulnerabilities and plan for and implement climate change adaptation projects. Importantly, these program allows communities the flexibility they need to design solutions that work for their unique circumstances.

Based on our experience in Massachusetts, I would like to share four themes that I believe will help further reduce greenhouse gas emissions and increase resiliency across the country.

First, states and local communities need support from the Federal Government. Many Federal initiatives are only available after a disaster occurs. Incentives similar to our MVP program would help communities address resiliency issues before the next disaster. Expanding programs like FEMA's new resilient infra-

structure grants and increasing funding available to states would accelerate existing efforts and galvanize new ones.

Bipartisan interest in infrastructure funding also holds tremendous promise to not only repair and modernize our infrastructure, but also make it resilient to changes in weather. Federal infrastructure legislation should incorporate consideration of climate change emissions, vulnerability, and design standards that reflect that changing climate.

Both state and Federal governments also need to develop public-private partnerships to bring private-sector dollars into our communities, while leveraging the knowledge and strategic thinking the private sector can bring to this challenge.

Second, we need strong Federal leadership and a bipartisan vision on climate change that prioritizes practical, market-driven, and cost-effective solutions, while affording states the flexibility to design strategies that work for their unique challenges. We believe it is essential for the Federal Government to create a target with respect to emission reductions that can vary by state or region.

In our state's experience, setting an aggressive target for reducing greenhouse gas emissions provides the foundation for clean energy policy, sends a clear message to industry, and enables long-range planning.

Third, strong Federal leadership should also include making impactful investments in research around both emission reductions and climate change adaptation. Federal research and development gave us the internet and GPS, technology that has changed our lives forever. I believe the Federal Government could bring its resources to bear in developing the next breakthrough battery cell or other technological advances that could help dramatically reduce emissions and radically transform our energy future.

Fourth, the Federal Government should incorporate climate risk and resilience in future Federal spending and planning decisions to ensure taxpayer dollars are used wisely. Our own Boston Harbor Islands, managed through a partnership between state and Federal Government and a non-profit, were already threatened by rising sea levels and storm surges.

Governors around the country are seeing and responding to the effects of climate change in our states and communities. This is not a challenge any one of us can solve alone. We need collective action from Federal, state, and local governments working with the private sector to aggressively reduce our greenhouse gas emissions and adapt to the changes that are already in motion.

I want to thank this Committee for the invitation to speak, and I thank my colleague, Governor Cooper, for joining me here today. I have submitted written testimony, which goes into more detail than my oral remarks. I look forward to working together on this challenge, and I am pleased to answer any questions from the Committee.

[The prepared statement of Governor Baker follows:]

PREPARED STATEMENT OF CHARLES D. BAKER, GOVERNOR OF THE COMMONWEALTH OF MASSACHUSETTS

Chairman Grijalva, Ranking Member Bishop, and members of the Committee, thank you for inviting me to testify today before the House Natural Resources Committee on the Commonwealth's approach to the very real challenge of climate

change. Thank you for addressing this issue in a bipartisan manner and for looking to the states who, along with cities and towns, are directly taking on this challenge by setting bold targets, developing practical and cost effective solutions, and working collaboratively across the country.

CHALLENGES AND OPPORTUNITIES IN MASSACHUSETTS

In Massachusetts climate change is not a partisan issue—while there may sometimes be disagreement on specific policies, we understand the science and we know the impacts are real. We know through experience that mitigation to clean up our energy supply and transportation system, paired with adaptation strategies to reduce risk and build resilience can foster strong communities, protect residents and natural resources, and contribute to strong economic growth and innovation throughout the state.

We have seen firsthand the impacts of a changing climate in Massachusetts. Shortly after taking office in January 2015, the snow started falling, hard, and it didn't end until well into April. What was different about those storms was the sheer volume of snowfall, with record-breaking amounts in Worcester and Boston. Although it seems counterintuitive, climate change is indeed producing higher volume precipitation events. As the air and oceans have warmed, higher concentrations of water vapor in the atmosphere lead to more intense rain and snowfall, and what we are seeing in Massachusetts is part of this pattern. In fact, the percentage of rain and snow falling in the heaviest 1 percent of storms in the Northeast has increased by over 70 percent since 1958.¹ The increasing frequency and intensity of storms is something of great concern to us in Massachusetts. Last winter we saw four major Nor'easters, setting record flood levels in Boston and other coastal communities, and causing significant damage to natural resources and infrastructure as well as devastating property loss. We have also seen an increase in intense rainfall events, with flash flooding and damage to ageing infrastructure in cities like Worcester and Lynn.

While last fall was the wettest ever recorded in Massachusetts, in the summer of 2016, we experienced one of the worst droughts on record. These droughts greatly strained public and private water supplies in many communities and led to significant losses in agricultural production, including cranberries, apples, peaches and Christmas trees whose growers reported up to 80 percent loss of seedlings. In September 2016, the U.S. Department of Agriculture designated all 14 counties in Massachusetts as primary or contiguous natural disaster areas due to losses caused by the drought, making them eligible for Federal disaster assistance.

Temperatures have also been rising. On the heels of the warmest 3 years on record, last August was the warmest month ever recorded in Massachusetts. This overall warming trend is leading to more frequent heat waves that threaten vulnerable population groups, warmer winters that impact weather dependent industries like maple syrup and skiing, and increases in Lyme disease and other tick and mosquito-borne illnesses. Climate change is also warming our coastal waters and threatening some of the Nation's most important commercial fisheries off the coast of New England. Stretching from Cape Cod to Cape Sable Island in Nova Scotia, the Gulf of Maine is warming faster than 99 percent of the world's oceans. Warming waters have already led to 80 percent reduction of Atlantic cod habitat over the last decade. Further warming is projected to shift lobster populations 200 miles north into Canada and enhance the ongoing invasion of green crabs that threaten the soft-shell clam industry.

By talking with our farmers and fisherman and touring the damage after weather events, one theme has become clear to me—while many of these challenges are not new, they are not like they used to be. They are occurring more frequently and they are more damaging than they ever were in the past. The science and economic data bear this out and we know that these changes are happening all across the globe. I am all too aware of the unique challenges other governors are facing, from the deadly wildfires in California and Montana, to permafrost and glacial melt in Alaska, to severe heat waves last summer across the Southwest.

These impacts come with a growing cost. Federal data from the National Oceanic and Atmospheric Administration (NOAA) shows that 2017 was the costliest year for weather and climate disasters with over \$300 billion in total spending.² In New

¹Horton, R., G. Yohe, W. Easterling, R. Kates, M. Ruth, E. Sussman, A. Whelchel, D. Wolfe, and F. Lipschultz, 2014: Ch. 16: Northeast. *Climate Change Impacts in the United States: The Third National Climate Assessment*, J.M. Melillo, Terese (T.C.) Richmond, and G.W. Yohe, Eds., U.S. Global Change Research Program, 16–1–nn.

²NOAA National Centers for Environmental Information (NCEI) U.S. Billion-Dollar Weather and Climate Disasters (2018). <https://www.ncdc.noaa.gov/billions/>.

England, the string of Nor'easters we saw last March cost the region \$2.2 billion and we lost nine lives. Since 2015, Massachusetts has also seen at least \$200 million in disaster damages to our towns and public agencies, which is only a fraction of the costs our communities face. The 2015 February blizzards alone were devastating—lives were lost, and the storms cost our state and local governments \$35 million, with total losses exceeding an estimated \$1 billion.

In Massachusetts our rural economy and natural resource based industries are increasingly threatened by changing seasons, shorter winters, and less snow. Warmer temperatures are hitting the ski industry particularly hard. Just one mild winter in 2009/2010 cost the Northeast ski industry 1,700 jobs and \$108 million in economic value.³ But our ski resorts are responding to this pressure with entrepreneurship to diversify their business model and expand into recreation and tourism activities outside of the traditional winter season.

On the eastern slopes of the Berkshires, Jon Schaefer's family business Berkshire East has become the first ski mountain in the world to be 100 percent powered by renewables. Concerned about the unpredictable cost of energy and the impact of climate change, Mr. Schaefer invested in wind and solar, using State and Federal incentive programs. The cost savings from installing clean energy allowed him to invest in more efficient snow-making equipment while also diversifying his business to include off-season activities like zip-lining and white water rafting to bring in additional revenue. He reports that 60 percent of the mountain's revenue now comes from non-winter business, resulting in an operation that is much more resilient to the changing weather patterns ahead.

There are stories like this across the country—stories of family businesses, farms, large industry and cities and small towns threatened by the changes they are already seeing, but harnessing innovation and ingenuity to take on these challenges. But they can't do it alone. The magnitude of the impacts from climate change requires all of us to put politics aside and act together, quickly and decisively. We still have the opportunity to check the severity of future impacts by aggressively reducing greenhouse gas emissions and adapting to the changes that are ongoing. That is the path we have taken in Massachusetts.

A HISTORY OF BOLD LEADERSHIP ON CLIMATE CHANGE AND BREAKTHROUGH MITIGATION POLICIES

The effort to reduce emissions to a level that avoids the most catastrophic changes to our climate clearly requires state, national, and international leadership. At the same time, there are aspects of Massachusetts' own experience in successfully establishing achievable goals, working regionally, and fostering innovative breakthroughs that could offer lessons for other states, regions, and the Federal Government.

With the unanimous, bipartisan passage of the Global Warming Solutions Act in 2008, Massachusetts became one of the first states in the Nation to establish both a long-term requirement to reduce carbon emissions by at least 80 percent below 1990 levels by 2050, while also setting interim targets every decade. The Act requires us to report our emissions annually, track policy effectiveness and develop plans for the future. By mid-century this course will yield significant GHG reductions, overhaul our energy structure, and lead to significant economic and societal change, while the interim targets will guide the implementation of cost-effective policies that reflect current technology. Clearly, this is an enormous undertaking but developing ambitious, yet realistic goals is working. Our 2020 goal of a 25 percent reduction under that baseline was set ambitiously in 2010 and as of 2016 we have reached a 21.4 percent emissions reduction and are well on our way to reach the 25 percent limit. Moreover, far from being an economic burden, we have seen close to a 70 percent increase over 1990 levels in our gross state domestic product and clean energy has been one of the strongest job growth sectors in our economy in the last decade.

The Commonwealth's aggressive 2020 goal puts the state on track to meet emissions reductions of 26 to 28 percent below 2005 levels by 2025—the nationally determined U.S. contribution through the Paris Agreement of the United Nations Framework Convention on Climate Change. Shortly after the announcement of the intent to withdraw the United States from the Paris Agreement, Massachusetts joined with a bipartisan coalition of states committed to fulfilling the tenets of the Paris Agreement by implementing policies to reduce emissions, tracking and reporting progress on emissions reductions and accelerating new and existing policies to

³Burkowski, E., and M. Magnussen. 2012. Climate Impacts on the Winter Tourism Economy in the United States. Natural Resources Defense Council. <https://www.nrdc.org/sites/default/files/climate-impacts-winter-tourism-report.pdf>.

reduce carbon pollution and promote clean energy deployment at the State and Federal level. The coalition is now 20 governors strong.

This 2020 goal has not only provided a focus within Massachusetts, but it has also compelled us to develop instrumental regional partnerships with New England states, the Canadian provinces and the Federal Government. Specifically, we have found that utilizing the comparative strengths of different regions—whether it is hydropower from Quebec or offshore wind in Federal waters—allows us to obtain cost-competitive pricing. Every region of our country should have the flexibility to develop a unique plan that leverages existing resources and economies, but we must seize the opportunity to responsibly reduce emissions now.

The predictability of the regional clean energy market and promotion of clean energy development and trade have also been essential to the Commonwealth's success. The Regional Greenhouse Gas Initiative (RGGI), a cap-and-trade program encompassing electric generators larger than 25 Megawatts across nine states, provides a stable policy to reduce emissions and allows states to invest auction proceeds in cost-effective energy efficiency programs, including nearly \$400 million in Massachusetts since its inception. While the program marginally increases wholesale electricity pricing, the reinvestment in highly cost-effective energy efficiency measures has resulted in \$3–\$4 in benefits for every \$1 of incremental cost. In Massachusetts, businesses across sectors are seizing the opportunity to take advantage of energy efficiency programs through our MassSave Program—from optimizing efficient cooling technology at the largest data center in New England run by the Markley Group, to installing advanced lighting at Hannaford, one of the largest supermarket chains in the state, to removing redundant motors at Cedar's Mediterranean Foods operations, saving over \$100,000 annually in energy costs. Our major sports facilities, including Fenway Park, have undergone LED lighting upgrades that have reduced the park's electricity use by 12 percent. Bottom line, we have saved billions in avoided electrical costs for all ratepayers by keeping electric load basically flat while our economy has grown. The results on New England sports fields have been pretty decent as well.

In total, the region's greenhouse gas emissions from this sector have fallen 50 percent since 2005 and the regional investments from the proceeds are estimated to have saved ratepayers across the RGGI states a cumulative \$8.6 billion. Regulated generators see the value in the clarity and the predictability of the program, while businesses support the energy efficiency investments that have earned Massachusetts the title of the #1 state for energy efficiency in the Nation for 8 consecutive years.

While we have leveraged cost-effective efficiency investments, including the installation of over 24.1 million LED light bulbs, energy innovation opportunities are accelerating. From further advancements in lighting, electrical heating and cooling, and advanced insulation improvements that make zero energy consumption for new building construction a reality, we now have commercially available efficient technology and materials that are transforming our economy.

There is no single solution to the challenges we face and we need to take a flexible approach that supports the innovations of tomorrow while acknowledging the role existing resources like natural gas and nuclear power, have played in our success to date. Clean energy innovation, guided by targeted research and development and pure entrepreneurial initiative, continues to deliver declining energy costs and new disruptive technologies. While deploying the cost-effective technology of today we should invest in clean energy research and development. These investments will likely produce key components of our energy future. For example, the ARPA-E program has partnered with MIT to move forward with advanced nuclear research to increase reactor performance. Harvard University is researching a flow battery that utilizes organic molecules to store electricity beyond increasingly competitive—but still expensive—electric batteries.

Storage completely alters the value proposition for renewable energy, presents unique advantages to reconfigure our electric distribution system, and can target reductions in the peak electricity consumption through timely dispatch. Our Department of Energy Resources determined that in Massachusetts, 40 percent of the electrical cost for ratepayers occurs during the top 10 percent of the usage hours of year. Storage technology can therefore provide both ratepayer and greenhouse gas reduction benefits. Massachusetts electric utilities are looking to avoid costly upgrades to distribution lines through targeted storage deployment, diesel generation on our islands are being replaced with storage units, and manufacturers are lowering bills through avoided demand charges by curtailing demand with storage during peak demand periods.

In 2019, we must jettison preconceived assumptions about the costs of clean energy and look at the facts. Just 7 years ago, Massachusetts considered moving

forward with an offshore wind project at a cost of roughly 20 cents per-kilowatt and projecting billions in above-market costs for ratepayers. In 2016, acting after passage of the bipartisan legislation, we issued a competitive Request for Proposals and Massachusetts selected an offshore wind project on one of three Federal lease areas proposed by Vineyard Wind that represents a cost reduction of more than 65 percent below the previous proposal and is projected to save ratepayers money. The factors that led to these disruptive prices include technology that will increase turbine sizes by nearly three times, economies of scale delivered by a larger project, and a competitive solicitation that challenged bidders to deliver the best price. These industry advancements would not have been possible without our critical partnership with the Federal Government. I applaud Congress for providing a predictable investment tax credit for this industry and also the Trump administration's Bureau of Ocean Energy Management for working with us to expeditiously review the project and build a new industry in the United States. The Administration has recognized the potential economic opportunity of modern offshore wind turbines and last December moved forward with lease sales for three additional parcels in Federal waters south of Massachusetts. Not only did the auction collectively deliver \$405 million for the Federal Government, but it attracted traditional companies like BP, Shell, and the Norwegian state energy company, Equinor. This is a partnership that can reduce emissions, save ratepayers money, and provide critical revenue to the Federal Government.

We can seize this economic opportunity while simultaneously realizing the emission reductions afforded by the best available science and technology. Congress has come together in the past to successfully enact meaningful bipartisan energy and climate change legislation that resulted in emission reductions and predictability for our business community. Just over 4 years ago, Republicans and Democrats came together and developed a compromise that included the extension of the renewable investment tax credit allowing Vineyard Wind to move forward with an 800 Megawatt project. This credit was imperative to the results: emission reductions by over 1.6 million metric tons annually, the equivalent of taking 325,000 cars off the road and it is estimated that the project will provide over 3,600 local full-time equivalent jobs over the life of the project.

While we have made significant progress to reduce power sector emissions, our next challenge will be transportation. In Massachusetts transportation emissions represent close to 40 percent of total emissions and continue to climb, while most other sectors are declining. In that spirit of regional partnership, this past December, we joined eight states and the District of Columbia through the Transportation Climate Initiative to work together over the next year to develop the framework for a regional program to address greenhouse gas emissions in the transportation sector, building on the strong foundation provided by RGGI. The announcement follows the recent release of the report of the Commission on the Future of Transportation, which I appointed to help Massachusetts navigate a disruptive transportation future. The report called for the de-carbonization of transportation, including collaborating with regional partners to develop a carbon pricing mechanism to cap emissions and invest revenue back within the state.

BUILDING A RESILIENT COMMONWEALTH

In Massachusetts we have focused first on reducing our contributions to climate change and building our clean energy economy, but our experience with severe weather and natural hazards has made clear the importance of preparing for the ongoing impacts of climate change. In 2016, I signed an Executive Order to, for the first time, pursue an aggressive, integrated effort using sound science to prepare state government and partner with our local communities to build resiliency for the challenges ahead.

One of the first things we did was to partner with the federally funded Northeast Climate Adaptation Science Center at the University of Massachusetts to understand the climate changes we are seeing now and the kinds of changes we will see in the future. Our secretaries of Energy and Environmental Affairs and Public Safety and Security led a 2-year, government-wide effort to complete a State Hazard Mitigation and Climate Adaptation Plan. The plan, which leveraged Federal Emergency Management Agency (FEMA) money and engaged over 500 stakeholders, is the first in the Nation to fully integrate Federal hazard mitigation planning requirements, with a proactive, forward looking approach to addressing the impacts from climate change. Throughout the development of the plan, every state agency completed a vulnerability assessment of their assets and functions and identified initial strategies to increase resiliency.

The plan will be used to inform policy, management and spending decisions including development of climate change resiliency criteria in our capital planning process to ensure that the investments we are making today are designed for changing conditions and do not increase our exposure to climate risk. While we know we need increased funding to deal with these challenges, the first step in this process is making sure existing spending is climate-smart and cost-effective.

As I mentioned, our local communities are already experiencing climate change impacts and are taking leadership themselves on this issue—our administration strongly values our municipal partners and has sought to work closely together on this challenge. Our Municipal Vulnerability Preparedness program (MVP), launched in 2017, builds on this partnership by providing grants and technical assistance to municipalities so they can assess their vulnerabilities, and plan for and implement priority climate change adaptation projects to build resiliency and reduce risk. My administration worked with partners across the state to develop this community-based program, including the Nature Conservancy and the Massachusetts Audubon Society and has trained over 300 technical service providers from consulting firms, regional planning authorities, engineering companies, small businesses and non-profits to lead municipal planning efforts. In its first 2 years, the MVP program enrolled 44 percent of Massachusetts municipalities, and awarded over \$8 million in grants.

These grants are advancing local resilience innovation—like the development of the city of Boston’s first ever resilient building code, restoration of an urban floodplain in Arlington, and a town-wide road stream crossing resiliency strategy in Belchertown. High participation from Massachusetts communities underscores the real need and enthusiasm for a program that maintains and enhances quality of life, helps to repair and replace aging infrastructure with climate-smart solutions, and promotes strong local economies while reducing risks and future costs. Importantly the program allows communities the flexibility to design solutions that work for their unique circumstances, are grounded in science and funded by the Commonwealth.

These programs cost money, and in fact over the first 4 years of my administration we have invested over \$600 million on climate change mitigation and adaptation actions through our environmental agencies alone without raising taxes or fees. Building on this investment, we recently worked together with the Legislature to craft an environmental bond bill focused on climate change adaptation, environmental protection, and recreation that authorizes \$2.4 billion of investments over 5 years.

Now that we have a better understanding of the scope of the challenges ahead through our state and local planning efforts, I also filed legislation in January calling for a modest increase in the excise on property transfers to fund a substantial and sustained investment in climate change adaptation to protect property. The proposal is estimated to generate \$1.3 billion over 10 years that would go directly back to cities and towns to invest in climate-smart infrastructure and nature-based solutions that protect public health, safety, and property across the Commonwealth. Climate-smart infrastructure is resilient to damage caused by climate change and extreme weather because it is designed to accommodate the climate conditions it will experience over its lifetime, rather than historic conditions which set the standards for the infrastructure we have today. Examples include:

- right-sizing culverts to accommodate increased streamflow from more intense storms;
- removing underutilized dams and restoring floodplains along rivers and streams to prevent flooding;
- installing resilient energy technologies such as microgrids that pair on-site renewables like wind and solar with battery storage to allow a critical facility like a hospital or campus to remain on-line during severe weather;
- employing nature-based solutions such as wetland restoration in urban areas to absorb increased runoff during storms;
- installing artificial oyster reefs and restoring natural coastal habitats to buffer against increased storm surge and sea level rise;
- upgrading combined sewer overflows to separate wastewater from stormwater to ensure cleaner water and fewer flooding events involving untreated sewage; and
- ensuring materials used in roads, bridges, train tracks and other heat sensitive infrastructure can withstand increasing temperatures over their useful life span.

RECOMMENDATIONS AND CONCLUSIONS: COMMONWEALTH PERSPECTIVE

I would like to share some themes I believe will help make progress on reducing greenhouse gas emissions and building resiliency across the country based on our experience in Massachusetts.

Support Local Communities and States

Communities need support in the form of incentives, like our MVP grant program, to address resiliency issues before the next disaster. Many of the current Federal incentives directed through FEMA are only available after a disaster occurs, yet for every dollar spent proactively on resiliency measures, taxpayers save \$6.⁴ One example of this type of funding comes from FEMA's new resilient infrastructure grants which provide large scale funding support to projects that will reduce risks, loss of life, and damages from future disasters. Our public and private sector partners are ready to make resilient investments in projects that protect our communities, and these matched funds ensure that construction can get started. Expanding programs like this and increasing funding available to states would accelerate existing efforts and galvanize new ones.

Bipartisan cooperation around funding to address the Nation's ageing infrastructure also holds tremendous promise to reduce climate change vulnerability, help transition to a clean energy economy, spur economic development, and build community resiliency. Additional Federal funding cannot only repair and modernize our deteriorating infrastructure but also help make it resilient to changes in weather. Consideration of climate change emissions, vulnerability, environmental justice communities, and design standards that reflect a changing climate must be incorporated into any infrastructure legislation that is filed. Nature-based solutions hold great potential for buffering or replacing existing traditional infrastructure and should be explored here. Our environmental bond bill includes these types of strategies that conserve, restore or mimic the functions of natural ecosystems to replace or enhance traditional infrastructure and provide multiple benefits for communities in the form of added resiliency, carbon sequestration and clean water and air.

These types of combined approaches, utilizing traditional infrastructure but enhancing its resilience with nature-based solutions, are in progress in many places now, including Louisiana, following the widespread devastation during Hurricane Katrina. First the levees were built higher and stronger, but Louisiana has also been incorporating wide-ranging nature-based flooding solutions, including restoring wetlands to absorb water, building up barrier islands to reduce wave energy and storm surge, and creating oyster reefs to protect against flooding as the seas rise.

Governments alone cannot sustain the enormous funding needs to support local and state resiliency initiatives or the transition to clean energy and transportation. Both State and Federal Government need to develop public-private partnerships that bring more dollars back to our communities while also leveraging the wealth of knowledge and strategic thinking the private sector can bring to this challenge.

Federal Leadership

I am proud of our record of climate leadership in Massachusetts, and there is much to learn from how states and regions have approached this issue; but states cannot solve this problem alone. We need strong Federal leadership and a bold bipartisan vision on climate change that seeks compromise and prioritizes practical market-based solutions, while affording states the flexibility to design strategies that work for their unique challenges while continuing to grow their economies.

In Massachusetts setting an aggressive target for reducing greenhouse gas emissions provides the foundation for our clean energy policy, sends a clear signal to industry, and enables us to complete long-range planning. We believe it is essential to establish Federal emission reduction targets that can vary by state or region with policy flexibility for states to design solutions that work for their unique circumstances. Such targets would level the playing field and send a clear signal to business and industry as we transition to a clean energy economy.

Our transportation sector targets are particularly important now. While predictability and compromise have made cost-competitive renewable energy projects possible, recent proposals to roll back the current Federal fuel economy standards are creating uncertainty for the automobile industry and will undermine national and state emission progress. Achieving Massachusetts' 2020 emissions limit assumes a strong foundation of Federal fuel economy standards based on harmonization with California's Clean Car Program standards which 13 states including Massachusetts

⁴Natural Hazard Mitigation Saves: 2017 Interim Report. The 2017 Interim Report (January 2018).

currently follow; states cannot succeed in reducing transportation sector emission without these strong standards.

Federal Research, Science and Innovation

Strong Federal leadership should also include making impactful investments in research to develop technologies that can reduce emissions and to design strategies and tools for adapting to the ongoing impacts of climate change. The congressional bipartisan effort to prioritize clean energy research is paying dividends across this country and must be measured in years. The research at the Department of Energy and our national laboratories around the country continues, and is the key mechanism to release disruptive innovation. It is inspiring to consider what this country could accomplish through a sustained commitment to clean energy research, while implementing a stable and simple commitment to emission reductions.

States, communities, businesses, agricultural producers, and natural resource managers rely heavily on science, data and management tools developed by Federal agencies including NOAA, the U.S. Geologic Survey and the Environmental Protection Agency. For example, the products provided by the NOAA National Weather Service, including real-time data that predicts climate variation on the scale of weeks to years, is used to inform decisions on national security, crop prices, insurance rates, tourism and recreation, energy, and the transportation sector. The Service provides outreach and education to local users across the country. We need agencies like NOAA to continue to deliver on their service mission by providing the best climate science and data, tracking climate change impacts, and helping states and communities develop and implement strategies for adaptation to climate change.

Use Climate Change Science and Data to Inform Planning, Policy-Making, and Resource Management

In the Commonwealth, we strive to set an example by working to incorporate climate risk and vulnerability into all of our decisions whether it is through our statewide planning, bonding, policy development or grant-making. The Federal Government should also take this approach by incorporating climate risk and resilience in all future Federal spending and planning decisions to ensure taxpayer dollars are used wisely on climate-smart investments. Failing to account for climate change impacts like sea level rise and inland flooding will put significant assets at risk within their serviceable life span and may further expose already vulnerable populations and communities to increased risk. Without intervention to adapt over \$1 trillion of coastal property and assets are vulnerable to as little as 2 feet of sea level rise—a level that may be surpassed before the end of the century.⁵

In 2013, Federal agencies released climate adaptation plans to ensure agencies can continue to meet their mission and serve the American public in the face of a changing climate. Like our state plan, these plans outlined strategies to reduce the vulnerability of Federal programs, assets, and investments to the impacts of climate change. Many of our Federal resources across the country are threatened by climate change. It is critical that Congress provide oversight to ensure that agencies implement these plans and prioritize actions based on a long-term, positive return on investment for the American taxpayer.

This is an issue of particular relevance for this Committee in your role providing oversight of our rich public lands. A recent study by National Parks Service scientists and independent researchers finds that all 417 parks are at risk of significant climate change impacts, including the disappearance of glaciers in Glacier National Park and increasing wildfires in Yellowstone that could transform the forested ecosystem to grassland within the century.⁶ Closer to my home, our Boston Harbor Islands, managed through a partnership between State and Federal Government and a non-profit are already threatened by sea level rise and storm surge.

These islands have rich historical and ecological value, provide unique recreational opportunities for urban youth, and also offer critical defense for Boston Harbor against increasing storm surge.

Risks are likely to be widespread across many different types of Federal holdings, including military installations. A report on climate change impacts from the

⁵ Dahl, K.A., Spanger-Siegrfried, E., Caldas, A. and Udvardy, S., 2017. Effective inundation of continental United States communities with 21st century sea level rise. *Elem. Sci. Anth.*, 5, p. 37. DOI: <http://doi.org/10.1525/elementa.234>.

⁶ Patrick Gonzalez, et al, 2018. Disproportionate magnitude of climate change in United States National Parks. *Environ. Res. Lett.* 13, 104001.

Department of Defense this January⁷ found that at least 79 military installations have significant vulnerabilities from climate change related risk including wildfires, drought, recurrent flooding, thawing permafrost or other threats. These bases have already experienced extreme weather, including wildfires in 2016 and 2017 at the Vandenberg Air Force Base in Southern California, permafrost loss on training grounds at Fort Greeley, Alaska, and recurrent flooding at bases in Virginia due to sea level rise, land subsidence, and changing ocean currents.

CLOSING

Governors around the country are seeing the effects of climate change in our states and communities, and we know that the decisions we make today will determine our ongoing risk and the well-being of future generations. But we also recognize the significant economic opportunity at hand to build a new clean energy industry, transform transportation, spur research advancements, and better design the resilient communities of tomorrow. This is not a challenge the Federal Government can solve alone; the severity of the impacts from climate change depends on our collective actions as Federal, state and local government, working with the private sector to aggressively reduce our greenhouse gas emissions and adapt to the changes that are already in motion. I thank the Committee for the invitation to speak and look forward to working together on this challenge.

QUESTIONS SUBMITTED FOR THE RECORD TO THE HONORABLE CHARLIE BAKER, GOVERNOR OF MASSACHUSETTS

Questions Submitted by Rep. Cunningham

Question 1. Do you support my beforementioned bill, H.R. 291, the Coastal Economies Protection Act?

1a. If yes, why?

1b. If no, how could we work together to change that?

Answer. Thank you for your efforts to protect the Atlantic Coast from the hazards associated with oil and gas activity and your sponsorship of H.R. 291. As I wrote to Secretary Zinke in 2017, Massachusetts does not support the inclusion of areas of the North Atlantic in the new Five-Year Outer Continental Shelf Oil and Gas Leasing Program, and I support Congress taking action to protect the Atlantic Coast. As Congress considers legislation regarding energy development in Federal waters, I recommend including stronger consideration of states' views in the Outer Continental Shelf planning process. I do not believe that the Federal Government should move forward with oil and gas activity over the objections of a coastal state, and I recommend providing specific authority that oil and gas activity decision making be cooperatively managed by the states and the Federal Government. Massachusetts has worked successfully with the Bureau of Ocean Energy Management on developing offshore wind in Federal waters and recommend State-Federal task forces on identifying where energy development, especially renewable energy, may be responsibly sited.

Question 2. Governor Baker, what does it say about the potential impacts of the offshore oil and gas drilling that a Republican such as yourself opposes this type of energy development?

Answer. Massachusetts has long history of managing our commercial fishing industry and promoting our state as a tourism destination irrespective of party affiliation. I believe it is imperative that the Department of the Interior and the Bureau of Ocean Energy Management review comments from governors, visit the coastal states, and meaningfully engage to develop responsible energy development that protects existing industries and has the support of the states. As mentioned in my written testimony, in Massachusetts, we have focused that partnership on renewable energy development.

Question 3. Aside from the risks of an offshore oil spill, what other harmful impacts might result—either onshore or offshore—from opening the Atlantic Outer Continental Shelf to oil and gas development?

⁷ Report on the Effects of Climate Change to the Department of Defense, January 2019. https://partner-mco-archive.s3.amazonaws.com/client_files/1547826612.pdf.

Answer. Massachusetts is particularly concerned about the interaction with our commercial fisheries, as well as the potential effects on endangered species, including the right whale. Massachusetts has a historical commercial and recreational offshore fishing industry as well as a major tourism industry that relies on the health of our ocean and beaches. In addition to the fertile fishing grounds of Georges Bank, on our sea scallop fishery—which is responsible for the port of New Bedford being the top in the Nation for catch value—would be placed at risk by oil and gas development on the Outer Continental Shelf.

Question 4. Governor Cooper and Governor Baker, while we're discussing the threats and impacts associated with climate change, there's an obvious connection to opening vast new areas of the Atlantic Ocean to oil and gas development. At a time when our country needs to confront the reality of climate change, what does the Trump administration's desire to open the Atlantic coast to unfettered fossil fuel development tell you about their priorities about environmental protection?

Answer. As I stated at the hearing, every level of government must accelerate efforts to address climate change. Massachusetts will continue to move forward with cost-effective greenhouse gas mitigation policies from energy efficiency to clean and renewable energy development. Every state and every region should be working with the Federal Government to implement individual cost-effective mitigation strategies that reflect existing economies and unique opportunities that would collectively lower emissions by the levels required to avoid catastrophic climate change. Local, state, and Federal leadership is required to reduce greenhouse gas emissions.

Question 5. Did either of you have conversations with former Secretary Ryan Zinke about his decision to unilaterally exempt Florida from offshore oil and gas development, but no other states that have equally as valuable and vibrant fishing and tourism industries?

5a. Why do you think former Secretary Zinke tried to exempt Florida, but no other state?

5b. Do you believe former Secretary Zinke potentially violated Federal laws when he made the snap decision to exempt a single state from his oil and gas leasing plan without going through the required public process?

Answer. I conveyed my concerns about the proposed oil and gas activity both in a formal letter and in person during a meeting to discuss this issue and the other Department of the Interior policies affecting Massachusetts. As stated earlier, energy development in Federal waters requires an extensive public process to engage with existing industries and ultimately requires a partnership with each coastal state.

Question 6. Why do your administrations oppose offshore oil and gas development, and are your positions in line with your state's coastal communities and coastal businesses?

Answer. My administration and our coastal communities are strongly aligned in working to protect our commercial fisheries and tourism industry, and we seek to further develop our partnership with the Federal Government for renewable energy development.

Question 7. Do you support seismic air gun blasting that is a precursor to oil and gas development?

Answer. Last December I joined a letter to Secretary Ross and Secretary Zinke alongside nine other governors of Atlantic coastal states to express my firm opposition to seismic air gun surveys and coastal oil and gas drilling. Peer-reviewed evidence suggests air gun surveys would have harmful impacts on marine mammals and fisheries, which could pose a serious risk to the economies of our coastal communities. I maintain my position outlined in this letter.

Question Submitted by Rep. Bishop

Question 1. Governors, you both stated your opposition to offshore oil and gas development in Federal waters. Governors, do you believe that states should have the right to control offshore energy development in Federal waters adjoining their coasts?

Answer. There must be a partnership between the Federal Government and the states in energy management in Federal waters and as you noted during the hearing this must also apply to Federal land management. Regarding, offshore oil and gas development I recommend incorporating stronger consideration of states' views of the Outer Continental Shelf planning process and do not believe that the Federal Government should move forward with oil and gas activity over the objections of a

coastal state. Rather, I would recommend providing specific authority that oil and gas activity decision making be cooperatively managed by the states and the Federal Government.

The CHAIRMAN. Thank you very much. I recognize myself for a couple of questions. Governors, let me just get this out of the way.

First of all, do you believe that there is any legitimate scientific debate over whether human-induced climate change is occurring as we speak?

Governor BAKER. No.

The CHAIRMAN. Both of you.

Governor BAKER. Well, yes, based on the way you asked the question.

Governor COOPER. No, I do not. There is overwhelming scientific consensus that that is the case.

Governor BAKER. What he said.

[Laughter.]

The CHAIRMAN. Some people argue, though, on that point and on that consensus of opinion, that although we know it is happening, that humans are a major contributing cause to it, that there is no way to stop it, or that it will be far too expensive to even try. It is a point of view, it is a reaction that you hear.

Your comments on that, on those two points.

Governor BAKER. Well, I guess I would say this. First of all, you know, the northeast United States, when I was a much younger person, had a huge issue with acid rain, which was mostly coming from the Midwest. And that was a big problem, it was an environmental issue. There was a lot of debate and discussion about it. But a combination of Federal and state policies, over time, basically solved it.

And if you look at what was done with respect to policy at the Federal and state level with regard to the ozone layer, while there is still repair going on there, the ozone layer is in far better shape than it was 30, 35 years ago: pretty clear indications that you can make a difference on big issues with policy.

And with respect to affordability, I come back to the procurement that we just did on offshore wind and the hydropower procurement we did, which involves hydropower from Quebec. The price points on both of those initiatives, each of which are worth hundreds of megawatts of resource to Massachusetts families and businesses, both came in at price points that, over time, are going to be more cost-effective than it would have been to use traditional resources.

So, I think the bigger issue here is are you willing to sort of head in that direction, be practical, chase cost-effective opportunities, and recognize that there are ways to get from here to there?

And the final thing I will just mention about this, if you have farmers or fishermen or resort operators or foresters in your communities and in your districts, I promise you they are worrying about climate change all the time. And whether it is the greenhouse gas emission issue, or the resiliency issue, they have major challenges that we should all be taking seriously, or we are going to put them all in very significant harm's way over time.

Governor COOPER. Mr. Chairman, if I might? We can't afford not to take urgent action to fight climate change. It is not too late, but it soon may be. That is why we need to take significant action. And everyone is concerned about cost, but can we afford not to do this?

And when you look at cost and profits and jobs, a move to a clean energy economy brings with it significant jobs. It brings a significant economic boost.

People may be surprised to know that North Carolina is Number 2 in the country in solar energy. How did we get there? Well, we forced the utilities to begin using more renewable energy. And we set a renewable portfolio standard for our utilities. We also took steps to limit our own coal-fired plant emissions in North Carolina.

So, what has happened is that we have grown this solar energy economy and clean energy economy in North Carolina to the point where it has political support from both parties because of the jobs that it has brought to the area. And now it is competitive in cost.

A nudge from state government, a nudge from the Federal Government, like you have done with tax credits, can move something in the right direction so it becomes part of the economy. And I think, at the end of the day, in moving to a clean energy economy, we are going to save a lot of money in health care costs. We are going to save a lot of money for these billions of dollars that our states are asking for the Federal Government to deal with climate change effects from flooding and from snow storms. We are going to make a positive difference if we do this.

We have to get moving fast. We have taken some small steps, our states are working very hard to do what we can. But this needs to be a partnership, and we want to work with you.

The CHAIRMAN. And with the time I have left, another argument people use to excuse the Federal Government from taking action is saying that we can innovate our way out of it, that there is a technological fix over the horizon that we need to find, and that, while innovation is important, that is an excuse to say we don't need any new laws, we don't need regulations, we don't need incentives, we are going to technologically innovate our way out of this.

Do you believe that that innovation in and of itself is enough?

Governor COOPER. Innovation is happening right now, with battery storage and other technological leaps. But you have to make it economically feasible. And state, local, and Federal government working together can help to push that along. Yes, it is going to require innovation for us to fight climate change and to significantly reduce our greenhouse gases, and it is a process.

But I think that Federal help, I think stopping the roll-backs that are occurring right now at the Federal level, particularly when it comes to the clean power plan and automobile emissions, we don't need to go backward in that area. And we need to encourage innovation and technology to help move us forward.

The CHAIRMAN. Thank you. Let me now turn to Mr. McClintock for any questions he might have for the governors.

Sir.

Mr. BISHOP. By the way, Grijalva, it is OK. You can take your extra 2½ minutes out of my time.

The CHAIRMAN. I intended to, sir.

[Laughter.]

Mr. MCCLINTOCK. Thank you, Mr. Chairman. I noticed in the written testimonies, both governors linked climate change with the catastrophic fires we have had in the West. My district is just southeast of Paradise, California. It encompasses the Sierra Nevada from Lake Tahoe past Yosemite Valley and on into Sequoia and Kings Canyon National Parks.

Last year, wildfires burned nearly 2 million acres in California. That is nearly eight times the average annual loss of 250,000 acres that we experienced during the last half of the 19th century. But if you go back farther into the pre-Columbian period, scientists estimate that wildfires destroyed between 4½ million and 9 million acres per year.

The Camp Fire recently burned 153,000 acres. It wiped out the town of Paradise and claimed 86 lives. But in 1910, the Big Burn in Idaho and Montana burned 3 million acres, wiped out seven towns, and killed 87 people among a far smaller and sparser population.

What happened in the intervening time is that the U.S. Forest Service was established, and it began actively managing our forests, removing excess timber before it could choke off the forests and die. And we actively suppressed brush on burned lands and on brush lands.

But in the 1970s, Congress imposed a series of environmental laws that subjected Federal land management to endlessly time consuming and, ultimately, cost-prohibitive environmental regulations. As a direct result, timber harvested from Federal lands has declined about 80 percent, while acreage destroyed by fire has increased proportionately. A typical acre in the Sierra can support about 80 mature trees. The current density is over 300. A single fully grown tree can draw 100 gallons of water from the soil on a hot day. Drought can quickly kill overcrowded forests, and it has.

And the problem is climate change doesn't explain the dramatic difference between private forests that practice active forest management and the Federal lands that don't. The boundary lines can often be very clearly seen from the air, because of the condition of the forests themselves. Green, thriving private forests grow right up to the boundary line. And on the other side the forests are morbidly overgrown and dying. I think it is quite clever of the climate to decimate only the lands that are hamstrung by these Federal environmental laws.

Now, decaying or burning forests make a mockery of all the laws aimed at reducing carbon emissions. Wildfires in the United States pump an estimated 290 million tons of carbon dioxide into the air every year.

So, Governor Cooper, if the climate is warming, doesn't it make sense to actively manage our forests so that we can match timber density to the ability of the land to support it, so that our forests don't die off and burn?

Governor COOPER. First, Congressman, we absolutely need to take action to fight climate change.

Mr. MCCLINTOCK. Would you address my question?

Governor COOPER. But that doesn't—

Mr. MCCLINTOCK. Governor, please.

Governor COOPER. Yes, sir.

Mr. MCCLINTOCK. My time is limited, so I have to ask you to be responsive.

Governor COOPER. Yes, sir. But that doesn't mean we shouldn't take steps to be more resilient.

My experience in——

Mr. MCCLINTOCK. If droughts are becoming more common, doesn't it make sense to provide enough spacing between trees, so that snow isn't trapped in dense canopies, and evaporates before it can reach the——

Governor COOPER. I think any resiliency action that you take needs to be balanced with environmental protection. And I think you have to rely on scientists and regulators to determine what needs to be done.

Mr. MCCLINTOCK. Well, we stopped relying on scientists and forest management some time ago. We have let our forests go to benign neglect. And we are finding out the results aren't very benign.

When I visited the Detwiler Fire that forced the evacuation of Mariposa almost 2 years ago, the firefighters bitterly complained that they couldn't get environmental permits to cut preventative fire breaks.

Governor, shouldn't we be actively suppressing brush buildup and free our firefighters to establish containment breaks before a fire starts?

Governor COOPER. Congressman, I think if you would join us in our fight against climate change, we could join in finding ways to make our environment more resilient and make our forests more resilient.

Mr. MCCLINTOCK. I mean if we agree on at least these common-sense steps, why can't we move forward together with them to properly manage our forests, so that they are resilient against climate change.

Governor COOPER. I think——

Mr. MCCLINTOCK. Governor Baker, you waxed eloquently over the use of wind power in Massachusetts. But just yesterday the *Wall Street Journal* published a scathing editorial on the experience of Falmouth, Massachusetts that spent \$10 million on wind turbines, and it has been a disaster.

That small town went deeply into debt to finance them. The townspeople couldn't bear the noise, the constant flickering light as 400-foot windmills turned. Property values plunged 20 percent. And I wonder how that squares with the bright picture that you painted.

The CHAIRMAN. Governor, a brief answer. The time has run out, if you don't mind.

Governor BAKER. The question you raise, Congressman, is a good one, and I will tell you why.

I deliberately used the words "practical" and "cost effective" in my remarks on purpose. The fact that I believe there are things we need to do with respect to mitigation, adaptation, and resiliency because of what is going on with climate means I also believe we ought to do things well.

My father always used to say that there are two things. There is doing the right thing, and then there is doing the thing right.

And just doing the right thing, doing it wrong, doesn't necessarily solve the problem. And there are a whole series of issues associated with a well-intended effort.

In Falmouth, in many respects, that failed because they didn't make a lot of the decisions with respect to where they sited them and how they sited them that would have made sense. And I think, to some extent, the success that we had with our Deepwater Wind procurement was in part our ability to learn from a previous experience that we had had in Massachusetts on a project that never got developed, where people gave a sole-source agreement to a single provider in the middle of Nantucket Sound at a very high price, because everybody said that was what the market would bear.

We put the thing out as a competitive procurement. We said we weren't going to pick anybody unless we got competitive bids. We spent a ton of time with our colleagues in the legislature, making sure that the statute that was written gave us the ability to do something that we thought would work. And then we took our time in making sure that the procurement we put out there was a procurement that would give us the answer we were looking for. And we made clear that if we didn't get a good bid, we wouldn't take it.

And one of the things we did in our statute that made a big difference was we framed it as a long-term lease. So, instead of having a type of contract that typically exists in this environment, where people are constantly having to renew it over and over again, we said, "If you win, you are going to have the time you need to amortize the cost of actually making the investment in the project returned."

And because of that consistency in the way we bid it, and the fact that it was competitive, we got a great price.

The CHAIRMAN. Thank you, Governor.

Governor BAKER. I think sometimes when something doesn't go the way it should go, everybody blames the concept. Well, sometimes we just screw up the way we actually implement it. And it makes the concept look bad.

The CHAIRMAN. Thank you, Governor. And before I get admonishment on my time management abilities here, if we could, keep the questions and the response to that 5 minutes so that everyone that is here will have an opportunity to ask questions.

Mrs. Napolitano.

Mrs. NAPOLITANO. Thank you, Mr. Chair. Welcome, Governors.

Governor Cooper, congratulations on your executive order to fight climate change. And there is tremendous information that can probably be given out to the general public to have them be part of the solution, not just the government, because sometimes we rely everything on government.

One of the things I am looking at is, you stated removing under-utilized dams and restoring flood plains. That is a great point that we need here in Congress, especially funding for recycled water and conservation, education to the public, to have them understand that we need more water to fight fires and to generally provide for the public, for the communities that we serve.

However, there is reticence in this Committee to fund recycled water projects. There used to be 37 million for 17 western states.

I am asking for 500 million for the future, because we have to prepare for ongoing drought and ongoing fires and everything else.

Suggestions? How can we improve public-private partnerships? Two of you.

Governor COOPER. Well, I think in North Carolina we are already doing that. We know that we have a lot of areas that are in danger of flooding. We have put advanced flood mapping in place. So, now that we know what to evacuate and where areas are going to be flooded, we are taking significant mitigation steps where we are using buy-outs, elevations, and even strategic retreats.

Mrs. NAPOLITANO. Do you inform the general public of your plan, so they can be supportive of what you are doing?

Governor COOPER. Yes, we incorporate what happens with our municipalities. They have to make these tough decisions, particularly about strategic retreat, because we have come to the realization that these floods are going to continue to occur, they are going to be fierce. We need to take our—

Mrs. NAPOLITANO. How about your aging infrastructure?

Governor COOPER. Aging infrastructure, and particularly waste water treatment plants that are extremely vulnerable to flooding. Helping local governments make sure that they are rebuilt and built in a resilient way.

I have established the North Carolina Office of Resiliency and Recovery. And what we are doing is working with local municipalities on catch basins, trying to figure out ways to prevent what happens in the future.

Mrs. NAPOLITANO. Right.

Governor COOPER. In addition to our efforts to fight climate change.

Mrs. NAPOLITANO. OK, thank you.

Governor Baker, what policies can states and city governments put into place to build an inclusive green economy?

Governor BAKER. Well, to just sort of piggyback a little bit on your previous question to Governor Cooper—I am a former local official. And I get the reason why it is really important to have local representation and local voices involved in discussions with respect to what happens in their communities. And that is why the vulnerability planning effort that we put together is a municipal vulnerability planning effort, because we want our colleagues in local government and local community leaders to be part of those conversations.

And as I have said before, you have 351 cities and towns—and in Massachusetts, they all have different issues with respect to resiliency and adaptation. And we want to make sure whatever it is we do is supported at the local level. Because if you don't have local support for it, it is not going to succeed, whatever it is you are pursuing. And it won't be sustained over time.

Mrs. NAPOLITANO. Yes.

Governor BAKER. I agree completely with him on that one.

Mrs. NAPOLITANO. Part of what a discussion on the forest fires also leads to the fact that we don't fund the agency with enough money to do it. And what—with the future threat of more fires, we should have enough funding there to be able to help them do the job they are meant to do. Do you agree?

Governor COOPER. I agree completely. We spend a lot of money—and we are grateful for it—on recovery. Not enough of that money that is dedicated to states and local governments is allowed to be used for mitigation and resilience.

And when you look at a flooded area and see homes that have been elevated, or areas that have already been bought out and now are simply catching flood water, you see the money that we are saving from the action that we have taken.

So, I would encourage the Congress to give states more flexibility to use this recovery funding as we rebuild smarter and stronger, as we are trying to do in North Carolina, because we know it is coming again. I am going to keep saying we have to fight this emission of greenhouse gases, and to fight this overall climate change issue here. But we know in the next few decades, if we are going to continue to deal with this severe weather, we need to be smart about how we rebuild. And us being able to use that funding for mitigation and resilience is a positive thing.

Mrs. NAPOLITANO. Thank you, Governor. I think we have to cut, because the Chairman is going to gavel me out. But I tell you 20 years ago I tried to put climate change in one of my bills, and I lost it because nobody wanted to deal with climate change. Thank you.

Mr. BISHOP. Thank you. I appreciate, once again, you being here. Governor Baker, I appreciate you being here.

Now, look, Ed Markey used to be part of this Committee, so at some point off the record I would like you to tell me how you got rid of the Rs at the end of your vowels. You are doing that very well.

[Laughter.]

Mr. BISHOP. And just as a hint, if you try to do Ski Massachusetts on your license plates, we have already done that in Utah. We got copyrighted on that. Don't try to go there.

I do want to ask a question of Governor Baker. You talked a great deal about working together in a collaborative process, the very essence of federalism. And also, you mentioned how some of the local people who work these issues on the ground know exactly what they are doing. I found in the state of Utah some of my best commissioners in rural Utah are those who used to work for BLM, and they are extremely pragmatic about what can and cannot be done.

This is one of those areas that actually is the jurisdiction of this Committee, and that is how can we actually increase collaboration between the Federal Government and the states. And you guys got to figure out state and local government, you are on your own, that is your jurisdiction. How do we actually increase that collaboration? Or is that significant, to increase that collaboration?

Governor BAKER. I do think on this vulnerability planning effort, which the Federal Emergency Management Agency has created, a program where states and locals can get together and start to work with the Feds around doing sort of what I would describe as high-risk analytics and making investments in resiliency and adaptation to deal with places that people are concerned about, so that the next time there is a storm, the next time there is a surge, we don't end up having to deal with the same cleanup that FEMA dealt

with the time before, I think that is, in some respects, one of the best ways for the Federal Government to work with states, and with locals.

Mr. BISHOP. Let me kind of zero in on that. Once again, this is our area of jurisdiction. There are statutes on the books that say we have to collaborate with you. There is nothing in that statute that says what our collaboration actually is.

Would there be a benefit of actually trying to list what steps need to be taken in the collaborative process so indeed the states and the Federal Government are working on the same page, as opposed to you just groveling before us?

Governor BAKER. Absolutely.

Mr. BISHOP. All right.

Governor BAKER. I think that would be a great idea.

Mr. BISHOP. And that is within our jurisdiction. However, I realize the Appropriations Subcommittee is having a hearing on the Anti-Deficiency Act, which has nothing to do with the appropriations process. So, eventually I think we will get jurisdictional issues worked out in this particular area.

Let me talk specifically once again about the concepts that were just brought up—and Mrs. Napolitano, she mentioned it before she left—this idea of forest fires and what they need. And maybe when Mr. Westerman has a chance to talk, he can exemplify on this.

One of the things that both the Obama and the Trump administrations told us is it is not necessarily an issue of funding that makes it difficult, it is an issue of what kind of powers they have to actually do management practices before the fire season takes place.

And the other big issue they also dealt with was cost of litigation, ever-increasing litigation by special interest groups, for which they either backed off what they were attempting to do in order to minimize that litigation, or they were forced to spend their money defending themselves on the litigation. So, what they were asking for is greater flexibility in actually managing the land, and help in defending themselves. Again, this litigation.

I am making the assumption that when we are dealing with you on the state level, that those issues are also significant. And indeed, the experts on the ground who ask us for this kind of help would be saying that same type of thing.

Governor BAKER. I actually made a note to myself to ask the folks who manage our lands. We have significant land that we manage, both actively and passively.

Mr. BISHOP. The nice thing is most of your land is state land, and that is great.

Governor BAKER. What I don't want to do is, I don't want to answer this question having not talked to my own people about it, but I will do that and make sure we get back to the Committee about it.

Mr. BISHOP. And I appreciate that. And actually, Mr. Grijalva—because I won't ask you another question, I am running out of time with that. But if we can go to the point in future where Utah has as much Federal land as Massachusetts and North Carolina have, I will be tickled pink.

Governor BAKER. I would love that, as long as I get the same amount of skiing that you have in Utah.

Mr. BISHOP. And we will take some of our extra mountains and put them in there, so you can actually ski.

[Laughter.]

Mr. BISHOP. And that will include our airflow, so we don't have crappy air in the winter. Perfect.

I yield back.

The CHAIRMAN. Thank you, Mr. Bishop.

Mr. Costa.

Mr. COSTA. Thank you very much, Mr. Chairman and Ranking Member. It sounds like the Governor and the Ranking Member have an opportunity to get great things done here, East-West.

But I think this is an important hearing for a lot of reasons. And clearly, the impacts of climate change are one of the most significant challenges we face in the 21st century around the world, in this country, and in our respective states.

I know the San Joaquin Valley that I represent has had significant impacts as it relates to the drought conditions, the feast or famine with too much rain and water, and trying to balance our needs.

We think about the planet we live in: 200 years ago we had 1.7 billion people, today we have a little over 7 billion. And by the middle of this century it is expected that we will have over 9 billion people. And sustainability and the impact that people have on all of our resources is the challenge that we face today.

We have people living in areas in which people didn't live before, where they are impacted by these fires, these floods, and these other natural conditions that include hurricanes and tornadoes and other weather events.

We, in California, have done a lot, I think, to try to address the future here in renewable and sustainable sources, as have other states—Governors, as you have recommended and told us of your own efforts.

I think the earlier comment about better coordination between the state, local, and Federal efforts needs to be done. We talk a lot in kind of broad, general terms. We don't, I think, focus enough on how we can coordinate together in actually getting something done on the impacts of climate change. And a multi-pronged approach, I think, is critical to that success.

Both governors, let me ask you a few questions here. And I am looking this way because, Mr. Chairman, the clock is blocked here. So, for those of us who watch it, make sure we get our time in. It is a little bit of a handicap.

As we continue to see, as you testified, the trends on intense weather changes and the impacts there, we have an aging infrastructure. We have been talking about a bipartisan infrastructure measure. Where do you think the best channeling of that funding in transportation and in water infrastructure would best be spent in your respective states?

Governor BAKER. Well, with respect to the issue we are talking about today, which is resiliency, I think the biggest and best opportunity would be around all of the infrastructure that we have that

is designed to deal with storms. And much of that infrastructure is nowhere near as significant as it needs to be——

Mr. COSTA. When FEMA comes—as they have in various parts of the country and they provide support and recovery efforts. We were just in Puerto Rico last month, and under the—I am trying to remember—Stafford Act, or whatever—they are only allowed to spend money to what the previous conditions were of that infrastructure.

Governor BAKER. Right, right.

Mr. COSTA. That makes no sense. I mean we have to be—and if we are repairing—guess what? More hurricanes are going to come, more tornadoes are going to come, more floods are going to come, and wildfires. We ought to do state-of-the-art restoration, don't you think?

Governor BAKER. Yes. We should be thinking about infrastructure going forward, in terms of what the consequences will be for bridges, for coverts, for dams, for all of that stuff, based on what people anticipate the significant issues they will be dealing with will look like. And those are different than the ones people were dealing with 100 years ago, absolutely.

Mr. COSTA. Governor Cooper?

Governor COOPER. And, Congressman, there is a lot of money that comes to states in the wake of disaster. But in the wake of disaster is time to talk about that resilient infrastructure.

People were driving around the state of North Carolina for 3 or 4 days after Hurricane Florence because Interstate 95 was under water.

Mr. COSTA. OK, I appreciate the examples. I have 30 seconds left.

To both of you, if you can quickly—there is a call, obviously, to provide less stringent environmental regulation in an effort to review and rewrite common-sense policies in the light of climate change based on sound science. Is that reasonable to ask?

Governor BAKER. I didn't understand——

Governor COOPER. I didn't understand what you said, sir.

Mr. COSTA. There is a sense that maybe we need to rewrite environmental regulations in the sense of dealing with these impacts of climate change. Is that reasonable to ask, based upon new science?

Governor BAKER. I think we should continually be updating our rules and our regulations with respect to new discovery and new science. We do it in health care, which is the space I came out of in the private sector. We do it in all sorts of areas. Yes, I would say definitely here, yes.

Governor COOPER. But I would say we don't want to roll back environmental safeguards that are helping us to reduce greenhouse gas emissions, and therefore fighting climate change, while we are doing that.

Mr. COSTA. Thank you.

The CHAIRMAN. Mr. Westerman.

Mr. WESTERMAN. Thank you, Chairman Grijalva, and thank you, governors, for being here today. I have had the opportunity to spend quite a bit of time in both of your states. You have beautiful states with beautiful forests and clean water there.

I get accused sometimes of getting too far into the weeds when I start talking about climate, environmental policy. So, taking a little bit of a different approach today, I was going to submit this to the record, but I haven't got a hard copy yet. But this is a Dilbert cartoon. And they are sitting around the table, and Dilbert says, "I have invented a cost-effective product to harvest CO₂ from the air and turn it into construction material," and his colleague says, "So . . . you invented a tree." And it goes on from there.

But you know, when we look at the climate and how we all want to be good stewards of it, we know that trees are one of the best things on earth to clean the air, to clean water, and provide good habitat.

Governor Cooper, I am from Arkansas and did a lot of work in your state before I got into Congress. I actually did a comparison one time of the forested area in Arkansas versus North Carolina. And both states are almost exactly the same, 17 to 18 million acres of forested land in both states, almost the same breakdown of hard wood versus soft wood.

There is a difference there, though. North Carolina has one of the most vibrant forest products industries in the country. Even though we have basically the same land mass and the same amount of forest, you all produce a lot more wood products than we do in Arkansas, although our forest products economy is growing and thriving there.

So, as we look at this issue of cleaning the air, I would like to get your take on how important the forest products industry and forest management is in North Carolina to keeping your forest pristine, which also helps your water quality and your wildlife habitat, and the different kinds of products that are made there, and how they may affect the environment.

Have you had a chance to get out—I am sure you have—to see all of the varied forest products industries in your state?

Governor COOPER. Yes, we do have a strong forest product industry in North Carolina. I think we have to be careful about going too far with it. And I know that our department of environmental quality is looking at additional safeguards that we may need in order to make sure that our forests are protected.

I do know, though, that it is an important industry in our state, and we are working hard to make sure that our forests are managed properly, because we know that those natural resources are critically important, not only to clean air, but to our tourism, as well, in North—

Mr. WESTERMAN. I believe about 68 percent of your forest land is privately held and managed by private owners who are doing that, just using good science. And you obviously have a sustainable forest there to be able to continue with a strong forest products industry.

I know also that North Carolina is one of the leading states in producing wood pellets. Those pellets were driven by the fact that Europe put a tax on carbon coming out of some of their big coal-fired plants, so that drove them to come to the United States to buy renewable pellets. How do you think that is affecting the health of the forest in North Carolina, and then the global climate

as well, being able to use those renewable wood pellets to replace coal in Europe?

Governor COOPER. There is a concern about the increase of the use of wood pellets in North Carolina. There is a concern about that, yes.

Mr. WESTERMAN. But that was all driven by a mandate from a government saying you had to get the coal out of the plants. So, they wanted to replace that with a bio-fuel. And North Carolina, obviously being on the East Coast and having the abundant forests they have, were a really good supplier to help in Europe to offset carbon emissions over there.

Governor COOPER. I don't know about that, Congressman. I don't know about that.

Mr. WESTERMAN. Are we going to get a second round of questions?

Real quickly, Governor Baker, the Quabbin in Massachusetts is a great example of how to manage forests and get clean water. Boston relies on that. It is a wonderful system, and I wish we could mimic that other places around the country.

I yield back.

Governor BAKER. So, just two things. We have planted thousands and thousands and thousands of trees since we took office for exactly the reason you just raised. And we have about 4 million acres of forest in a state with 6½ million acres, overall. And about a million acres are managed by the Commonwealth.

Planting trees is one of the best—

The CHAIRMAN. Thank you.

Governor BAKER. Give us some money to plant trees, we will plant trees. They also help with soil runoff and a whole bunch of other things, as well.

The CHAIRMAN. Mr. Sablan.

Governor BAKER. And the most interesting thing about it has been that the relationship between the sportsmen community and the environmental community over the importance of forest and wildlife habitat.

The CHAIRMAN. Mr. Sablan.

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

Governor Baker and Governor Cooper, welcome. Thank you for being here. Thank you for your leadership on climate change you are both demonstrating in your states.

Getting to the question, a little history, background, is in 2016, our bureau of environmental and coastal quality developed a 5-year strategy that noted that although the development surge in Saipan, one of the islands in the Northern Marianas, would result in dramatic loss of green space and permeable natural surface, particularly in shore land locations, the political leadership were calling for even less regulatory oversight and for expedited permit processing. And that leads me to no longer be hopeful that my political leadership would join your U.S. Climate Alliance.

But having said that, and someone mentioned earlier about people being displaced from their homes. Over the past 2 years alone, hundreds of thousands of Americans have been forced from their homes, some of them as recent as Puerto Rico, Irma and Maria. And in the future we will see many more people who need to

permanently move because their homes will become uninhabitable, either by rising sea levels or hurricanes and typhoons. The people of the Northern Marianas will be especially hard hit.

So, what can states and the Federal Government do in order to more effectively address displacement due to climate change?

Governor COOPER. Congressman, in North Carolina I think we have seen it just as you have, that the people who can afford it the least often get hit the hardest in these natural disasters. And one of our problems that we have right now is the issue of affordable housing, being able to find safe, affordable places for people to live.

In the wake of this disaster, I think it is helping us put together a plan on affordable housing across the state. That is something that is going to require public-private partnerships, and investments, and trying to get developers into making sure that more affordable housing is constructed in areas that are not in flood plains and in danger of being destroyed during these disasters. It is a human tragedy.

And I look forward to your ideas. And we certainly can provide you with some of ours on how we do that.

The CHAIRMAN. And Governor Baker?

Governor BAKER. I would just get back to the question Congressman Costa asked about rebuilding to the standard of what it was before. I mean, clearly, we need to be taking a much more forward-looking approach to the way we handle that stuff, because building to the standard that existed before will be nowhere near as resilient as you need to be to deal with many of those issues.

Mr. SABLON. Right, and I agree with you, Governor Baker, because where I come from, the Northern Marianas, we just had a super-typhoon, I think the second-largest in U.S. history. And we are not actually a wealthy community.

So, what took people years to build as their homes were destroyed, demolished. And FEMA has inspections. Some of them got awarded \$6,000. So, they were made an offer: "We can take you and move you to another location away from the Northern Marianas until you can get your structure rebuilt." The \$6,000 is going to take care of 20 percent, maybe, of the cost of the building, if at all.

So, that person, this family, will move and probably never come back. And from a case where our population is hardly, very little over 50,000, we need all our people to remain at home. But it is not. So, yes, I agree. FEMA encourages this relocation.

And my time is up. Thank you very much.

The CHAIRMAN. Thank you very much.

Mr. Graves.

Mr. GRAVES. Thank you, Mr. Chairman. I appreciate the time. Governors, I want to thank you very much for being here.

Governor Cooper, I know that—I am from Louisiana. We sent many volunteers and rescue teams to your state—

Governor COOPER. Thank you, sir.

Mr. GRAVES [continuing]. Following—I am trying to remember—Chris, Matthew, Florence, Michael, a number of storms you have had in recent years. I have been praying for you all and working closely with your delegation.

Two things, real quick.

You mentioned some of these resiliency measures on—I think it was October 3, the President signed the Disaster Recovery and Reform Act into law. That law that we worked closely with your delegation in putting together does provide some additional flexibility and dollars on more resilient reconstruction, to where we are not rebuilding the same things over and over again, and I urge you to take a look at that.

Next, on the duplication of benefits letter you sent to the White House, in regard to your recovery we are working closely—our governor has done the same thing—we are working closely—

Governor COOPER. Have you gotten an answer yet?

Mr. GRAVES. Blood pressure is going up a little bit, potentially filing a lawsuit, but we will be working closely with you all on that.

Governor COOPER. OK.

Mr. GRAVES. I also spent a good bit of time in Pisgah, Linville, Bent Creek, a lot of your real jewels over there. You have a great state.

Governor Baker, reading about some of the things that your state has done in regard to emissions reduction and climate change, it is interesting. Our states, again, south Louisiana, Massachusetts, very different. I heard you in your testimony talking about ski slopes. And, of course, the Ranking Member was discussing that, as well. We would love to have that. We have some resource issues. Ski slopes aren't really conducive to south Louisiana.

Some of the top industries in Massachusetts, it is technology patents, venture capital, computing technology. Some areas that aren't necessarily licensing, aren't necessarily energy or emissions intensive. My home state of Louisiana, we are one of the top energy producers in the Nation, one of the top refiners in the Nation, one of the largest petrochemical industries in the Nation, one of the largest industrial corridors in the Nation. It is a very different economy.

Your home state of Massachusetts, according to the EIA, part of the Department of Energy, they indicated that your state has virtually no oil and gas production. Yet, just within the last few years, your state has averaged over 1 quadrillion BTUs of fossil fuels being used to just operate your state, over 1 quadrillion BTUs of fossil fuels being consumed for everything going on in the state of Massachusetts.

In Revere, you have one of the three home heating oil reserves. Much of your, if I remember right, coal and natural gas, approximately 70 percent of the energy production in your state is from coal and natural gas. That comes from Louisiana, it comes from other states.

My home state of Louisiana, we are blessed with natural resources. We are blessed with port systems and have a big industrial corridor. How do you reconcile what you are able to do based on your economy, versus the challenges in Louisiana based on what our economy is founded on?

Governor BAKER. Well, our view on this issue for the better part of the past decade has been to make the kinds of investments that can either reduce our draw on energy when we produce productivity, or continue to redefine our source points for energy, generally.

And if you look at the last 10 years, or even go back before that, maybe the last 20, we have had significant increase in our gross state product. We have had modest population growth. We have had modest increase in the number of vehicle miles driven, and a 20 percent reduction in our greenhouse gas emissions over that same period of time. And the energy draw generally has been flat over the same period, because we have gotten more productive about how we actually use energy.

And I think in some respects that is one thing that we haven't really talked about at all today. One of the biggest and best opportunities we all have with respect to climate change and greenhouse gas emissions, generally, is energy efficiency. Our Mass Save program——

Mr. GRAVES. And, Governor, I agree. I need to reclaim my time because I am about——

Governor BAKER. We have installed 24 million LED lights——

Mr. GRAVES [continuing]. To run out right now, but I do appreciate that you all have taken steps, I do. But I also think it is important to recognize that states in some cases are fundamentally differently.

Governor BAKER. Agreed.

Mr. GRAVES. Years ago I calculated the amount of energy that Massachusetts consumed, and I think it was 24 times more energy than they produced. So, you built three LNG terminals, a lot of energy is coming in from Louisiana and other states.

Mr. Chairman, I want to ask to insert in the record two things.

First, and it is interesting, it is a letter asking the President to increase global oil production—to increase global oil production. And that letter is signed by Senators Cantwell, Schumer, Menendez, and Markey.

Second, Mr. Chairman, I ask unanimous consent to include in the record a statement that shows the average electricity prices for each state, indicating the state of Massachusetts has electricity prices that are usually the top or the second top in the continental United States, more than double that of the state of Louisiana.

The CHAIRMAN. Thank you. Without objection.

[The information follows:]

UNITED STATES SENATE
WASHINGTON, DC 20510

May 23, 2018

The President
The White House
Washington, DC 20500

Dear Mr. President:

World crude oil prices increased over 75 percent in the past year, with some market analysts expecting prices to approach \$100 per barrel in the coming months. Elevated fuel prices are a burden on every family, business, and farm and threaten our nation's continued economic growth and global competitiveness. Today, we call on you to use all of your authority to take timely action to pressure the Organization of the Petroleum Exporting Countries (OPEC) and cooperating countries to increase world oil supplies in order to lower prices at the pump during the upcoming summer driving season.

The U.S. Energy Information Administration (EIA) attributes current increases in crude oil prices to “falling global oil inventories, heightened market perceptions of geopolitical risks, and strong global economic growth signals.” Indeed, global oil supplies have been relatively flat over the last two years, despite record U.S. crude oil production, because of an agreement between the OPEC and non-OPEC countries like Russia to decrease their oil production by around 1.7 million barrels per day starting in January 2017. Since the agreement has been in place, those countries have actually reduced production by over 2.4 million barrels per day.

Surging oil prices have made gas station fill-ups more expensive. According to the EIA, gasoline prices will average \$2.95 per gallon this summer, 61 cents higher than last year. That means the average U.S. household will be forced to pay \$167 more in fuel costs this summer driving season as compared to the same period last year. Diesel fuel, essential for transporting American goods to market, will average 64 cents more per gallon than last summer, and prices could top \$4 per gallon in some states.

The impact of rising fuel prices on our economy and on family budgets is significant and widespread. According to a recent analysis by Goldman Sachs, the run up in oil prices will roughly cancel out the effects from tax reductions this year, with the greatest impact on households that can least afford it.

Last month, you said it was unacceptable for OPEC to artificially inflate oil prices. We agree and urge you to work with our international partners to take the following actions to make sure OPEC does not continue to suppress world crude oil supplies, and to protect domestic policies that help consumers:

- Leverage your personal relationship with Saudi Crown Prince Mohammad bin Salman to urge Saudi Arabia to use their swing capacity to increase world oil supplies.
- Send Energy Secretary Perry to the June 22, 2018, OPEC meeting in Vienna, Austria to personally communicate the importance of maintaining stable crude oil prices.
- Initiate World Trade Organization dispute proceedings against countries engaged in anticompetitive practices that artificially inflate world oil prices.
- Work with our European allies and China, which last year surpassed the United States as the world’s largest oil importer, to put pressure on oil exporting nations.
- Direct the Federal Trade Commission, Commodities Futures Trading Commission, and the Department of Justice to exercise vigorous oversight over oil markets.
- Maximize the use of more environmentally friendly and domestically produced biofuel alternatives by protecting the Renewable Fuel Standard.
- Abandon your Administration’s stated plan to roll back fuel economy standards that otherwise will save the average car owner more than \$6,000 over the life of the car and cut the nation’s oil consumption by over two million barrels per day by 2025.

The current run up in world oil prices is effectively a tax on every American family’s discretionary budget, except that the money goes to the OPEC cartel rather than the U.S. Treasury. Adding to our constituents’ pocketbook concerns is their un-

derstanding that our nation's continued dependence on oil is at the heart of many of our nation's greatest economic, environmental, and national security challenges.

Sincerely,

Maria Cantwell
Washington

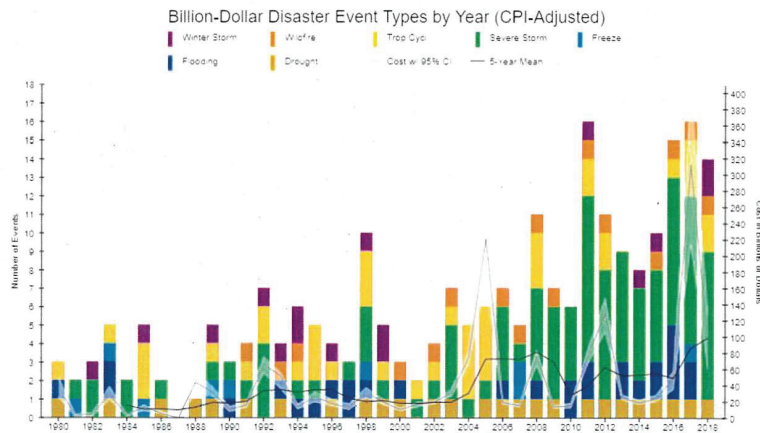
Robert Menendez
New Jersey

Charles Schumer
New York

Edward J. Markey
Massachusetts

Submission for the Record by Rep. Graves

- The U.S. has sustained 241 billion-dollar weather and climate disasters since 1980, including inflation adjustment to 2018 dollars. The total cost of these 241 events exceeds \$1.6 trillion.
- The 1980–2018 annual average number of events is 6.2 events (CPI-adjusted); the annual average for the most recent 5 years (2014–2018) is 12.6 events (CPI-adjusted).



(bars refer to left vertical axis) The number (left vertical axis) and type (colors) of U.S. billion-dollar disasters from 1980-2018.

(lines refer to right vertical axis) Running annual cost (grey line), along with the 95% confidence interval, and 5-year average costs (black line).

Full Information on Billion Dollar Weather and Climate Disasters can be found at:
<https://www.ncdc.noaa.gov/billions/>

And additional blog post will be available at:
<https://www.climate.gov/news-features/blogs/beyond-data/2018s-billion-dollar-disasters-context>

Mr. GRAVES. Thank you. I yield back.

The CHAIRMAN. Also insert in the record—NOAA just released their recap today for the U.S. and Global Climates for 2018. A couple of highlights in that release, in that report: 2018 was the fourth hottest year on record for our planet, falling behind only 2015, 2016, and 2017; in 2018 the United States was warmer than average, and the wettest in 35 years; in 2018 there were 14 weather and climate disasters, each with damages over \$1 billion, total cost \$91 billion. And this is a report that was released as of today by NOAA. And we want that entered into the record, as well.

Mr. BISHOP. Are you asking for objections?

The CHAIRMAN. Without objections, I hope.

[The information follows:]

Submission for the Record by Rep. Grijalva

Just now, NOAA released their recap for U.S. and global climate for 2018. A couple highlights from this report:

- 2018 was the 4th hottest year on record for our planet, falling behind only 2015, 2016, and 2017.
- The 2018 Arctic sea ice extent was its second smallest since recordkeeping began, only behind 2017.
- In 2018, the United States was warmer than average, and the wettest in 35 years.
- In 2018, there were 14 weather and climate disasters each with damages over \$1 billion, total cost was \$91 billion.

NOAA: 2018 was 4th Hottest Year on Record for the Globe

U.S. Experienced \$14 Billion Disasters in a Warmer- and Wetter-Than-Average Year

2018 Global Temperature and Sea Ice

- For 2018, the average temperature across global land and ocean surfaces was 1.42°F (0.79°C) above the 20th century average. This was the fourth highest among all years in the 1880–2018 record, behind 2016 (highest), 2015 (second highest), and 2017 (third highest). Nine of the warmest years have occurred since 2005, with the last 5 years (2014–2018) ranking as the five warmest years on record.
- In a separate analysis of global temperature data, released today, NASA scientists also determined 2018 to be the fourth warmest year on record. Analyses from the United Kingdom Met Office and the World Meteorological Organization ranked 2018 among the top four warmest years on record.
- Sea Ice: Average annual sea ice extent in the Arctic was approximately 4.00 million square miles, just edging 2017, as the second smallest annual average in the 1979–2018 record. The annual Antarctic sea ice extent was 4.20 million square miles. This was the second smallest annually averaged value on record, about 77,000 square miles larger than the previous record set in 2017.

2018 Annual U.S. Temperature and Precipitation

- Much of the contiguous U.S. was warmer than average, particularly west of the Rockies and across the coastal Southeast, which were characterized by much-above-average temperatures, within their warmest 10 percent of the record. Fourteen states across the U.S. had annual temperatures among the 10 highest on record. Arizona: second highest; New Mexico: third highest; and California: fourth highest. Most of the Northern Plains and Upper Midwest experienced near-normal temperatures. South Dakota and Nebraska, respectively, observed annual average temperatures 0.4°F and 0.1°F below their 20th century averages, marking the first year since 2014 that any state observed a temperature nominally cooler than its 20th century average.

- The 2018 nationally averaged precipitation for the contiguous U.S. was 34.63 inches. This total was 4.69 inches above average, the wettest in the past 35 years, and third wettest since record keeping began in 1895. The total was largely driven by record and near-record annual precipitation across much of the eastern United States. Nine eastern states—Delaware, Maryland, Massachusetts, New Jersey, North Carolina, Pennsylvania, Tennessee, Virginia and West Virginia—experienced their wettest year on record. Much of the West and Pacific Northwest experienced a drier than normal year.

2018 Weather Events

- There were 14 weather and climate disasters with losses each exceeding \$1 billion during 2018. These disasters included: two tropical cyclones (Hurricanes Florence and Michael), one western wildfire disaster comprised of several constituent fire complexes over several months, eight instances of severe convective storms (hail, tornado, and/or damaging winds), one large drought episode, and two winter storms. The 14 events, in total, claimed at least 247 lives and cost \$91 billion. About \$73 billion of this total was attributable to three events: Hurricanes Michael (\$25 billion) and Florence (\$24 billion), and the complex of western wildfires (\$24 billion).
- In other notable extremes, during a 24-hour period spanning April 14–15, 2018, a rain gauge at Waipā Garden, near Hanalei on the Hawaiian island of Kauai, observed 49.69 inches of rainfall. This is the largest verified amount of precipitation observed in 24 hours in the United States. The previous record of 43 inches was set at Alvin, Texas, in July 1979.

January 2019 U.S. Temperature, Precipitation and Drought

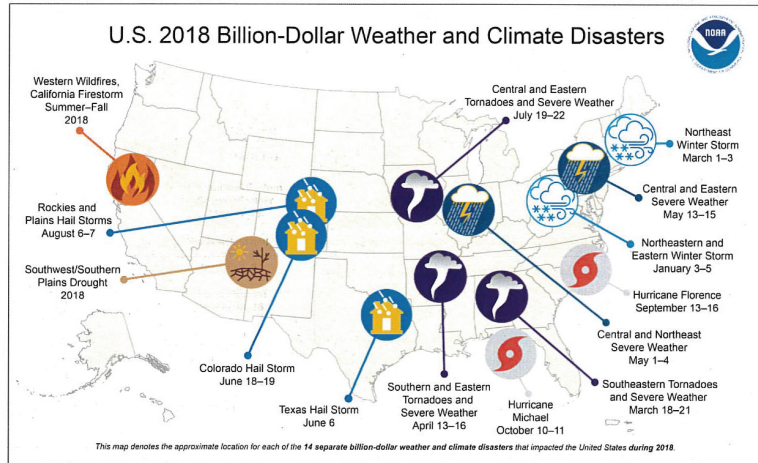
- January 2019 average temperature for the contiguous U.S. was 32.7°F, 2.6°F above average and ranked among the warmest third of its historical record. Near-normal temperatures generally prevailed in the eastern half of the country, while the West was above average for the month. Although short-lived, a cold outbreak near the end of the month gripped much of the Midwest and Northeast, where many daily cold records were set.
- The contiguous U.S. precipitation total for January was 2.49 inches, 0.18 inch above average. Large portions of the Northeast recorded much-above-average precipitation. Rhode Island and Vermont each had their eighth wettest January on record. This was the sixth consecutive month with nationally averaged precipitation categorized as above average or much above average.
- According to the January 29 U.S. Drought Monitor report, 16.5 percent of the contiguous U.S. was in drought, down more than five percentage points since the end of December. Drought improved across much of the Southwest and California.

For More

- A more complete summary of climate conditions and events can be viewed at: <http://www.ncdc.noaa.gov/sotc/global/> and <http://www.ncdc.noaa.gov/sotc/national/>

Summary of 2018 Billion Dollar Weather and Climate Events

- There were 14 weather and climate disasters with losses each exceeding \$1 billion during 2018. These disasters included: two tropical cyclones (Hurricanes Florence and Michael), one western wildfire disaster comprised of several constituent fire complexes over several months, eight instances of severe convective storms (hail, tornado, and/or damaging winds), one large drought episode, and two winter storms.



- The 14 events, in total, claimed at least 247 lives and had total losses estimated at \$91 billion. About \$73 billion of this total was attributable to three events: Hurricanes Michael (\$25 billion) and Florence (\$24 billion), and the complex of western wildfires (\$24 billion)
- 2018 marked the eighth consecutive year with eight or more billion dollar disasters, exceeding the long-term average of 6.2 per year. This was 4th highest total number of events, behind the years 2017 (16), 2011 (16) and 2016 (15). It was also the eighth year in the period of record (1980–present), and seventh since 2008, with at least 10 billion-dollar disasters.
- 2018 also had the 4th highest total costs (\$91 billion) behind the years 2017 (\$312.7 billion), 2005 (\$220.8 billion) and 2012 (\$128.6 billion) when adjusted for inflation.
- 2018 experienced a historically damaging wildfire season (\$24.0 billion), a new U.S. annual record, exceeding the previous \$18.0 billion wildfire cost record set in 2017.

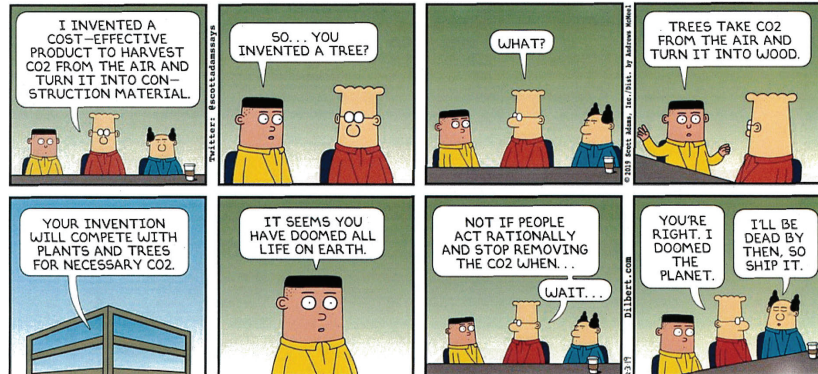
The CHAIRMAN. Mr. Huffman.
 Mr. BISHOP. No, Mr. Westerman has something for the record, too, maybe.
 The CHAIRMAN. Yes.

Mr. WESTERMAN. While we are submitting for the record, I would like to submit this Dilbert cartoon to the record.

[Laughter.]

Mr. WESTERMAN. It explains the photosynthetic process.

[The information follows:]



Mr. HUFFMAN. Mr. Chairman, that is one of the more substantive submittals I have seen from the other side.

The CHAIRMAN. That one will be framed.

Mr. Huffman.

Mr. HUFFMAN. Thank you, Mr. Chairman. Thank you for having this hearing. It is so important that we have an honest conversation about climate change. And while Ranking Member Bishop wondered where this is heading—obviously, it is too early to say which policy prescriptions and solutions this Committee may eventually support, but you have to begin with the kind of conversations, science-based, fact-based, policy-based that we are having in this room.

And what better way to have it than this bipartisan duo of governors? I am struck, in listening to your testimonies, that when honest people simply listen to the facts, listen to the science, and try to solve problems for those they represent, the party labels kind of melt away and we just become problem solvers. That is refreshing.

This Committee and this Congress need to hear more of that. This country needs to hear more of that. Because, frankly, I think America is tired of the shrill, fact-free partisan food fight that has tended to be what they see when we talk about climate change. So, thank you both so much for being here.

Governors, I want to ask you about offshore drilling. You know that the Trump administration has proposed issuing new leases for offshore drilling that would potentially affect each of your states. You might say that they want to make your states' economies look a little more like my friend, Garret Graves' economy in Louisiana, which is still reeling in many respects from the BP oil spill.

What does new offshore drilling represent, from your perspective? Is it a threat? What would it do to the coastal economies of your states?

Governor COOPER. North Carolina says not off our coast. We oppose seismic testing. We oppose offshore drilling. We have too much invested in our tourism economy and our commercial and recreational fishing economy and our ports. We cannot tolerate a disaster of epic proportions which could occur.

We have continued to file comments, we have stated our opposition, we have met with Federal authorities, and will continue to oppose it in North Carolina, just like over 200 bipartisan local governments have passed resolutions opposing offshore drilling off of the North Carolina coast.

Mr. HUFFMAN. Governor Baker?

Governor BAKER. It is pretty unanimous support for not drilling off the coast of Massachusetts, as well, for many of the same reasons. We have one of the most important fisheries in the United States. The New Bedford scallop fishery is more than \$1 billion. I think it is the largest, from a dollar basis, of any fishery in the United States.

We also have demonstrated that the best and biggest opportunity, we believe, for offshore energy activity is around Deepwater Wind. And just to put a point on that, we put our bid out, we took the best of the bids that we got. Rhode Island took one of the bids, Connecticut took one of the bids. And New York, New Jersey, Virginia, and Delaware all of a sudden got very interested in Deepwater Wind when they saw the price points on the procurement that we had negotiated.

And the Federal Government, the Bureau of Ocean Energy Management, put a series of Federal leases out on Federal waters to see what kind of bids they would get on those, and they got tremendous bids on that. And I think if we are looking for a way to grow energy resources on the East Coast, my view would be let's do the Deepwater Wind, which I believe has huge potential.

But the tourism industry, the fishery industry, there are a lot of really good reasons not to be doing offshore drilling off the coast—

Mr. HUFFMAN. We have never heard of a catastrophic wind spill off our coast.

[Laughter.]

Mr. HUFFMAN. So, that seems like a prudent course.

Governor Baker, you referred a little bit to this when you talked about climate change impact on your fisheries, and this is something you do very much have in common with Louisiana. You have a thriving and very vibrant commercial fishing industry.

But I understand that the Gulf of Maine is one of these hot spots for ocean warming. It is warming much faster than most other parts of the ocean. Could you speak to what that is doing to the movement of these fish that have historically been there, how that might impact the seafood industry that you represent, and coastal fishing communities?

Governor BAKER. Well, if you think particularly about cod and lobster, which are probably two commercial fishing industries that are as identified with Massachusetts and Maine as any you are going to find—in fact, there is a cod that is actually hanging on the wall in our State House of Representatives chamber, because that is considered to be kind of the—

Mr. HUFFMAN. Sacred.

Governor BAKER. Yes, exactly. And that cod fishery is moving north. And the lobster fishery is moving north, as well. We are all very concerned that, as the water continues to warm in the Gulf of Maine, it could have huge implications for the shellfish industry, as well.

It is a very big problem, and it is one that you don't have to project out. It is already happening, and it is there, and you can see it in the data. And you can see it when you talk to any of the folks who are part of those fishing communities.

Mr. HUFFMAN. Thank you both for your leadership. I yield back.

The CHAIRMAN. Thank you very much.

Mr. Lowenthal.

Dr. LOWENTHAL. Thank you. And I want to thank the panelists, both—

The CHAIRMAN. Mr. Lowenthal, I just want to be respectful of the governor's time. We probably have him for the rest of my colleagues—they are gracious enough for an additional 10 minutes. Maybe if we can—and then we will have to end at that point.

Dr. LOWENTHAL. Thank you, Mr. Chairman.

The CHAIRMAN. I apologize—

Dr. LOWENTHAL. In my 10 seconds, I would like to talk about the speed by which we move toward zero carbon economies. In your experience, and you both have stated in your testimony that you set targets for the reduction of greenhouse gases. Can you share with us some of your thoughts about what we can do at the Federal level in setting targets? And what are the obstacles you received, or you found in doing this? How far can we go?

Because I am leaning toward what is the balance between a regulatory approach and an incentive, market-driven approach? Can they complement each other? Or should we just have one versus the other?

Governor COOPER. We have set a goal in North Carolina of a 40 percent reduction by the year 2025. And one thing we know, it is going to take a balanced approach. For example, our renewable portfolio standard, we are making requirements of our utilities to increase their renewable energy production, while at the same time we are doing things to encourage zero-emission vehicles, energy efficiency. I mean it has to be a combination of all of the above.

One thing I do know is that the United States needs to be a world leader again in this issue. And anything that you can do from a Federal perspective to make that happen, we would appreciate it. Our 20-state Climate Alliance represents about 47 percent of the population of the United States, and a little over half of the gross domestic product. So, we do have a strong voice that we want the United States to be a leader in this again. And anything that you can do, legislatively from your bully pulpit to make that happen is greatly appreciated. It is absolutely necessary.

Governor BAKER. And I would just say a couple things. One is I do think the most important thing is to establish long-term goals and objectives, because that helps the private sector plan. The second thing I would say is that the goals and objectives can vary from region to region. And I think that, back to the Louisiana versus Massachusetts issue, that is a legitimate issue.

The regional greenhouse gas coalition that we put together with the northeastern states around electricity and energy production has been incredibly effective at reducing greenhouse gases through energy production.

And we are currently talking to the same states about doing something in transportation, which I believe will have similar implications for nudging people and encouraging people to move to zero-emission-type vehicles over time. And as I said in my remarks before, our economy has continued to perform, even as our actual energy use has stayed completely flat, and our greenhouse gas emissions have gone down.

I think one of the things that is important here is, we have created state-based incentives to encourage our utilities and to encourage our businesses to head in this direction. And we have about 100,000 jobs now in Massachusetts that are related to the green economy, getting back to the point that Governor Cooper made previously, which is even in Massachusetts the solar industry has been very successful at finding a path forward.

And we are now pairing solar investments with storage, and that is another area where the Federal Government can play a big role. I mean storage has tremendous potential, and it has tremendous potential on both price and on environmental issues.

The time we typically burn the most environmentally dangerous fuels at the highest price is when it is really cold out, or really hot out, and we are paying a ton for what we get, and most of the time it is our most environmentally dangerous sources. And I think storage is a big opportunity to do something about that, and that is a place where the Feds could really play a big role.

Dr. LOWENTHAL. I just want to say one thing. Thank you for that. I represent the port area of Long Beach, Los Angeles. We are the largest complex. We have reduced our greenhouse gas effect by 80 percent and had the greatest economic growth because of that. So, there are a lot of models out there.

The last thing is, I think that there are regional differences. I am glad that Representative Graves mentioned it, the difference between Louisiana and Massachusetts. You pointed that out. I think the transition to a green economy, which we are doing, and green energy, is going to have to deal with that, the transition in workers and resources to different regions. And I think it is important that he at least mentioned it, even though I think we have differences of opinion on how we reach that goal.

Governor BAKER. I mean I have always been—Texas is a very big oil and gas state. It also is a very big wind and solar state. It is a big energy state. And I wonder if that is one of the ways we could think about some of these issues, going forward.

The CHAIRMAN. Mr. Cox.

Mr. COX. Thank you, Mr. Chairman. I thank Governor Cooper, Governor Baker for being here today.

Every day, when I come to work for the people of California's Central Valley, I think about how what we do is going to affect their lives, particularly in these rural communities that I represent. And while it is clear as day that climate change is real, according to the National Climate Assessment, rural communities in particular face more challenge obstacles responding to climate

change, because they are so highly dependent on our natural resources.

And, certainly in California, we have seen those direct impacts, the heat waves, the fires, the droughts. And we all know it is only going to get worse unless we do something about it.

But my particular concern and interest—and to you, Governor Baker, because I know that you worked in the healthcare industry—is really the linkage between climate change and public health. And particularly public health, how it is going to affect our rural communities.

Governor BAKER. I think the two things I would speak to on that, the first is, obviously, the air quality issue, which Congressman Bishop mentioned before. There are definitely air quality issues associated with climate, and those air quality issues translate into issues around asthma, emphysema, and other both acute and chronic conditions that are associated with that.

The second thing I would say with respect to the rural piece is the rural communities generally have difficulty not just with climate, but with access to what I would describe as sort of modern and sort of standard operating procedure technology that you see in other places.

I mean one of the biggest things we have been working on in western Massachusetts, which has many hill towns and many rural communities, is broadband, which is a really big issue, in terms of economic development and sort of just future capacity to support and serve the people who live in those communities, and provide jobs and economic opportunity. And I think, in many ways, the strategy around rural communities needs to be about a lot of things, one of which relates to energy and the climate.

But there are a lot of things we should be doing with rural communities, because they have very different issues that they need to worry about.

Mr. COX. Yes, thank you, I appreciate the comments regarding the air quality. San Joaquin Valley is the worst air quality basin in the Nation. And it is not getting any better. It is such a shame that we get to see the mountains once or twice a year, right after a nice rainfall.

And Governor Cooper, I don't know if you had—

Governor COOPER. When we, in North Carolina, forced the Tennessee Valley Authority to significantly reduce coal-fired plant emissions, there was a demonstrable positive effect on public health. That matters a great deal.

And from the rural perspective, farmers are getting hit hard by the effects of climate change. And they know it. And you hear from them, because in North Carolina now we have made significant state appropriation to get some immediate help to our farmers, many of them hit by flood after flood, storm after storm, who are now beginning to make the decision this is just not worth it. It is not worth it to be in this business. That should be a frightening result, not only for my state, but for the rest of the country and the world, for that matter.

Mr. COX. Amen.

Mr. Chairman, I yield back the rest of my time.

The CHAIRMAN. Thank you, and to the governors, our appreciation. Thank you very much for your testimony. Members have up to 3 days to submit questions that we will forward to you. And if you would be gracious enough to respond to them, particularly the Members that didn't have an opportunity today to ask questions or make comments and have a dialogue with you.

Governor BAKER. Thank you for that, Mr. Chairman.

Mr. BISHOP. Can I just say one last thing? I will be actually asking some questions, as well, to you, specifically on Mr. Huffman's response or questions on offshore drilling, that if you think the governors or the states have a right or at least a say on what happens in Federal waters off your shores.

And if your answer is yes, then I am going to wonder why my governor doesn't have a right and a say on Federal lands within my state. Anything short of that is hypocritical, and that issue is something that is the jurisdiction of our Committee.

The CHAIRMAN. Thank you very much, governors.

Governor BAKER. Thank you, I appreciate it.

The CHAIRMAN. And we very much appreciate it and thank you for initiating this very important discussion and solution seeking here in this Committee.

With that, let me invite the second panel up and we will begin then. And I will begin the questioning with the Members that didn't have an opportunity for the second panel. OK, senior Members?

[Pause.]

The CHAIRMAN. Let me resume the meeting and welcome the second panel. Let me introduce the second panel.

We have Ms. Elizabeth Yeampierre, the Executive Director of UPROSE; Ms. Nadia Nazar, Co-Founder and Co-Executive Director of Zero Hour Movement; Dr. Kim Cobb, Professor of Earth & Atmospheric Sciences and the Director of the Global Change Program at the Georgia Institute of Technology; Ms. Paula DiPerna, Special Advisor, CDP North America; Reverend Lennox Yearwood, President and CEO of Hip Hop Caucus; Mr. Derrick Hollie, President of Reaching America; and Dr. Judith Curry, President of Climate Forecast Applications Network.

As with the first panel, all statements are limited to 5 minutes. Your entire statement will be part of the hearing record.

I explained the lights. Yellow means you have 1 minute. Red—for the sake of everybody having their questions and additional time to engage with the witnesses today, we would hope that you would stop at that point.

Let me begin with Ms. Nazar. Your 5 minutes—thank you for being here. I appreciate it, and I am looking forward to your comments and your perspective.

STATEMENT OF NADIA NAZAR, CO-FOUNDER, CO-EXECUTIVE DIRECTOR, AND ART DIRECTOR, ZERO HOUR MOVEMENT; CO-ORGANIZER OF THE YOUTH CLIMATE MARCH, PERRY HALL, MARYLAND

Ms. NAZAR. Thank you for inviting me to be here today. I would first like to acknowledge that we are on the land of the Piscataway Indian Nation, an indigenous tribe. My name is Nadia Nazar. I am

16 years old, and I am a junior in high school in Baltimore, Maryland. I am an artist and environmentalist. I have dedicated my time and efforts to the community and animals on this planet since I was 12 years old. I am a founder of the youth-led climate organization Zero Hour.

We say this is Zero Hour because this is zero hour to act on climate change. In fact, Zero Hour will soon launch a nationwide campaign for youth to educate their peers about climate justice.

Climate change has already impacted my future. Scientists say we will be at irreversible climate chaos by the year 2030 if we don't drastically reduce our emissions right now. I will be 28 years old in 2030.

Our world is already experiencing the impacts of global warming, and living conditions will only get closer and closer to the extremes. Humanity has pushed this planet to the edge. And, from my view, it seems that few in the policy and political world are paying attention to the consequences of our actions over the generations.

The climate crisis exasperates problems that are already prevalent, especially in developing nations. Clean water, a vital element to life, is becoming even more scarce. Extreme weather and natural disasters are now the norm, creating new crises against vulnerable populations.

The United States is historically the largest emitter of greenhouse gases. But those who are facing the most severe consequences are the people in developing countries and those in lower-income communities. People in poverty have less access to resources needed to survive when climate extremes take place.

Marine life, such as sea turtles and whales and other species are facing a mass extinction, because of the warmer ocean waters that we humans have caused. My community in Baltimore depends on the Chesapeake Bay. These warming waters will not only harm future generations of my community, but it will also harm generations around the world that rely on bodies of water for their livelihoods.

It seems here in Washington the policy makers have for far too long put the interests of fossil fuel corporations and other carbon-emitting industries over the health and prosperity of the people, the wildlife, and this planet. The lives of my generation have been disregarded for far too long.

You should put the interests of your future generations first, not just because it is the right thing to do, but because many of us have the right to vote in just a couple of years. We care about clean air and clean water, and we will be voting for those who want to address climate change head on.

Some of my friends say they don't want to have children, because they are worried about the kind of lives they would have to live on a warming planet. In the future, asthma rates will be higher, there will be less access to food, and more extreme natural disasters in weather will occur, all due to climate change.

Climate change not only threatens the future of my generation, but it continues to displace and kill people. My family in Kerala, India experienced the floods that occurred there this past summer. These floods displaced approximately 800,000 people and killed 483 people. Around the same time my friends in Ellicott City, Maryland

experienced floods that caused landslides and infrastructural damage in a historical city.

Climate change has been happening. Climate change is happening. Climate change will continue to happen. Climate change is my future, unless you do something about it right now. My generation includes your children and your grandchildren.

I see climate change as an issue that connects everyone and everything on our planet. This is not just about changes in the weather. It is about these changes that will impact and harm populations all around the world. If there is no food because plants can't grow due to extreme drought, that can cause war. And the most vulnerable populations oppressed by racism, the patriarchy, colonialism, and more will be the ones who suffer.

These are the people who are so often left out of conversations, conversations about the quality of the air and water, about energy, and about how we treat this land. We at Zero Hour believe that not only have the voices of the Nation's youth been ignored, but others, as well: women, people of color, indigenous communities, and some of our most vulnerable populations.

How can we progress toward an equal and equitable society of justice if we can't listen to those who make up our country?

I believe that everyone must work together, united and with compassion, on this issue. Those who hold the most power and influence in our society should work with those working in our local communities. I ask of you, Congress, to work with the grass roots climate movement, including the youth, and listen to them in order to bring sustainable change swiftly in time for my generation and I to be able to enjoy life, liberty, and the pursuit of happiness. Thank you.

[The prepared statement of Ms. Nazar follows:]

PREPARED STATEMENT OF NADIA NAZAR, CO-FOUNDER, ZERO HOUR MOVEMENT

Hello, my name is Nadia Nazar. I am 16 years old and I am currently a junior in high school. My SATs are in 2 months, and even though I'm swamped with my academic studies and obligations, climate change is so important to me that I'm here to talk to you about this crisis and the impact it will have on me and my peers' future. I need your help to solve this crisis that is taking away my future.

I live near Baltimore, Maryland. I was born and raised there. Both of my parents are immigrants from Kerala, India. I have been surrounded by nature for as long as I can remember, and I'm sure you have too. My mother is a marine biologist and every year she would take me to the National Aquarium. I would stare at the sting-rays, sharks, turtles, jellyfish, and seahorses as they swam by my tiny self. The beauty of life in the ocean was absolutely mesmerizing. As I got older, people would tell me about how humans kill these animals. I'd always wonder why, and I still do.

I have been studying climate since I was in the 8th grade and I have become increasingly troubled by the dangerous impact of climate change to people, wildlife, and the planet.

That is why I co-founded Zero Hour, a youth-led organization, with three friends online. We were youth who just wanted a livable planet. This organization became Zero Hour, a youth led climate organization. We organized the Youth Climate March on July 21, 2018. We had a Youth Climate Lobby Day, where 180 youth from across the country lobbied for the Zero Hour Platform and the No Fossil Fuel Money Pledge. We also had a Youth Climate Art Festival where we brought together art, music, and climate action. I love my work with Zero Hour because we push for change on all levels. Change starts from the ground up; we must work locally, nationally, and globally. One of the key aspects of Zero Hour's platform is that it provides a variety of solutions systematically, and for individuals. Climate change

is an issue that needs to be fought on a global and at a household level in order to achieve a livable planet.

Zero Hour will soon be launching a campaign that will educate youth across the country about climate justice and how systems of oppression intersect with the climate crisis.

I am the Co-Executive and Art Director of Zero Hour. I wake up early to go to school. Send out e-mails on the school bus, during lunch, and on the school bus home. I do my homework and then work for Zero Hour for hours. I stay up till 1 a.m. almost every night, sometime 3 a.m., doing calls, e-mails, and homework for my AP classes. That's how important this issue is to me.

This lifestyle is something I'd never imagine myself pursuing. I always saw myself having a normal high school experience with my friends. But I had to act on climate because it just didn't seem many of the adults were. We are spending our teenage years, which you only have once, are being spent organizing for something we didn't choose to happen to us. None of us wanted this burden to be passed down onto us.

Why do we have to clean up the mess that past generations, and YOUR GENERATION, has left us?

People always ask if I have hope. As a young climate activist, people look to youth like me and see hope. Every time that happens I lose hope, because the adults are looking for us to solve the problem. But how can we solve it if many people doing nothing. My hope is equal to the time we have left. We have such little time left, so we must act upon that hope, not just stare at it ignorantly from a distance. Adults are glad that we are taking action, but we need YOU adults to take action too. We, the youth, need everyone to act in order to solve climate change, before it is too late.

According to the United Nations Intergovernmental Panel on Climate Change report, that time is in 11 years. We have until 2030 to kick our addiction to fossil fuels if we want to have a chance at keeping warming below 1.5C. I will be 28 years old in 2030. The rest of my life, then, will depend on the decisions we make today. As the latest National Climate Assessment shows, I've already lived my whole life in a changed climate.

My peers have similar worries.

Youth all over the world have held strikes from school to bring attention to climate change, and its effect on my generation. On March 15, youth from all across the United States will be on strike to protest and demand climate action. Specifically, Zero Hour and the youth striking will be asking you, Members of Congress, to support the Green New Deal and act on climate. Please, listen to the youth of this country.

Climate change may not have affected you personally yet, but many individuals all around the world are already coping with the effects from the suffocating and deadly wildfires in California to the massive flooding from the most vicious hurricanes our United States has ever seen.

The magnitudes of natural disasters will only continue to increase as climate change grows stronger. There will be more floods. Deserts will be drier. This past summer's heatwave has already shown that summer is getting hotter. These irregular weather patterns are from the changing climate. Climate is different than weather, but climate has a significant impact on the weather.

Here are some more natural disasters from just the past 3 years:

Nov. 8, 2018	Paradise, CA	Camp Fire	79
Sept. 13, 2018	Carolinas	Hurricane Florence	42+
Sept. 9, 2018	Guam, Marshall Islands, Philippines, and southern China	Super Typhoon Mangkhut	69+
July 23, 2018	Redding California	The Carr Fire	8/1,604 homes destroyed
July, 2018	Japan	Japan Flooding and Mudslides	122+
May 2, 2018	Western and Northern India	India Dust Storms	125+
Jan. 9, 2018	Southern California	Montecito Mudslides	21/129 homes destroyed

Aug. 14, 2018	Sierra Leone, West Africa	Sierra Leone floods and landslides	1000+
Aug. 17, 2017	Houston, Texas	Hurricane Harvey	68
Aug. 30, 2017		Hurricane Irma	52
July 2017	Indian Subcontinent	2017 South Asian floods	1,300+
Sept. 16, 2017	Puerto Rico and Virgin Islands	Hurricane Maria	2,975
Jan. 23, 2016	U.S. Northeast	Winter Storm Jonas	49
Sept. 28, 2016	Atlantic Ocean	Hurricane Matthew	603

Systems of oppression have magnified the effects of climate change. Systems including—racism, patriarchy, colonialism, homophobia, ableism—have made the effects of climate change disproportionately affect certain groups of people.

People of color are disproportionately incarcerated, with black people incarcerated at more than five times the rate of white people. Prisoners were forced to clean up toxic areas after the BP oil spill. They're also fighting wildfires, and cleaning up after hurricanes and floods. In the event of a natural disaster, prison protocol (in some prisons) is to lock prisoners in their cells while the staff evacuates the building, leaving prisoners to die if the prison is hit. Example, when Hurricane Katrina hit New Orleans. This past weekend, the inmates at the Metropolitan Detention Center in Brooklyn were left without heat during the frigid temperatures of the polar vortex, that was linked to climate change.

Often, the majority of industrial fossil fuel projects are constructed around or near minority neighborhoods, impacting the health of those peoples.

And climate change's impacts are even more dire in developing countries.

Colonialism refers to control over a piece of land and its people by a more dominant power. One example on the negative impact climate change has with colonialism, patriarchy, and racism is the impact on girls of color in the United States who are the missing and murdered Indigenous girls. Fossil fuel companies hire land men to build pipelines carrying crude oil through Indigenous lands. Some of these men rape native girls on their land. Monica Jack, Aielah Saric-Auger, and Cheyenne Begay are some of the Indigenous women that have been assaulted on their land. These are just a few of the girls that were endangered. And trans-native girls are more likely to be victim to sexual assault by some of these men that build the pipelines. Sometimes pipelines leak crude oil into the water source. This pollutes drinking water for the Indigenous people.

Homophobia, the hate against the LGBTQIA community, has led transgender people to be two times more likely to be homeless. Just last week, many homeless people passed away due to the extremely cold temperatures. Many homeless people don't have access to the resources to survive when climate extremes take place.

Many people's voices in the climate crisis who make up our country have been ignored. The Indigenous communities have been ignored. People of color have been ignored. Women have been ignored. The LGBTQIA community have been ignored. Disabled people have been ignored. The Youth have been ignored. To solve climate change, we must work with the people, the wildlife, and nature.

I was given the honor and opportunity to speak at the United Nations for International Day of the Girl last October 11. I spoke about climate change's effect on girls around the world. Climate change's effects are intruding on a successful life filled with happiness for many girls in developing countries. After natural disasters, sexual violence in the area increase. Girls are more likely to be raped in disaster struck areas.

I stood next to a girl from the Philippines at the International Day of the Girl event. I will never forget her story. Her name was Hani. Her community in the Philippines was hit with a typhoon. She lost many things including important legal documents and more. But she also lost her best friend.

I don't want to lose my best friend.

I don't want to lose my brother.

I don't want to lose my family in India.

I don't want to lose myself.

The youth who fight day and night for you to take action on climate change don't want to lose out on their future. That is why we fight, and why we will continue to fight.

One cause of climate change that many people overlook is industrial animal agriculture. This industry has contributed to between 14.5 and 18 percent of the greenhouse gas emissions in the atmosphere.

What disappoints many other youth and I, is that there are elected officials prioritizing money from fossil fuel corporations over the lives of my generation. I hope you aren't one of them.

Our relentless greed, our relentless thirst for things that don't make us happy, has taken away our connection from earth. Basic necessities—food, shelter, air, water—have been critically endangered because we are in a mass extinction. It is surreal that profit is being put above the people. Adults have been compromised by greed.

Not only are these actions of these corporations hurting people, but it is also harming the wildlife of this planet. Earth is now in the 6th mass extinction in all of history. More species are reaching extinction. The last mass extinction was the one that killed all the dinosaurs. Humanity's legacy on earth will be that we killed a significant amount of species on this planet. As Elizabeth Kolbert said, if you look closely in your backyard you can see species going extinct at this moment. Humanity cannot survive without the biodiversity of the environment.

I have to take an inhaler multiple times a week, sometimes multiple times a day. Clean air is a necessity of life. How can "Life, Liberty, and the Pursuit of Happiness" be pursued when clean air and clean water is harder to have?

The United States' inaction on climate change is violating my right to life, liberty, and the pursuit of happiness as a citizen of the United States.

I ask that you push your efforts into climate legislation, for the sake of my generation. I ask that you believe in science. I ask that you make sure the sacrificed time and efforts of the youth are not ignored. I ask that you recognize climate justice.

I ask that you listen to my voice.

The CHAIRMAN. Thank you very much.

Ms. Yeampierre, Executive Director, UPROSE, the floor is yours.

STATEMENT OF ELIZABETH YEAMPIERRE, EXECUTIVE DIRECTOR, UPROSE, CO-CHAIR OF THE CLIMATE JUSTICE ALLIANCE, BROOKLYN, NEW YORK

Ms. YEAMPIERRE. Buenos dias. My name is Elizabeth Yeampierre. I am the Co-Chair of the Climate Justice Alliance, an inter-generational alliance of more than 68 front-line community organizations, movement networks, and movement support groups rooted in Indigenous, African-American, Latinx, Asian-Pacific Islander, and poor white communities living on the front lines of climate change, as well as the dig, burn, drive, dump industries causing the climate crisis.

I am also Executive Director of UPROSE. It is a woman-of-color-led inter-generational organization founded in 1966 dedicated to environmental and social justice. We are home to the largest gathering of young people of color and climate justice, the Climate Justice Youth Summit. We are located in Sunset Park, Brooklyn, a diverse community of color made up predominantly of people of color and immigrants. We have a poverty rate of nearly 26 percent above the city average, and far above the national average.

From a climate perspective, we are an industrial waterfront community exposed to flooding from hurricanes and storm surges, as was the case in 2012 when Superstorm Sandy hit.

Like climate change, the conditions of our communities are the consequence of a long history of extraction. We share legacies of

fighting colonialism, as well as race, class, and gender oppression, while advocating for environmental justice. Our communities are the first and most impacted by the storms, fires, floods, and droughts, and are disproportionately burdened by the pollution, poverty, and systemic violence associated with the multi-national corporations driving these ecological crises.

Puerto Rico is the most recent and drastic example of a land ravaged by corporate extraction, with people left to fend for themselves after years of colonialism, austerity, and neglect. The double disasters of Hurricanes Maria and Irma created an opportunity for disaster capitalists to profit from people's suffering in a time of social and economic devastation. The same thing took place in the Gulf South for black and indigenous communities after Hurricane Katrina.

Climate change solutions must honor human rights and respect front-line leadership through the solutions that are proposed.

Elsewhere, the extractive economy continues to harm entire communities, as is the case with uranium mining in New Mexico, which affects over 60 indigenous nations. The southwest United States was declared a national sacrifice zone in the Federal energy policy of the 1970s.

This means that environmental safeguards were not enforced, thus endangering human life. Drinking water is tainted with uranium and arsenic, and there is a high rate of cancer, heart disease, and lung disease. Uranium mining is a key element of nuclear energy, which is considered renewable energy in most Federal clean energy policy initiatives.

You can understand why we do not support the use of large-scale bio-fuel, bio-mass, mega-hydro dams, nuclear energy, or energy derived from burning waste. They are usually developed in our backyards, where we live, work, play, and pray, and they do not reduce emissions at the source of extraction, only prolonging any real solutions to the climate crisis.

To effectively tackle climate change, we must invest in a just transition. A just transition will not be smooth, but must be just, leaving no worker or community behind. Front-line communities and an economic framework that moves us away from extraction must be at the center of any effort to address climate change.

All around the country there are examples of front-line communities developing projects that engage in innovative infrastructure, further control, and create jobs. Some are at the early stages, while others are ready to be scaled up and replicated. They will benefit more people and communities if there is political will, public investment, and incentives to do so.

The fossil fuel industry receives millions in subsidies. Imagine what communities are already forging comprehensive solutions to the climate crisis could do with a reallocation of these subsidies. My organization, UPROSE, just recently partnered with the New York City Economic Development Corporation, Solar One, and Co-Op Power, to create the first community-owned solar cooperative in the state of New York.

On a larger scale, we advocate for turning the area's industrial sector into an economic engine able to build for the region's climate adaptation future. Offshore wind alone can deliver power to New

York City, displacing the need for dirty power plants. But just as importantly, it would position the city at the center of this emerging industry, driving local economic development.

For years in another part of the country, the residents of Highland Park, Michigan suffered high energy costs and blackouts, along with massive flooding. When the municipality was in a financial crisis, the local energy company repossessed 1,000 street lights, leaving the residents in the dark. Soulardarity, a local environmental justice group and a CJA member stepped in and designed a system for installing solar power lights.

Soulardarity created a bulk purchasing program that is training residents in the solar installation and weatherization, readying them to step into clean energy jobs. They are using education and organizing to literally make light of a dark situation.

Front-line communities know what is at stake. The question is, will legislation aid our communities' future survival, or hinder it? I hope, for all of our sakes, it will be the former. The bottom line is that our communities are not sacrifice zones, and they have been for too many years. Gracias.

[The prepared statement of Ms. Yeampierre follows:]

PREPARED STATEMENT OF ELIZABETH YEAMPIERRE, EXECUTIVE DIRECTOR, UPROSE;
CO-CHAIR, CLIMATE JUSTICE ALLIANCE

My name is Elizabeth Yeampierre. I am Co-Chair of the Climate Justice Alliance, a national organization that links 68 organizations across the United States and Puerto Rico. I am also Executive Director of UPROSE, Brooklyn's oldest Latinx organization. Founded in 1966, UPROSE is dedicated to environmental and social justice and part of the national frontline climate justice movement representing those most impacted by climate change.

UPROSE is located in Sunset Park, Brooklyn. It is a diverse working-class community where over half of the residents are People of color/immigrants, mostly of Latinx descent. We have a poverty rate of nearly 26 percent, above the city average and far above the national average. Housing affordability is a major crisis, with nearly half of my neighbors being rent-burdened and the city undergoing extreme gentrification that will only worsen with the expansion of Opportunity Zones.

From a climate perspective, we are an industrial waterfront community exposed to flooding from hurricanes and storm surges, as was the case in 2012 when Superstorm Sandy hit. As a poor and working-class community, housing displacement and disruption of services due to storms and other severe weather affect our people much more acutely compared to residents of affluent communities with more resources. Further, on a day-to-day basis, disproportionate exposure to fossil fuel pollution and other climate change impacts, such as extreme heat, is built into New York City's policy fabric, transportation planning, and economic development, all arising from racism that compounds the pollution impacts with socioeconomic inequities. The oppression of low wages and underfunded schools in our community is exacerbated by high rates of asthma and other pulmonary diseases, heart disease, and lung cancer, which further restrict my neighbors' economic and educational potential.

THE CLIMATE JUSTICE ALLIANCE

The Climate Justice Alliance (CJA) is an alliance of more than 68 frontline community organizations, movement networks, and movement support groups rooted in Indigenous, African American, Latinx, Asian Pacific Islander, and poor white communities living on the frontlines of climate change, as well as the "dig, burn, drive, dump" industries causing this crisis.

Like climate change, the conditions of our communities are the consequence of a long history of extraction. We share legacies of fighting colonialism, as well as race, class and gender oppression, while advocating for environmental justice. And we share vision, values and principles that guide our environmental, economic, and social justice organizing. Our communities are the first and most impacted by the storms, fires, floods and droughts, and are disproportionately burdened by the

pollution, poverty and systemic violence associated with the multi-national corporations driving these ecological crises.

Puerto Rico is the most recent and drastic example of a land ravaged by corporate extraction, with people left to fend for themselves after years of colonialism, austerity and neglect. The double disaster of Hurricanes Irma and Maria created an opportunity for “disaster capitalists” to profit from people’s suffering in a time of social and economic devastation. The same thing took place in the Gulf South for Black and Indigenous communities after Hurricane Katrina. Climate change solutions must honor human rights and respect frontline leadership through the solutions that are proposed.

Elsewhere, the extractive economy continues to harm entire communities, as is the case with uranium mining in New Mexico, which affects over 60 Indigenous nations. The southwest United States was declared a “National Sacrifice Zone” in the Federal Energy Policy of the 1970s. This means that environmental safeguards were not enforced, thus endangering human life. Drinking water is tainted with uranium and arsenic and there is a high rate of cancer, heart disease, and lung disease. Uranium mining is a key element of nuclear energy which is considered renewable in most Federal clean energy policy initiatives. You can understand why we do not support the use of large-scale biofuel, biomass, mega-hydro dams, nuclear energy, or energy derived from burning waste. They are usually developed in our backyards, where we live, work, play and pray and they do not reduce emissions at the source of extraction, only prolonging any real solutions to the climate crisis.

TOWARD A JUST TRANSITION

To effectively tackle climate change, we must invest in a Just Transition toward specifically local, living economies of scale.

Just Transition is a vision-led, unifying and place-based set of principles, processes and practices that build economic and political power to shift from an extractive economy to a regenerative economy—not just for workers but for whole communities. This means approaching production and consumption cycles holistically and waste-free.

This transition away from fossil fuels itself must be just and equitable, redressing past harms and creating new relationships of power for the future through reparations, living wage jobs and economic and social development that aims to address historical harm and discrimination. If the process of transition is not just, the outcome will never be.

It is clear from the scientific data that we must move away from fossil fuels. It will not be smooth but the transition must be just, leaving no worker or community behind. Frontline communities and an economic framework that moves us away from extraction must be at the center of any effort to address climate change.

Climate change demands that we live with what we need instead of what we want. Everywhere people are learning to do this, and frontline communities are leading the way and reclaiming their traditions.

NEW YORK’S FIRST SOLAR COOPERATIVE IS COMMUNITY OWNED

All around the country there are examples of frontline communities developing projects that engage innovative infrastructure, further local control, and create jobs. Some of these projects are in the early stages. Others are ready to be scaled up and replicated in ways that will benefit more people and communities if there is public investment and incentives to do so. The fossil fuel industry receives millions in subsidies. Imagine what communities already forging comprehensive solutions to the climate crises could do with the reallocation of those subsidies.

My organization, UPROSE, partnered with the NYC Economic Development Corporation, Solar One and Co-op Power to create the first community-owned solar cooperative in New York State.

On a larger scale, we advocate for turning the area’s industrial sector into an economic engine able to build for the region’s climate-adaptable future. Offshore wind alone can deliver power directly to New York City, displacing the need for dirty power plants. But just as importantly, it would position the city at the center of this emerging industry, driving local economic development.

This industry will revitalize our working waterfront and create thousands of blue-collar industrial jobs. The Department of Energy expects 40,000 new jobs in the sector by 2030. Those jobs will be located wherever the ports and the work force are. This could move our region away from the fossil fuels that threaten our climate while blunting the forces of real estate speculation that are disrupting our communities. An offshore wind hub in Sunset Park would serve as an innovative model of economic development that would transform our energy system and provide

pathways to a middle class income for workers. It would act as a bulwark against extractive real estate interests and position the city as a leader on climate change solutions at the national level. From the very local to a much larger scale, frontline communities like ours are working to operationalize creative solutions that address local needs.

EDUCATING FOR THE FUTURE, SOLVING PROBLEMS NOW

For years, in another part of the country, the residents of Highland Park, Michigan suffered high energy costs and energy blackouts along with massive flooding. When the municipality was in financial crisis, the local energy company repossessed 1,000 streetlights, leaving the residents in the dark. Soulardarity, a local environmental justice group and a CJA member, stepped in and designed a system for installing solar-powered street lights. They have installed 7 solar-powered streetlights and created a proposal for the City to finance and install a full 1,000, re-lighting the streets and providing affordable internet and civic engagement tools. Building on its commitment to energy democracy and community empowerment, Soulardarity created a bulk purchasing program that is training residents in solar installation and weatherization, readying them to step into clean energy jobs as they become available, and has deployed \$30,000 of solar lighting and other products in Highland Park and neighboring communities. They are using education and organizing to literally make light of a dark situation. The group is shortly releasing a Blueprint for Energy Democracy, a plan to make Highland Park a global model of sustainability and democracy, and collaborating with a diverse array of stakeholders to advance the plan, and advocating for state and Federal actors to provide financial resources and technical assistance to bolster community plans.

EXPANDING SOLAR WHILE GROWING COMMUNITY JOBS

In Chicago, CJA member Little Village Environmental Justice Organization (LVEJO), which is based in a low-income, mainly Latinx immigrant neighborhood, worked hard to directly represent environmental justice communities in the state of Illinois' Future Energy Jobs Act (FEJA) by insisting that it focus on health, environmental justice, and economic justice opportunities. With unprecedented funds directed to low-income environmental justice communities, LVEJO developed access to a solar panel training program delivered in communities across the state that prioritizes community members that were formerly incarcerated or had aged out of the foster care system. FEJA programs were designed to bring the benefits of solar energy to low-income communities, whether or not they are able to install the panels on their homes, including energy sovereignty opportunities for low-income communities to build ownership of solar systems. The group is also at the center of a plan to repurpose a closed down coal-fired power plant, with the goal of using it for community-run projects.

These are but a few examples of how our communities are developing concrete projects to address the climate crisis. There are many more that look at the different tipping points and sectors needed to halt the climate crisis and if we want to ensure a healthy future for future generations we must start prioritizing and scaling them now.

FOLLOWING THE LEAD OF THE FRONTLINES AND ACTING NOW

Today, we are at the tipping point with little time to waste. We urgently need a Just Transition to be centered in community-driven Climate Action Bills, coupled with a commitment to Just Recovery and Rebuilding Infrastructure. Simply put, we must have legislation that clearly prioritizes investments in scalable projects like those mentioned today that reduce emissions at the source and address the historical harm and discrimination communities like mine have faced for centuries.

Investment in just development plans around the Nation through block grants earmarked for community-based organizations and community development funds would go even further to repair historical harm and center community innovation for water, land, air, and energy resources, in both urban and rural areas, as well as Indian Country.

Frontline communities know what is at stake, the question is: will legislation aid our communities' future survival or hinder it. I hope for all our sakes it will be the former.

QUESTIONS SUBMITTED FOR THE RECORD BY REP. HAALAND TO MS. ELIZABETH YEAMPIERRE, EXECUTIVE DIRECTOR, UPROSE

Ms. Yeampierre did not submit responses to the Committee by the appropriate deadline for inclusion in the printed record.

Question 1. Can you share with us some of the disproportionate impacts climate change has on underserved and underrepresented communities? Are there ways that climate change impacts indigenous peoples to an even greater extent?

Question 2. The Tohono O'odham Nation is having an especially difficult time securing the Federal funding it needs to respond to the devastation of Hurricane Rosa. This systemic breakdown follows a pattern set by Hurricanes Katrina, Maria, and so many others, in which underrepresented groups bear the brunt of natural disasters.

2a. Can you speak to the financial burden climate change puts on underserved communities?

2b. Why it is so important that the government work to fund adaptation, mitigation, and response efforts in these areas?

Question 3. We've seen the dire reports from the international scientific community, and even from the current Administration about the need to act on climate to avoid disastrous long-term outcomes. However, it's important we recognize that some communities are reliant on fossil fuel investments as a revenue base for their schools, hospitals and other essential services. How can we invest in those communities to ensure they are not left behind in a clean energy transition?

The CHAIRMAN. Thank you.
We will turn Kim Cobb.

STATEMENT OF KIM COBB, GEORGIA POWER CHAIR, DIRECTOR, GLOBAL CHANGE PROGRAM, ADVANCE PROFESSOR, EARTH AND ATMOSPHERIC SCIENCES, GEORGIA INSTITUTE OF TECHNOLOGY, ATLANTA, GEORGIA

Dr. COBB. Thank you. I thank Chairman Grijalva and Ranking Member Bishop for allowing me to contribute to this important conversation about our Nation's future. My message today is simple: the data and the science could not be more clear. It is time to act.

There are many no-regrets, win-win actions to reduce the growing cost of climate change. But we are going to have to come together to form new alliances in our home communities, across our states, and, yes, even in Washington.

I know I speak for thousands of my colleagues when I say that scientists all over the country are willing and eager to assist policy makers and the design of data-driven defenses against both current and future climate change impacts.

As a professor at the Georgia Institute of Technology for the last 15 years, my research uses samples collected from the remote Pacific to reconstruct past climate variations. Our records are consistent with countless other records indicating that the rate in magnitude of recent climate change dwarf natural climate variability over the last millennium.

I love my work, but 3 years ago, I witnessed something that would change my life forever. In 2015, we received funding from the National Science Foundation for a series of field expeditions to document the evolution of a strong El Niño event projected that winter. I had waited 15 years for this scientific opportunity. However, little did I know that warming ocean temperatures 6 degrees

Fahrenheit warmer than average would kill up to 90 percent of the coral at our study site. And I had a front-row seat to that carnage.

And 2016 would go on to become the worst global-scale coral bleaching and mortality event on record, and the warmest year on our planet since records began. Personally, 2016 was my wake-up call. Unfortunately, the last years brought a number of devastating wake-up calls much closer to home. Hurricanes Harvey, Lane, and Florence decimated entire communities, delivered record-breaking rainfall, while Hurricanes Maria and Michael decimated entire communities with their force, including many in my home state of Georgia.

The National Climate Assessment, released this last November by a consortium of 13 Federal agencies, documents how climate change loads the dice in favor of extreme precipitation events, and how warmer oceans fuel larger tropical storms. On the other side of the country, record-breaking wildfires raged across California, linked to prolonged drought and warmer temperatures.

The economic toll of these disasters can be measured in the hundreds of billions of dollars. However, their real toll, the vast human suffering left in their wake, is immeasurable. And beyond these deadly extremes, a host of additional climate change impacts represent a growing threat to ecosystems and communities alike. Sea levels are rising with up to 6 feet of global sea level rise projected this century. Drought threatens water supplies across the western United States with no end in sight. The oceans are becoming more acidic, as excess carbon dioxide reacts with sea water. And, as of today, 2018 will officially take its place as the fourth warmest year on record behind 2016, 2017, and 2015.

Climate change impacts are now detectable all across America, and they will get worse. That is the bad news. I am sure you are ready for some good news, and there is plenty to go around.

The good news is that science can help inform measures to help protect communities, as well as our oceans, forests, parks, waterways, and wildlife from the most devastating impacts of climate change. Here, early action is essential to the success of these approaches delivering vast returns on investment.

Many jurisdictions, from the local to the Federal, have developed a suite of climate adaptation measures informed by rigorous science, stakeholder engagement, and cost benefit analysis. But we must accelerate these efforts. Toward that end, a national climate assessment provides an actionable blueprint for such adaptive measures, including an in-depth assessment of climate impacts on ecosystem structure, function, and services.

The other good news is that it is not too late to avoid the most damaging impacts of future climate change. We have the tools we need to dramatically reduce greenhouse gas emissions. And in doing so, we will enjoy cleaner water, cleaner air, and healthier communities.

The rapid expansion of renewable energy across the Nation demonstrates a strong appetite for carbon-free, clean power. Even so, U.S. greenhouse gas emissions were up 3 percent last year.

The bottom line is that we are running out of time. Comprehensive Federal policies are needed to speed the transition to low-carbon energy sources. Top on the list must be a price on carbon

to reflect the true cost of continued fossil fuel emissions and to incentivize consumers, companies, and the market to find the cheapest, most effective means of reducing emissions.

With or without a price on carbon, increased energy efficiency is a win-win strategy that can deliver energy cost savings, while reducing harmful air pollution.

Last, there is a strong case you made that we can deploy our vast forests, grasslands, and coastal marshes in service to natural carbon sequestration. At its most basic level, this means designing strategies to safeguard these environments with their rich carbon reserves in the face of continued climate change.

As a climate scientist, I have to wonder how bad will it have to get for us to recognize that climate change represents a clear and present threat, and to act decisively to protect ourselves. I am heartened by recent polls showing that nearly three in four Americans are concerned about global warming and support a range of policy options to address it. As a mother to four young children, I am inspired by the sea of young people demanding that we not squander their chances for climate stability.

I urge this Committee to capitalize on the vast trove of climate science findings by: (1) protecting our natural resources and the communities that depend on them from known climate change impacts; and (2) using Federal lands to advance climate solutions, rather than expanding the scope of the climate change problem. Thank you.

[The prepared statement of Dr. Cobb follows:]

PREPARED STATEMENT OF DR. KIM COBB, PROFESSOR, EARTH & ATMOSPHERIC SCIENCES; DIRECTOR, GLOBAL CHANGE PROGRAM, GEORGIA INSTITUTE OF TECHNOLOGY

I thank Chairman Grijalva and the rest of the Committee for allowing me to contribute to this important conversation about our Nation's climate future. My message today is simple: there are many no-regrets, win-win actions to reduce the growing costs of climate change, but we're going to have to come together to form new alliances, in our home communities, across our states, and yes, even in Washington. I know I speak for thousands of my colleagues when I say that scientists all over the country are willing and eager to assist policy makers in the design of data-driven defenses against both current and future climate impacts. It is not too late to alter the damaging trajectory of inaction. There are plenty of prizes for early, meaningful action. These include cleaner air and water, healthier, more resilient communities, a competitive edge in the low-carbon 21st century global economy, and the mantle of global leadership on the challenge of our time. I'm confident that through respectful discourse, we will recognize that our shared values unite us in seeking a better tomorrow for all Americans.

My own journey began 20 years ago, at the Scripps Institution of Oceanography, where my research focused on extracting records of past climate variability and change from far-flung, remote islands in the deep tropics. At the time, I never thought that I would ever find myself testifying to Congress about climate change. I was a passionate and dedicated student of our earth system, eventually settling into a rewarding academic career at the Georgia Institute of Technology, where I teach courses on energy and climate change, and manage a lab full of instruments and student research assistants. Over the last 15 years, I have published over 60 peer-reviewed articles, been awarded a Presidential Early Career Award for Scientists and Engineers, and am currently a Lead Author for the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Together with my students and collaborators, I work to advance the tools and approaches of in my chosen field of paleoclimatology, in part by generating more and better records of past climate change. Such records help us peer into the distant future by quantifying the response of the climate system to past climate forcings, including greenhouse gases. I've led over 20 expeditions to the middle of the Pacific, SCUBA-diving on abundant,

diverse reefs where the largest corals are 10-ft tall and contain 100 or more years of past climate data.

But 3 years ago, I witnessed something that would change my personal and professional life forever.

In 2015, we received funding from the National Science Foundation for a series of field expeditions to document the evolution of a strong El Niño event projected that winter. I was giddy with the expectation of scientific discovery. After all, I had waited 15 years for this opportunity. What I could not have predicted was that ocean temperatures 6 degrees Fahrenheit warmer than usual would kill up to 90 percent of the coral at our study site over 9 months. And I got a front-row seat to the carnage. By early 2016, even the largest corals would succumb—corals that had lived through record-breaking El Niño's in 1983 and 1998. And the carnage was global—scientists report that by 2017, up to 75 percent of global reefs had experienced bleaching-level heat stress and for up to 30 percent of reefs, heat stress reached lethal levels (Eakin et al., 2018). Reefs in Hawaii and Florida were not spared. It will take decades for our study site to recover, but with ocean warming accelerating (Cheng et al., 2019), we know that the next ocean heat wave is lurking around the corner. 2016 was my wake-up call.

Unfortunately, 2017 and 2018 brought a number of devastating wake-up calls much closer to home. As a physical climate scientist, I am trained to focus on data, and their uncertainties, but let me cut to the chase: many of the natural disasters in past years bear the unmistakable signature of climate change. Hurricanes Harvey, Lane, and Florence delivered record-breaking rainfall (National Weather Service) while Hurricanes Maria and Michael decimated entire communities with their force, including many in my home state of Georgia. The National Climate Assessment (hereafter NCA, 2018)—released this last November—documents how climate change loads the dice in favor of extreme precipitation events, and how warmer oceans fuel larger tropical storms. On the other side of the country, record-breaking wildfires raged across California, linked to prolonged drought and warmer temperatures (Abatzoglou and Williams, 2016). The economic toll of these disasters can be measured in the hundreds of billions of dollars. However, their real toll—the vast human suffering left in their wake—is immeasurable.

And beyond these deadly extremes, a host of additional climate change impacts represent a growing threat to ecosystems and communities alike. Sea levels are rising, with 6-ft of global sea level rise projected this century (Sweet et al., 2017; NCA, 2018). Drought threatens water supplies across the western United States (NCA, 2018), with no end in sight. The oceans are becoming more acidic as excess atmospheric carbon dioxide reacts with seawater (NCA, 2018). A warming ocean holds less oxygen, increasing the risk for deadly coastal hypoxia events (NCA, 2018). All of these trends are expected consequences of climate change—most through fairly straightforward physics and chemistry—and all have been borne out by repeated sets of observations.

The National Climate Assessment outlines the region-by-region and sector-by-sector impacts of ongoing climate change. The report makes clear that climate change is already impacting the lives of many Americans, with outsize impacts to those who can least afford it. The report singles out indigenous communities as uniquely vulnerable, given their economic and cultural dependence on natural resources. But there's plenty of threats to go around—America's farmers, fishermen, coastal residents, children, the elderly, and low-income families sit squarely in the crosshairs of climate change. As a resident of the southeastern United States, I am particularly concerned about the high concentration of vulnerable populations in our region, given that studies predict a pile-on of escalating climate impacts in our region (e.g. Hsiang et al., 2017).

Climate change also represents a major threat to national security, a “threat multiplier,” in the words of a 2015 Department of Defense report (DOD report Ref ID 8-6475571). In the last month, a new Department of Defense report highlights the risk that current and future climate change poses to its infrastructure (DOD report Ref ID 9-D30BE5A). It notes that 53 installations are currently subject to recurrent flooding, growing to 60 at risk over the next 20 years.

Climate change impacts are now detectable all across America. And they will get worse. That's the bad news. I'm sure you're ready for some good news, and there is plenty to go around.

The good news is that science can help inform measures to protect communities, as well as our oceans, forests, parks, waterways, and wildlife, from the most devastating impacts of climate change. Here, early action is essential to success, delivering vast returns on investment.

Many jurisdictions—from the local to the Federal level—have developed a range of adaptation measures informed by the best science, stakeholder engagement, and

rigorous cost-benefit analysis. But the adaptation portfolio is still spotty, and nowhere near the scale justified by the set of well-established climate impacts. Toward that end, The National Climate Assessment provides an actionable blueprint for such adaptive measures, including an in-depth analysis of climate impacts on ecosystem structure, function, and services. For example, the report highlights a key role that our Nation's natural resources, such as coastal wetlands, which can protect communities from rising seas while delivering a range of other valuable ecosystem services. The National and Regional Climate Adaptation Science Centers (<https://casc.usgs.gov>) provide a mechanism to accelerate adaptation planning and implementation to protect our Nation's natural resources and safeguard the critical services that they provide.

And there is plenty of room for innovation and advanced technology to assist communities in quantifying their unique risks and vulnerabilities to specific climate-related threats. At Georgia Tech, teams of scientists and engineers are teaming up with city and county officials in and around Savannah, Georgia to design and deploy sensors for monitoring water levels and air temperatures in real time, from neighborhood to neighborhood (see <https://www.sealevelsensors.org>).

The other good news is that it's not too late to avoid the most damaging impacts of future climate change. We have the tools we need to dramatically reduce greenhouse gas emissions. And in doing so, we will enjoy cleaner water, cleaner air, and healthier communities.

The rapid expansion of renewable energy across the Nation demonstrates a strong appetite for carbon-free, clean power on the part of private homeowners and large utilities alike. Even so, U.S. greenhouse gas emissions were up 3 percent last year (Rhodium Group, 2019). The bottom line is that we are running out of time. Comprehensive Federal policies are needed to speed the transition to low-carbon energy sources. Top on the list must be a price on carbon, to reflect the true costs of continued fossil fuel emissions, and to incentivize consumers, companies, and the market to find the cheapest, most effective means of reducing emissions.

As much as we need to ramp up low-carbon energy production, we also have a huge opportunity to dramatically reduce emissions in the near term through energy efficiency, while delivering energy cost savings to consumers and corporations alike. It's worth noting that efficiency gains come with significant health benefits, largely from reduced air pollution, and are effective even without a price on carbon. A 2018 energy efficiency scorecard by the American Council for an Energy Efficient Economy (ACEEE) reports state-by-state gains in energy efficiency, with the winners providing a wide range of policy instruments to achieve large-scale gains. In general, southeastern states like Georgia rank near the bottom of the list, despite high energy burdens that leave many low-income families struggling to afford their monthly energy bills (ACEEE, 2017). In this case, policies that promote energy efficiency will improve living conditions for many of the most vulnerable members of society. And of course, improved energy efficiency will be critically important going forward, as demand for cooling increases across many areas of the country.

I became a passionate spokesperson for energy efficiency after Georgia Tech undergraduates showed me what could be achieved by partnering with local businesses as part of the "Carbon Reduction Challenge" (<http://carbonreduction.gatech.edu>). In one semester, 30 students routinely design and implement strategies to save their organizational partners energy, simultaneously banking carbon reductions and cost savings. During one Challenge, student teams brought 12 million lbs of CO₂ reductions to fruition, simply by identifying low-hanging interventions to champion with their large partner organizations. That's the CO₂ equivalent of 20 homes going 100 percent solar for 20 years, except this CO₂ savings didn't cost money. It made money.

Last, there is a strong case to be made that we can deploy our vast forests, grasslands, and coastal marshes in service to natural carbon sequestration, in a variety of forms. At its most basic level, this means designing strategies to preserve our mature forests, grasslands, and wetlands, with their rich soil carbon reserves, in the face of continued climate change.

Listening to the stories of those whose lives have already been destroyed by climate change I have to wonder: How bad will it have to get for us to recognize that climate change represents a clear and present threat, and to act decisively to protect ourselves and the natural resources that we all depend on?

As a climate scientist, I'm heartened by recent polls showing that nearly 3 in 4 Americans are concerned about global warming, and support a range of policy options to address it (Leiserowitz et al., 2018). 72 percent of Americans think that global warming is happening, 62 percent understand that it is mostly human-caused, and 72 percent of Americans think that global warming is important to them personally. On policy options, 68 percent of Americans support a carbon tax,

and 82 percent support tax rebates for energy efficiency and solar panels. The path forward is clear.

And as a mother to four young children, I'm heartened by the sea of young people demanding that we not squander their chances for climate stability.

I urge this Committee to center the robust findings of climate science in making critical policy decisions about our Nation's natural resources by:

- 1) moving to protect these resources, and the communities that depend on them, from the suite of ongoing, well-established climate change impacts; and
- 2) ensuring that our use of Federal lands is geared toward advancing climate solutions, rather than expanding the scope of the climate change problem.

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QUESTIONS SUBMITTED FOR THE RECORD BY REP. HAALAND TO DR. KIM COBB, PROFESSOR, SCHOOL OF EARTH & ATMOSPHERIC SCIENCES, GEORGIA INSTITUTE OF TECHNOLOGY

Question 1. This Committee has frequently discussed and will continue to discuss wildfire safety and forest management. Can you please explain the role that climate change plays in altering wildfire patterns?

Answer. Data are now clear—the frequency and extent of western U.S. wildfires are increasing. The U.S. National Climate Assessment (specifically Chapter 6: Forests; <https://nca2018.globalchange.gov/chapter/6/>) lays out the compound hazards that climate change poses to our nations forests, particularly in the vulnerable western United States. Most of these risks are directly associated with increased fuel loading linked to warmer temperatures, either directly or indirectly. For one, pine bark beetles have increased their geographic range as winters have become more mild, killing hundreds of millions of trees in the last decade, and creating an abundance of dead trees to fuel wildfires. Prolonged drought has also played a key role, weakening forest resistance to the pine bark beetles and drying out the landscape to add to the available fuel load. Severe drought in the western United States is directly linked to climate change, as warmer soil temperatures drive evaporation while decreased snow pack leaves less water available for summer streamflow. These trends are expected to continue to exacerbate the risk of wildfires across the western United States. Regionally specific trends in wildfires call out the extreme vulnerability of the southwestern United States to wildfire, noting impacts to water quality and quantity that have profound societal impacts (Chapter 25: Southwest; <https://nca2018.globalchange.gov/chapter/25/>). The National Climate Assessment notes a number of potential mitigation strategies to minimize the losses associated with wildfires, including maintaining the health of forest ecosystems by minimizing habitat fragmentation by human land use decisions. The report also highlights the role for data-driven forest wilderness management strategies such as allowing naturally ignited fires to burn where safe to do so, as well as pre-emptively setting low-intensity prescribed burns in reducing wildfire risk.

Question 2. For over a decade, Congress has struggled to extend meaningful protections to important American landscapes—landscapes that protect wildlife habitat and provide valuable economic, ecological, and recreational benefits.

2a. Do protected landscapes play any role in helping humans and wildlife adapt to climate change?

2b. What do we risk when we fail to extend these protections?

2c. How do policies that encourage energy extraction on public lands impact the climate?

Answer. Protected landscapes play a vital role in increasing the “adaptive capacity” of natural systems, the communities that live in them and/or depend on them for a variety of ecosystem services. The 2018 National Climate Assessment defines “adaptive capacity” as “the ability of human and natural systems to prepare for, adjust to, respond to, and recover from experienced or anticipated climate impacts” (Chapter 28: Adaptation; <https://nca2018.globalchange.gov/chapter/28/>). This is perhaps most clear along the coasts, where salt marshes and mangroves serve as important natural barriers to reduce the risks of coastal flooding while delivering a range of additional ecosystem services to support local fisheries, tourism, and recreational activities. However, protected corridors across the nation’s interior

are cited as a critical mechanism to allow wildlife to migrate to more hospitable climatic zones as temperature and rainfall patterns shift. Most obviously, continued warming will place acute stress on temperature-sensitive species that might be mitigated by a northward or upslope shift in the range of those species to cooler temperatures. Habitat fragmentation represents a significant barrier to such natural redistributions of terrestrial species as they adapt to climate change. In the previous answer, I referred to the importance of maintaining forest health through habitat protection in bolstering our defenses against wildfires fueled by weakened forests. Wherever possible, data-driven forest management practices are also effective tools to aid local communities in reducing the risk of wildfires under continued climate change.

The National Climate Assessment outlines a number of specific threats to ecosystems, ecosystem services, and biodiversity in Chapter 7 (<https://nca2018.globalchange.gov/chapter/7>) for your further review. The health of our nation's ecosystems is inextricably tied to human welfare in the following areas, especially through freshwater quality and availability, and economic and cultural dependence on specific species. When we fail to deploy data-driven defenses to protect ecosystems, we are putting American health, welfare, and prosperity at risk by reducing our capacity to adapt as a society to continued climate change. At the same time, we would be forsaking the important role that our ecological systems are playing in sequestering carbon—a critical climate service.

Continued expansion of fossil fuel extraction across our nation's public lands represents a serious risk to current and future generations of Americans, who will face a warmer world characterized by increasingly severe climate change impacts. Increased fossil fuel production drives increased consumption, increasing emissions during a time when we must move aggressively to stem the most dangerous impacts of climate change. The National Climate Assessment details the dozens of specific risks that are now detectable across every community in America, and highlights the compounding risk of unmitigated climate change for every year that we fail to curb our emissions growth. The data could not be more clear. The many benefits of early action could not be more clear. Instead of using our precious public lands to compound the climate change problem, we should be using these precious national resources in the design of data-driven strategies to protect communities from climate change, assist key species in their efforts to adapt to climate change, expand our portfolio of low-carbon energy, and enhance our nation's natural carbon sinks.

The CHAIRMAN. Ms. DiPerna?

**STATEMENT OF PAULA DiPERNA, SPECIAL ADVISOR, CDP
NORTH AMERICA, NEW YORK, NEW YORK**

Ms. DiPERNA. Thank you for the opportunity to testify here today. And no doubt disclosure information on our CDP platform touches all the states represented on the Committee, and I thank you for your service to the Nation.

CDP North America, formerly known as the Carbon Disclosure Project, is a non-profit that operates for the public good. Today, roughly 500 companies in the United States, including 70 percent of the S&P 500, disclosed to us and through us their quantitative and qualitative information about their environmental performance, and the imperatives they perceive.

Our standardized annual information request is signed off on by roughly 500 investor enterprises, represent over \$94 trillion in cumulative assets and most of the financial service sector of the world. Our signatories use disclosure as a gauge on corporate strategic advantages and vulnerabilities, and a reference for making investment decisions.

If you stroll through our data, you would find there more than 15 years of evidence of the doability, desirability, and necessity of reducing greenhouse gas emissions to address climate change

expressed voluntarily by companies themselves, many of whose shareholders are public pension funds, and thus relevant to much of the American people.

As for me, you have my full resume. But suffice it to say here that I have seen the climate change issue from 360 degrees, from coral reefs to carbon markets, literally, working closely with both economist Richard Sandor to help him design the world's first integrated cap and trade, the pioneering Chicago Climate Exchange, and with oceans explorer Jacques-Yves Cousteau, seeing the first President Bush twice at the Oval Office to discuss climate change.

President Bush signed the United States to the landmark United Nations Framework Convention on Climate Change, to which the United States remains a signatory, even if the United States has pulled out of the Paris Agreement. And we now stand alone among nations outside the global consensus, and also likely missing out on opportunities to use coherent policy, state and local and Federal, to maximize jobs creation and future-proof our crumbling infrastructure.

Sometimes it is said that American companies are concerned that strong policies will hurt business. On the contrary, companies are quite concerned about climate change itself. And following I will share with you a few examples from almost all of your districts and states—probably all—and refer you to my written testimony and other materials of CDP for further details.

In Arizona and Colorado, for example, Arizona Public Services, 6,300 new employees serving 1.2 million customers, has said, "Risks associated with forest fires are not new. But scientists have indicated that as the global temperatures increase, there is a greater risk of drought and a correlated increase in risk and intensity of forest fires. Potential threat is very real."

Of course, we have heard very much today about the burning in California. It is not only the trees. The downgrade of most of the utilities in California directly affects American people. The credit rating downgrade is very, very significant, rating companies from stable to negative by Moody's and S&P and Fitch's.

In Connecticut, Stanley Black and Decker, an employer of nearly 60,000 Americans, has stated, "Climate change can have potentially devastating impacts on our supply chain, should drought or flood occur."

In Ohio, American Electric Power, which has 17,500 employees and 5 million customers across 11 states, including Texas, Louisiana, Kentucky, and West Virginia, in their SEC filing has said, "Climate change risk is considered a major and material issue for AEP."

And on the issue of regulatory uncertainty, AEP is on the record as saying, "Additionally, in recent years legal challenges to almost every major EPA rulemaking have added additional uncertainty and cost. While environmental regulations mentioned will have a large impact on our operations, the uncertainty regarding climate change regulation or legislation is a more challenging risk to manage."

In Texas, companies such as Chevron, Dupont, and Total have described risks in their disclosure pertinent to the need for storm barrier protection for oil facilities.

Florida, Harris Corporation, with close to 17,000 employees, is worried that their data centers will be affected as temperatures rise and they lose “ambient cooling potential.”

On the supply chain front, Johnson and Johnson, based in New Jersey with 134,000 global employees, is worried about climate change, extreme weather disrupting not only demand for products, but disruptions in manufacturing and distribution networks of vital medicines, and afraid that it will affect the overall design and integrity of our products and operations.

Atlanta, Coca Cola, 90,000 companies, is worried about agricultural products, including sugar cane, corn, and citrus. Coca Cola has said, “The affordability of our products and, ultimately, our business could be negatively impacted.”

In Nevada, even Caesar’s Palace is not immune from climate change. Its parent has said they are virtually certain to see short-term increase in cost, due to a shortage of precipitation.

Even before the Paris Agreement, we were getting risks on supply chain. And if it wasn’t from soup to nuts, it is soup to tomatoes. For example, Campbell’s Soup cited water risks and climate change as very significant and of concern. And ConAgra has said, “they have seen delayed tomato harvesting due to unseasonably cool weather.”

Dr. Pepper, of course, is worried about water. It is one of their main ingredients, and has said, “A portion of our cost of sales, or \$2.5 billion, could be at risk through increased costs to our supply chain.”

I could go on and on. I will not. I know my time is up, and I will be happy to answer any questions.

Thank you again.

[The prepared statement of Ms. DiPerna follows:]

PREPARED STATEMENT OF PAULA DIPERNA, SPECIAL ADVISOR, CDP NORTH AMERICA

Thank you for the opportunity to testify here today on climate change and the recognition of its economic importance among businesses, investors, and consumers—all, of course, constituents. No doubt the CDP Platform has a touch point with all the states represented here on the Committee and I thank you for your service to the Nation.

A word about CDP: CDP-North America, formerly known as the Carbon Disclosure Project, is a non-profit organization that operates for the public good. Today, roughly 500 companies in the United States disclose to us and through us quantitative and qualitative information about their environmental performance and imperatives they perceive. Our annual request for this information is standardized and signed by roughly 550 institutional investors, asset owners and asset managers, our signatories, who represent over \$94 trillion in cumulative assets, and most of the financial services sector of the world. They use our disclosure as a reference on corporate environmental performance, strategic advantages and vulnerabilities, and a gauge for making investment decisions.

The CDP disclosure platform also provides companies with information needed to benchmark to their peers, and we make this information available to the general public.

If you took a stroll through our data, in sum, you would find more than 15 years of evidence of the do-ability, desirability and necessity of addressing climate change, expressed by companies themselves, as well as evolving corporate, investor and consumer attitudes on the topic.

In short, we are the “go to” platform for companies to disclose how climate change is affecting their businesses. And what affects business affects average Americans

directly—floods, power outages and disrupted supply chains means people can't get to work—who pays them for that time missed? Climate change is, in sum, a here and now issue that will hurt the poor and disenfranchised most of all.

A word about me: My resume is part of my written testimony but suffice it to say here that I have seen the climate change issue from 360 degrees, from coral reefs to carbon markets, literally, having helped spearhead, with renowned economist Richard Sandor, the world's first integrated cap-and-trade system, the pioneering Chicago Climate Exchange, also known globally as CCX; as well as with oceans pioneer Jacques-Yves Cousteau to visit the first President Bush in the Oval Office and his Cabinet to discuss these issues, resulting in the United States signing the landmark Framework Convention on Climate Change, to which the United States remains a signatory even if the United States has pulled out of the Paris Agreement. This withdrawal has left the United States the only nation on Earth to stand outside the circle of consensus that climate change must be addressed, not only because of the risks it poses, but the extraordinary opportunities that addressing it represents as we redesign, retool, rebuild and refit almost all our critical infrastructure, generating jobs and helping the United States regain dominance of 21st century technological innovation and manufacturing. For example, in Maryland, Lockheed Martin Corporation, which has more than 590 facilities in 50 U.S. states and employs approximately 100,000 people worldwide, in our disclosure identified the use of lower-emission energy sources as a \$21 billion opportunity.

The International Labour Organization (ILO) forecasts that "24 million new posts will be created globally by 2030," with the caveat that, "the right policies to promote a greener economy must also be in place for this to happen, along with better social safety nets for workers.

Sometimes it is said that American companies are worried about regulation on climate change hurting business. On the contrary, companies are quite concerned about climate change itself, and what they do need, above all is the certainty level playing field established by public policy, especially as all the other nations in the world enact rules that could hamper the ability of a U.S. company to compete as they struggle to smooth out uneven legal and operational requirements across global operations.

I will share with you here a few examples of what key companies are doing or have disclosed about risks they face, and climate change related losses and costs they have incurred already. I refer you to my written testimony and CDP itself for further details and examples.

In Arizona and the Colorado River Basin, Arizona Pinnacle West Capital Corporation, which owns Arizona Public Services, with ~6,300 employees and serving 1.2 million customers, identified catastrophic fires as an enterprise top risk in 2017–2018, with a potential financial risk of over \$50 million. The company said "Risks associated with forest fires are not new, but scientists have indicated that as the global temperatures increase, there is a greater risk of drought and a correlated increase in risk and intensity of forest fires," they state. "Forest fires could threaten not only communities that APS serves, but also our vast network (35,000+ miles) of electric transmission lines and facilities . . . The potential threat is very real."

In Connecticut: Stanley Black and Decker, employer of nearly 60,000 Americans, stated, "Climate change can have potentially devastating impacts on our supply chain should drought or flood occur." It estimated a potential loss of \$118 million associated with supply chain disruption of primary materials and minerals used in their products from droughts in Chile and droughts and floods in Western Australia alone. SBD lists suppliers in USA, Israel, Brazil and Mexico as being potentially affected by drought.

In Ohio, American Electric Power Company, responsible for employing 17,500 people, and serving 5 million customers across 11 states, including Texas, West Virginia, Louisiana, and Kentucky, has disclosed:

"Climate change risk is considered a major and material issue for AEP," adding "AEP has invested to ensure its system is reliable and resilient over more than a century. However, as the generation fleet transitions to lower carbon and intermittent resources and other infrastructure ages, additional capital investment is needed for resiliency. Additionally, public discourse about climate-related weather events has also prompted public interest in resiliency investment." And in 2017, about regulatory uncertainty, AEP said, "Additionally, in recent years, legal challenges to almost every major EPA rulemaking have added additional uncertainty and cost. This uncertainty can lead to uneconomic decisions being made during the planning process as the ultimate goals are subject to change. These uneconomic decisions will lead to increased capital and operating costs. While general

environmental regulations mentioned above will have a large impact on AEP operations, the uncertainty regarding climate regulation or legislation is a more challenging risk to manage.”

In Texas, companies such as Chevron, Dupont, and Total described risks in their CDP disclosure pertinent to the need for storm barrier protection for oil facilities.

In Florida, Jacksonville-based Harris Corporation, with close to 17,000 employees, identifies increased severity of extreme weather events such as storms, cyclones and floods risks as a current and direct risk to its operations. Their disclosure states, “For data centers, reduction in operational efficiency and increased component failure rates as increases in average temperatures and associated humidity will affect baseline design parameters. For example, the loss of ambient cooling potential. Changes in humidity may also lead to changes in patterns and rates of equipment corrosion. Higher humidity levels may also lead to new requirements to maintain internal environments within system tolerance ranges, as excess condensation can cause short-circuiting or water ingress.” Harris also said it will, “expand the scope of events we consider in our planning to include more frequent and unusually disruptive storms in these locations, as well as the impacts of increased/more severe winter storms on our operations in the Midwest and Northeast.”

Also of general interest, in 2017, 96 companies disclosing to CDP disclosed that they have set an internal carbon price, indicating that they accept and understand that greenhouse gas emissions carry a hidden cost to their business which they seek to make visible using a projected surrogate cost, an internal carbon price. 245 companies have stated they would disclose their internal carbon pricing by 2019. And many companies using this internal mechanism indicate they do so because they wish to be better prepared for eventual regulation and/or are operating in a jurisdiction where they already face mandatory requirements, such as in the EU or in China.

Among the companies using an internal carbon is Oklahoma Gas and Electric, which employs 2,500 people and serves more than 800,000 electricity customers. Citing opportunities ahead, OG&E also disclosed that it “has leveraged its advantageous geographic position to develop renewable energy resources and completed transmission investments to deliver the renewable energy. The Southwest Power Pool (SPP) has begun to consider and authorize the construction of transmission lines capable of bringing renewable energy out of the wind resource area in western Oklahoma, the Texas Panhandle and western Kansas to load centers by planning for more transmission to be built in these areas.”

In fact, given the links between drought and water availability, and anticipated scarcities in predictable water supply, 88 companies have also begun using internal water prices to better gauge rising costs and risk.

Also, of general interest, far from denying the science of climate change, companies are bending over backward to establish reduction targets that are in line with the demand of climate change science on the scope and rate of emissions reductions, known as Science Based Targets or SBTIs. As of the end of 2018, 150 disclosing companies disclosed they had or were in the process of setting SBTs, as compared to 128 companies in 2017 and 88 in 2016.

With regard to disruption of supply chains due to extreme and unpredictable weather, some may question whether there is a direct link between changing climate and the increases in extreme or unpredictable weather we have been experiencing of late, but the preponderance of scientific evidence establishes a strong likelihood. Some examples of what companies anticipate follow:

Johnson and Johnson, headquartered in New Jersey and employing 134,000 people, states “changes to global climate, extreme weather and natural disasters could affect demand for our products and services, cause disruptions in manufacturing and distribution networks, alter the availability of goods and services within the supply chain, and affect the overall design and integrity of our products and operations.”

Michigan based GM, employing 180,000 people, has an “active” crisis center that “watches the weather 24/7” and begins contacting suppliers when extreme weather events are forecasted, the system was partly developed in reaction to the Tohoku earthquake and the Thai floods in 2011. “People felt pretty good because none of our production or manufacturing facilities were in the way,” but those events impacted both GM’s direct suppliers and the suppliers of its suppliers.

In Georgia, Atlanta-based Coca-Cola Company employs over 90,000 Americans. Coke and its bottling partners use many key ingredients in the manufacture and packaging of their beverage products. that are derived from agricultural commodities such as sugarcane, corn, sugar beets, citrus, coffee and tea. Coca-Cola has stated, “Increased demand for food products and decreased agricultural productivity

in certain regions of the world as a result of changing weather patterns may limit the availability or increase the cost of such agricultural commodities and could impact the food security of communities around the world . . . the affordability of our products and ultimately our business and results of operations could be negatively impacted.”

In Nevada, even Caesar’s Palace is not immune from climate change impacts. Its parent company, Caesar’s Entertainment in Las Vegas, foresees increased operating costs as “virtually certain” in the short-term due to increasing temperatures and reduced precipitation in areas where water resources are more limited such as the U.S. southwest and their properties in Southern Africa and Egypt. Caesar spends “approximately \$15 million per year on water utilities, a 10 percent increase in water prices due to increasing temperature causing water supply issues would represent a cost increase of up to \$1.5m.” Rising mean average temperature will impact Caesar’s supply chain. “Caesars requires a steady stream of fresh produce and other food sources to stock our restaurants and kitchens. Our supply chain has been impacted by temperature fluctuations that have cause us to source from alternative suppliers. The relative magnitude has thus far been low on our total business operations. However, if enough suppliers face major climate related impacts the future magnitude could be substantial.”

In fact, this very day in Las Vegas, we are conveying a conference on protecting supply chains and other related issues in Las Vegas co-sponsored by Caesar’s, to be attended by concerned large procurement entities as Walmart, Los Angeles Department of Water and Power, Johnson & Johnson and JBS, a \$28 billion meat packaging and distribution company with 78,000 employees or so.

With regard to supply chain disruption, the source of risk is eclectic and widespread, and many U.S. companies have acknowledged this likelihood as credible for some time.

For example, as early as 2014, the year before the Paris Agreement was signed, we issued a report specifically focused on these disruptions and risks cited literally ranged if not from soup to nuts, soup to tomatoes.

For example, Campbell’s Soup cited water risks and climate change for all its products due to threats to agriculture and Con Agra told us literally, “we have experienced weather-related sourcing challenges, such as delayed tomato harvesting due to unseasonably cool weather.”

Gap and the VF Corporation told us that both drought and its opposite, increased precipitation, had reduced cotton production in India and China, and were contributing factors in the rise of global product prices.

Sears, ill-fated, told us as early as 2011 that it faced more than \$14 million in expenses just from repairing and replacing buildings and goods that were the direct or indirect result of extreme weather, as well as another \$8.7 million due to flood damage that year alone.

Dr. Pepper Snapple Group said, “water is the main ingredient in substantially all of our products and climate change may cause water scarcity and a deterioration of water in areas where we maintain operations . . . a portion of our cost of sales, or \$2.5 billion, could be at risk through increased costs to our supply chain.” Concerns about water issues laced through the disclosures of Pepsi Co and other beverage companies as well.

And, after Superstorm Sandy in the New York area, the venerable utility Con Edison reported that the costs of restoration in just two counties, Orange and Rockland, were \$431 million and \$90 million respectively.

Obviously, events such as these affect the lives of people directly in myriad ways we have seen, from blackouts to hospital patients having to be evacuated in their beds to costs passed on to consumers, loss of work days, etc.

As to investors and the capital markets, of substantial recent note, Moody’s, which by its own wording “strives to be the rating agency of choice,” issued just recently in January this year its General Principles for Assessing Environmental, Social and Governance Risks, to better inform its users in this evolving field cited the bankruptcy filing by PG&E, which employs 20,000 people, related to the catastrophic forest fires in California. Moody’s said “. . . From a climate-related time horizon perspective, it could [also] be argued that the effects of climate change crystallized into event risk more rapidly than PG&E expected, adding, “We highlighted this in 2018, when we noted that ‘long term climate change risks like droughts and wildfires are manifesting faster than regulators and legislators can react to protect [PG&E] from exposure.’”

Also just last month, Standard and Poor’s ratings stated, “we lowered our credit rating on Edison International and its subsidiary Southern California Edison . . . and placed all of our ratings on the companies on Creditwatch with negative implications” which “reflects the increased likelihood that Edison will continue to

experience catastrophic wildfires due to climate change.” S&P similarly downgraded San Diego Gas and Electric Company, for the same reasons. Subsequently, Fitch Ratings also revised its rating outlook for Edison International, from stable to negative adding “given the unprecedented size of recent wildfires, future multi-notch downgrades cannot be ruled out.”

These credit ratings changes may seem far from the American people, but in fact they reflect a drain on financial stability and borrowing power of key employers and infrastructure providers, not so much linked to the longer term impact climate change but the here and now impact of related unpredictable and extreme weather events—causing hardship and heartbreak for the ordinary Americans who suffer loss of life and property.

Yet, on the other hand, recognizing that addressing climate change is essential to long term financial value creation, mainstream investors are also recognizing the significant upside of shifting capital to companies that take environmental and social factors into strategic account in their business management. According to the Sustainable Investment Forum of the United States, for example, which tracks relevant data:

“Sustainable, responsible and impact (SRI) investing in the United States continues to expand at a healthy pace. The total U.S.-domiciled assets under management using SRI strategies grew from \$8.7 trillion at the start of 2016 to \$12.0 trillion at the start of 2018, an increase of 38 percent. This represents 26 percent—or 1 in 4 dollars—of the \$46.6 trillion in total U.S. assets under professional management.”

And, in a basic core indication of how integrated low carbon efficiency has become, the S&P 500 carbon efficient index, which overweights carbon efficient companies and underweights carbon intensive companies, is now tracking virtually to a T with the venerable classic S&P500, an alignment that indicates if nothing else that it does not cost mainstream companies or their shareholders, if low carbon intensity and energy efficiency are prioritized. On the contrary.

And as for constituents and consumer preferences, CDP disclosure can also shed light.

Minnesota headquartered Best Buy reported that by promoting ENERGY STAR certified products, Best Buy U.S. helped its customers realize utility bill savings of more than U.S. \$45 million in 2018. ENERGY STAR is a response to the increased demand for low-carbon products.

And Ohio-based American Electric Power Company states: “AEP has increasingly seen customers look to deploy low or no-carbon generation resources as a means of supplanting, replacing, or offsetting electricity provided by AEP. AEP is actively pursuing deploying utility-scale and community scale distributed resources which provide our customers with a more cost-effective solution in utilizing low and no-carbon energy.”

PepsiCo says: “Any negative perception (whether valid or not) of PepsiCo’s response to climate change or water scarcity could result in adverse publicity and could adversely affect PepsiCo’s business, financial condition or results of operations. Changes in consumer preference, for example, due to a negative reaction to PepsiCo’s reputation relative to the environment could adversely affect PepsiCo’s business, for example, a 1-percent impact on PEP’s market value (defined as our market capitalization) would equate to ~\$1.6 billion.”

I could go on and on, but will not. In sum, climate change is present and costly to companies and average Americans, and the United States has made itself more vulnerable, not less. Thank you and I will be glad to answer any questions.

The CHAIRMAN. Thank you very much.
Reverend Yearwood, the floor is yours, sir.

**STATEMENT OF LENNOX YEARWOOD, JR., PRESIDENT AND
CEO, HIP HOP CAUCUS, WASHINGTON, DC**

Rev. YEARWOOD. Thank you to Chairman Grijalva and the entire Committee for having me here today. And thank you to the other panelists for your commitment to solving climate change. I especially love Zero Hour and UPROSE.

My name is Reverend Lennox Yearwood, Jr. I am the President and CEO of the Hip Hop Caucus. And all of you, Republicans and Democrats, are invited to be part of the Hip Hop Caucus—a little joke there to start off the testimony.

[Laughter.]

Rev. YEARWOOD. But let me get right to it. As Americans, we face challenges head on. Climate change is not a Democrat issue or a Republican issue; it is a human issue. This crisis is complex. It impacts all of us and future generations, and those with the least resources are impacted first and worst. But we know how to solve this crisis. We must make a just transition off of fossil fuels to a 100 percent clean, renewable energy economy that works for all.

Many communities, cities and states across our country, are leading the way on climate solutions. I urge every member of this Committee to visit places and people who have gone through climate disasters, and visit communities, projects, and businesses that are implementing clean energy and climate solutions. When you visit these communities, it will become very clear that climate change is a civil and human rights issue.

In 1960, four African-American college students sat at the Woolworth's lunch counter in Greensboro, North Carolina to desegregate the South. They were courageous beyond belief in standing up for equality. Today, young people like Nadia across the table from me and across this country are courageously standing up not only for equality, but for our existence. Climate change is our lunch counter moment for the 21st century.

Young people are organizing, marching, and coalition-building, and they are leading the call for solutions like a Green New Deal. They are doing it because they know that the science on climate change is undeniable. But also because, like all of us here today, they have watched as people have died in Hurricanes Harvey, Maria, Irma, Katrina, and Superstorm Sandy. They have seen the families who have lost everything to fires that have ripped across the West. They have been part of peaceful movements opposing fossil fuel developments led by Lakota people at Standing Rock and the Gwich'in people in the Arctic Refuge.

So, the question is what are you, as members of this Committee, going to do? It is my prayer that you call up at least as much courage as young people standing up around the country, and that you act now, and you act boldly and courageously. If this Committee and bold chambers of Congress don't urgently come together, put the people of this country first, put God first, and put your political party to the side to solve climate change, we don't make it beyond 12 years from now without huge amounts of death, destruction, and suffering.

As an officer in the U.S. Air Force Reserve Chaplain Corps, I had to ponder the unique relationship between military and faith. In the military we need our faith, not only to strengthen us in battle, but we need our faith to guide us to do what is right. We need you to use your faith to guide you to do what is right.

If you are approaching climate change as a partisan, political issue, your faith is leading you astray. We, the American people, need you to have courage to do what is right. It is your courage

that can put our country and the world on the path of solving climate change.

In the words of Dr. Martin Luther King, Jr., “We must learn to live together as brothers or perish together as fools.”

Thank you, and may God be with you and with us all.

[The prepared statement of Rev. Yearwood follows:]

PREPARED STATEMENT OF REV. LENNOX YEARWOOD JR., PRESIDENT & CEO, HIP HOP CAUCUS

Thank you to Chairman Grijalva and the entire Committee for having me here today.

And thank you to the other panelists for your commitment to solving climate change.

My name is Rev. Lennox Yearwood Jr. I am the President and CEO of Hip Hop Caucus.

As Americans we face challenges head on. Climate change is not a Democrat issue or a Republican issue. It is a human issue, and therefore, we must look to God and our faith to guide us.

This crisis is complex. It impacts all of us and future generations, and it's those with the least resources that are and will continue to be impacted first and worst.

But we know how to solve this crisis. We must transition off of fossil fuels to a just 100 percent clean energy economy that works for all.

Many communities, cities, and states across our country are leading the way on climate solutions. I urge every member of this Committee, if you have not yet, to visit places and people who have gone through climate disasters, and to visit communities, projects, and businesses that are implementing clean energy and climate solutions.

The fossil fuel industry receives billions of dollars of taxpayer subsidies. You are subsidizing an industry that is killing Americans with their pollution and climate disasters. Further, the Trump administration's attacks on basic public health and environmental safeguards mean even more death sentences, particularly for the poor. Clean air, clean water, and solving climate change are inextricably linked.

In 1960 four college students sat at the Woolworth's lunch counter in Greensboro, North Carolina to desegregate the south. They were courageous beyond belief in standing up for equality.

Climate Change is our lunch counter moment for the 21st century.

Today, like those brave students, young people across this country are courageously standing up not only for equality, but for our existence. Young people are organizing, marching, and coalition building, and they are calling for a Green New Deal.

And they are doing it because they know that the science on climate change is undeniable. But also because, like all of us here today, they have watched as people died in Hurricanes Harvey, Maria, Irma, Katrina, and in Superstorm Sandy. They have seen the families who have lost everything to fires that have ripped across the West. They have been a part of the peaceful movements opposing fossil fuel developments led by the Lakota people at Standing Rock and the Gwich'in people in the Arctic Refuge.

The question is, what are you, as members of this Committee, going to do? It is my prayer that you call-up at least as much courage as the young people standing up around the country, and that you act, you act now, and you act boldly and courageously.

We do not make it beyond 12 years from now without huge amounts of death, destruction, and suffering, if this Committee, and both chambers of Congress don't urgently come together, putting the people of this country first, putting God first, and putting your political party to the side, to solve climate change.

As an officer in the U.S. Air Force Reserve Chaplain Corps, I had to ponder the unique relationship between military and faith. What I realized is that in the military we need our faith not only to strengthen us in battle, but we need our faith to guide us to always do what is right.

We need you to use your faith to guide you to do what is right. If you are approaching climate change as a partisan, political issue, your faith is leading you astray. We, the American people, need you to have the courage to do what is right. It is your courage that can put our country and the world on the path to solving climate change.

May God be with you. Thank you and God bless.

The CHAIRMAN. Thank you.
Mr. Hollie, the floor is yours, sir.

**STATEMENT OF DERRICK HOLLIE, PRESIDENT, REACHING
AMERICA, BENNSVILLE, MARYLAND**

Mr. HOLLIE. Greetings, Chairman and members of the Committee. Thank you for the opportunity to speak. My name is Derrick Hollie, President of Reaching America, an organization I developed to address complex social issues that are impacting the African-American community.

We are focused on solutions not based on right- or left-wing views, but what makes sense for a more united America. One of the issues that we do the most work on is addressing and reducing energy poverty.

What is energy poverty? Energy poverty exists when low-income families or individuals spend upwards of 30 percent of their total income on their electric bill. And when that happens, it puts people in tough situations and having to make tough choices, like do I eat today, or do I pay the electric bill? Do I get this prescription filled, or do I fill up my gas tank? I can't even give the kids a couple of dollars today because I have to pay the electric bill.

And for many Americans, particularly in the minority community, we face these challenges every single day. And the African-American community, we don't have the luxury to pay more for green technologies. We need access to affordable energy to help heat our homes, power our stoves, and get back and forth to work.

And through Reaching America, I have had the opportunity to reach and talk to thousands of African-Americans who all talk about one thing: the question of rising costs of energy, along with the fees and subsidies that they have to pay that they don't benefit from, and how they struggle to keep up with it.

My passion for energy is deeply rooted. When I first graduated from college, I worked for Norfolk Southern Railroad as a brakeman. And I can couple the cars, I could switch the tracks, I knew how to tighten up the brakes and everything. I worked at Lamberts Point in Norfolk, Virginia. Our job and responsibility was loading coal ships that transported coal all around the world. So, I have always asked myself the question. If our natural resources are good enough for other countries, then why is it not good enough for us right here at home?

And in addition to that, my grandfather was a black coal miner in southwest Virginia. So, it is safe to say if it wasn't for the energy industry, I wouldn't be here to talk to you all today.

When the government creates policies, its first priority should be the welfare of the people, especially those impacted the hardest, rather than big business and special interest groups looking for a handout.

I am also a member of Project 21, a national black leadership organization. And in our blueprint for A Better Deal for Black America, we focus on 10 key areas for reform, including minority impact assessments for new regulations. This would be a major step toward increasing economic opportunities and having input from governors and community leaders, much the same way that

qualified opportunity zones were developed and will create a level of trust in communities that never existed before.

After all, the government requires environmental impact studies and statements to estimate the effects of projects like roads and buildings on nature. Shouldn't the government act similarly when it comes to how regulations impact the population, or a particular market segment?

A minority impact assessment would create a list of all positive, all negative impacts a proposed regulation would have, and the factors including employment, wages, consumer prices, home ownership, job creation, et cetera. The regulatory impact would then be analyzed for its effect on minorities, in contrast to the general population.

The bottom line: any policy that contributes to energy poverty is a bad one for low income and minority communities.

Fortunately, our Nation has an abundant supply of natural gas that is the solution to our Nation's energy questions.

Recent polar vortex temperatures last week dropped so low in some areas that windmills couldn't even turn. We have to have a Plan B. Natural gas is clean. The U.S. Energy Information Administration reports that almost two-thirds of the CO₂ emissions from 2006 through 2014 came from the fuel shifting toward natural gas.

Natural gas is reliable. It is efficient. And it meets the needs of our Nation's grid. And natural gas is also affordable. And for many Americans, this allows them not to have to choose to keep the lights on or feed their families.

In closing, I am all for protecting the environment. I am a licensed captain, had the opportunity to take my boat to Florida and back, and the coastal waterways are beautiful. So, I am all for the environment. However, until we figure out a way to harness the sun and the wind to sustain ourselves, we need to use what we have, especially if it could lower energy costs, create jobs, and boost the economy.

That is my time. Thank you.

[The prepared statement of Mr. Hollie follows:]

PREPARED STATEMENT OF DERRICK HOLLIE, PRESIDENT, REACHING AMERICA

Greetings Chairman Grijalva, Ranking Member Bishop and members of the Committee. Thank you for this opportunity to speak.

I'm Derrick Hollie, president of Reaching America, an education and policy organization I developed to address complex social issues impacting African American communities.

We're focused on solutions not based on right- or left-wing views but what makes sense for a more united America.

One of the issues Reaching America does the most work on is reducing energy poverty across the board.

Energy Poverty exists when low income families or individuals spend up to 30 percent of their total income on their electric bill. And when this happens, people have to make tough choices like, do I eat today or pay the electric bill? Do I get this prescription filled or fill up my car with gas? We all know someone who faces these choices every month.

For members of the African American community, Energy Poverty is a reality. Members of our community don't have the luxury to pay more for green technologies. We need access to affordable energy to help heat our homes, power our stoves and get back and forth to work each day.

Through Reaching America I've had the opportunity to speak with thousands of African Americans in several states who question the rising cost of energy along with fees and subsidies they don't benefit from and how they struggle to keep up.

My passion for energy is deeply rooted, after graduating from college I worked as brakeman for Norfolk Southern Railways at Lambert's Point in Norfolk, Virginia. Our job and responsibilities was loading coal ships that transported coal all around the world and I constantly ask the question, "If our coal and natural resources are good enough for other countries—why is not good enough for us here at home. My grandfather was also a black coal miner in southwest Virginia. It's safe to say if it weren't for the energy industry, I wouldn't be here to speak with all of you today.

When the government creates policy, its first priority should be the welfare of the people, especially those impacted the hardest, rather than big businesses and special interests looking for a handout.

I'm also a member of Project 21, a National Black Leadership Organization. In our Blueprint for A Better Deal for Black America we focus on 10 key areas for reform including "Minority Impact Assessments" for new regulations. This would be a major step toward increasing economic opportunities. And having input from governors and community leaders the same way "Qualified Opportunity Zones" were created will establish a level of trust in communities that never existed before.

After all, the government requires environmental impact statements to estimate the effects of projects like roads and buildings on nature. Shouldn't the government act similarly when it comes to how regulations impact the population?

A minority impact assessment would create a list of all the positive and negative impacts a proposed regulation would have on factors including employment, wages, consumer prices and homeownership. This regulatory impact would then be analyzed for its effect on minorities in contrast to the general population.

The bottom line: any policy that contributes to energy poverty is a bad one for low income families and minority communities.

Fortunately, our Nation has an abundant supply of natural gas that is a solution to our Nation's energy questions. Recent polar vortex temperatures dropped so low in some areas that windmills couldn't turn. We need a plan B.

Natural gas is clean. The U.S. Energy Information Administration reports that almost two-thirds of the CO₂ emission reductions from 2006–2014 came from the fuel shifting toward natural gas.

Natural gas is also reliable. Natural gas generation efficiently meets the needs of our Nation's energy grid.

And natural gas is affordable. For many Americans, this allows them to not have to choose whether to keep the lights on or feed their families.

In closing, I'm all for protecting the environment and clean energy however until we have figure out a way to harness the sun, wind and water to sustain ourselves, we need to use what we have especially if it can lower energy cost, create jobs and boost the economy.

QUESTIONS SUBMITTED FOR THE RECORD BY REP. HICE TO MR. DERRICK HOLLIE,
PRESIDENT, REACHING AMERICA

Question 1. Mr. Hollie, I represent the 10th District of Georgia, much of which is extremely rural. Now when I say "rural" different people get different things in their heads, so let me explain. When I say "rural" that means that in some parts of my district my constituents have to park at the Chick-fil-A to let the kids sit in the car to get WiFi to do their homework. When I say "rural" that means in other parts of my district my constituents have to drive to an entirely different county to get to a grocery store.

So, I was struck by a remark you made in your testimony that, "When the government creates policy, its first priority should be the welfare of the people, especially those impacted the hardest . . ."

You would agree then that if policies like the Green New Deal encourage energy poverty for rural, low income, and minority communities that we need to immediately hit the pause button on those ideas? And why would that be a prudent step?

Answer. That's the essence of the Minority Impact Assessment. Before a regulation is enacted, it should go through a process to see how it might specifically impact certain populations. Before a Green New Deal proposal to phase out the combustion engine in favor of electric vehicles is enacted, for example, it should be seen if this is feasible for specific communities. Can people in GA 10 afford a Tesla? What costs will come to the district to put electric car charging stations "everywhere" as prescribed by the Green New Deal FAQ? Can an electric car do the things that

people in GA 10 need a vehicle to do (i.e. rural jobs)? The Minority Impact Assessment acts as a “cooling saucer” to prevent regulations from imposing unrealistic expectations on specific people and communities.

Question 2. One of the main reasons many of our founders supported federalism was because it provided for “laboratories of experimentation”¹ and regulatory diversity. What works best for some parts of the country does not necessarily work best for other areas. In my home state, we have almost completed two of the first nuclear reactors to be built in roughly 50 years at Plant Vogtle.

Georgia has also been a leader in other clean energy sources like solar and hydro energy production. Plant Vogtle works hand in glove with other clean energy technologies. And nuclear will continue to provide cheap, clean energy when the sun is not shining or to refill the reservoir overnight at clean pumped-storage hydroelectric plants like our Rocky Mountain facility.

But the Green New Deal would ban nuclear energy—which would effectively harm rural and low-income communities in my district and state. Mr. Hollie, how might your proposed Minority Impact Assessment prevent laws or regulations from banning affordable energy solutions for these communities?

Answer. The Minority Impact Assessment would look at proposed regulation to ensure that it does not have a disparate impact on minority communities by affecting factors such as income, home prices, access to jobs and quality of life issues. Losing affordable, reliable and efficient power for a source that increases energy costs and breeds energy poverty does not make sense. The Minority Impact Assessment will identify these disparities—if Congress acts to instate Minority Impact Assessment requirements.

Question 3. Mr. Hollie, one last question for you. The Green New Deal would ban most private cars to be replaced with “high-quality and modern mass transit.” Mr. Hollie, if you lived in a county that didn’t even have a grocery store and you needed your personal transportation to get food for your family, does it sound like the Green New Deal is a policy designed to help rural, low income, and minority communities, or a policy designed for the milieu—the wealthy and cultural elite?

Answer. I can’t image using public transit to do the grocery shopping for my family in the bustling suburbs of Washington, DC area much less rural Georgia. For many people, a car or truck is freedom. Freedom to pursue the employment best for them. Freedom to associate with family, friends and like-minded people. Freedom to shop next door, across town or across county or state lines. There is also a potential limitation on freedom that comes with relying on a government entity to take you from point A to point B. Too often policy is presented that does not represent what’s best for the people who are impact the hardest. The Green New Deal calls for environmental impact studies and I would highly urge Congress to also include Minority Impact Assessments.

The CHAIRMAN. Thank you very much.
Dr. Curry.

**STATEMENT OF JUDITH A. CURRY, PRESIDENT, CLIMATE
FORECAST APPLICATIONS NETWORK, RENO, NEVADA**

Dr. CURRY. I thank the Chairman, the Ranking Member, and the Committee for the opportunity to offer testimony today.

I am concerned that both the climate change problem and its solution have been vastly over-simplified. This over-simplification has led to politicized scientific debates and policy gridlock. My testimony is presented today in the spirit of acknowledging the complexity of the problem, and proposing pragmatic ideas that can break the gridlock.

Climate scientists have made a forceful argument for a future threat from climate change. Man-made climate change is a theory

¹New State Ice Co. v. Liebmann, SCOTUS, 1932.

whose basic mechanism is well understood, but the potential magnitude is highly uncertain.

If climate change were a simple, tame problem, everyone would agree on the solution. Because of the complexities of the climate system and its societal impacts, solutions may have surprising unintended consequences that generate new vulnerabilities. In short, the cure could be worse than the disease. Given these complexities, there is plenty of scope for reasonable and intelligent people to disagree.

Based on current assessments of the science, man-made climate change is not an existential threat on the timescale of the 21st century, even in its most alarming incarnation. However, the perception of a near-term apocalypse and alignment with a range of other social objectives has narrowed the policy options that we are willing to consider.

In evaluating the urgency of emissions reductions, we need to be realistic about what this will actually accomplish. Global CO₂ concentrations will not be reduced if emissions in China and India continue to increase. If we believe the climate models, any changes in extreme weather events would not be evident until late in the 21st century. And the greatest impacts will be felt in the 22nd century and beyond.

People prefer clean over dirty energy, provided that the energy source is reliable, secure, and economical. However, it is misguided to assume that current wind and solar technologies are adequate for powering an advanced economy. The recent record-breaking cold outbreak in the Midwest is a stark reminder of the challenges of providing a reliable power supply in the face of extreme weather events.

With regards to energy policy and its role in reducing emissions, there are currently two options in play. Option Number 1: do nothing, continue with the status quo. Or, Option Number 2: rapidly deploy wind and solar power plants with the goal of eliminating fossil fuels in one to two decades.

Apart from the gridlock engendered by considering only these two options, in my opinion, neither gets us where we want to go. A third option is to re-imagine the 21st century electric power systems with new technologies that improve energy security, reliability, and cost, while at the same time minimizing environmental impacts.

However, this strategy requires substantial research development and experimentation. Acting urgently on emissions reduction by deploying 20th century technologies could turn out to be the enemy of a better long-term solution.

Since reducing emissions is not expected to change the climate in a meaningful way until late in the 21st century, adaptation strategies are receiving increasing attention. The extreme damages from recent hurricanes, plus the billion-dollar losses from floods, droughts, and wildfires emphasize the vulnerability of the United States to extreme events. But it is easy to forget that U.S. extreme weather events were actually worse in the 1930s and 1950s.

Regions that find solutions to current impacts of extreme weather and climate events will be better prepared to cope with

any additional stresses from climate change, and to address near-term social justice objectives.

The industry leaders that I engage with seem hungry for a bipartisan, pragmatic approach to climate policy. I see a window of opportunity to change the framework for how we approach this. Bipartisan support seems feasible for pragmatic efforts to accelerate energy innovation, build resilience to extreme weather events, pursue no-regrets pollution reduction measures, and better land use practices.

Each of these efforts has justifications independent of their benefits for climate change. These efforts provide the basis of a climate policy that addresses both near term economic and social justice concerns, and also the longer term goals of mitigation.

This ends my testimony. Thank you.

[The prepared statement of Dr. Curry follows:]

PREPARED STATEMENT OF JUDITH A. CURRY, PRESIDENT, CLIMATE FORECAST APPLICATIONS NETWORK

I thank the Chairman, Ranking Member and the Committee for the opportunity to offer testimony today on 'Climate Change: The Impacts and the Need to Act.' I am President of Climate Forecast Applications Network (CFAN) and Professor Emerita and former Chair of the School of Earth and Atmospheric Sciences at the Georgia Institute of Technology. I have devoted four decades to conducting research on a variety of topics related to weather and climate.

By engaging with decision makers in both the private and public sectors on issues related to weather and climate, I have learned about the complexity of different decisions that depend, at least in part, on weather and climate information. I have learned the importance of careful determination and conveyance of the uncertainty associated with our scientific understanding and particularly for predictions. I have found that the worst outcome for decision makers is a scientific conclusion or forecast issued with a high level of confidence that turns out to be wrong.

I am increasingly concerned that both the climate change problem and its solution have been vastly oversimplified.¹ For the past decade, I have been promoting dialogue across the full spectrum of understanding and opinion on the climate debate through my blog Climate Etc. (judithcurry.com). I have learned about the complex reasons that intelligent, educated and well-informed people disagree on the subject of climate change, as well as tactics used by both sides to try to gain a political advantage in the debate.

With this perspective, my testimony focuses on the following issues of central relevance to climate change, its impacts and need to act:

- The climate knowledge gap
- The climate change response challenge
- The urgency (?) of CO₂ emissions reductions
- Resilience, anti-fragility and thriving
- Moving forward with pragmatic climate change policies

THE CLIMATE KNOWLEDGE GAP

Climate scientists have made a forceful argument for a future threat from man-made climate change. Man-made climate change is a theory in which the basic mechanism is well understood, but the potential magnitude is highly uncertain. Scientists agree that surface temperatures have increased overall since 1880, humans are adding carbon dioxide to the atmosphere, and carbon dioxide and other greenhouse gases have a warming effect on the planet.

However, there is considerable disagreement about the most consequential issues: whether the recent warming has been dominated by human causes versus natural variability, how much the planet will warm in the 21st century, whether warming

¹ Curry, JA and Webster PJ, 2011: Climate science and the uncertainty monster. *Bull. Amer. Meteorol. Soc.*, 92, 1667–1682. <http://journals.ametsoc.org/doi/pdf/10.1175/2011BAMS3139.1>.

is ‘dangerous’, and whether radically reducing carbon dioxide (CO₂) emissions will improve the climate and human well-being in the 21st century.

The scientific conflict regarding the theory of man-made climate change is over the level of our ignorance regarding what is unknown about natural climate variability. Why do climate scientists disagree on the relative importance of natural versus man-made climate change? The historical data is sparse and inadequate. There is disagreement about the value of different classes of evidence, notably the value of global climate model simulations and paleoclimate reconstructions from geologic data. There is disagreement about the appropriate logical framework for linking and assessing the evidence in this complex problem.² Further, politicization of the science and the consensus building process itself can be a source of bias.

Apart from these broad sources of disagreement, there are two sources of misconception and uncertainty that are of particular relevance to climate policy making:

- Projections of 21st century climate change
- Linking extreme weather events to man-made climate change

With regards to projections of 21st century climate change, Sections 11.3.1.1 and 12.2.3 of the Intergovernmental Panel on Climate Change (IPCC) 5th Assessment Report (AR5) describe uncertainties in the climate model-based projections. Climate models consistently indicate that the mean global temperature of the planet will rise with increasing CO₂ emissions. However, these models show systematic errors in the simulated global mean temperature that are similar in magnitude to the size of the historical change we are seeking to understand.³ The *likely*⁴ range of estimates of the sensitivity of global warming to doubling of CO₂ as reported by the IPCC AR5 varies by a factor of 3, from 1.5 to 4.5°C.⁵ Apart from uncertainties in climate model projections that focus primarily on the impact of increases in greenhouse gases, we do not have sufficient understanding to project future solar variations, future volcanic eruptions, and decadal to century variations in ocean circulations. Finally, existing climate models are unable to simulate realistically possible extreme outcomes, such as abrupt climate change or a rapid disintegration of the West Antarctic Ice Sheet. Hence global climate models provide little relevant information regarding very unlikely but potentially catastrophic impacts—whether caused by man-made climate forcing or natural processes or some combination.

Among the greatest concerns about climate change are its impacts on extreme events such floods, droughts, heat waves, wildfires and hurricanes. However, there is little evidence that the recent warming has worsened such events. The IPCC *Special Report on Extreme Events*⁶ acknowledges that there is not yet evidence of changes in the global frequency or intensity of hurricanes, droughts, floods or wildfires. The recent Climate Science Special Report from the Fourth National Climate Assessment (NCA4)⁷ reported the following conclusions about extreme events and climate change:

- “Recent droughts and associated heat waves have reached record intensity in some regions of the United States; however, the Dust Bowl era of the 1930s remains the benchmark drought and extreme heat event in the historical record.” [Ch. 6]
- “Detectable changes in some classes of flood frequency have occurred in parts of the United States and are a mix of increases and decreases. Extreme precipitation is observed to have generally increased. However, formal attribution approaches have not established a significant connection of increased riverine flooding to human-induced climate change.” [Ch. 8]
- “State-level fire data over the 20th century indicates that area burned in the western United States decreased from 1916 to about 1940, was at low levels until the 1970s, then increased into the more recent period.” [Ch. 8]
- “[T]here is still low confidence that any reported long-term increases in [hurricane] activity are robust, after accounting for past changes in observing capabilities” [Ch 9]

² Curry, JA, (2011). Reasoning about climate uncertainty, <https://link.springer.com/article/10.1007/s10584-011-0180-z>.

³ Mauritsen et al., (2012). Tuning the climate of a global model, <https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2012MS000154>.

⁴ >66% probability.

⁵ IPCC AR5 WG1 Report, <https://www.ipcc.ch/report/ar5/wg1/>.

⁶ IPCC Special Report on Extreme Events, <http://www.ipcc.ch/report/srex/>.

⁷ 4th National Climate Assessment, Vol 1, <https://www.globalchange.gov/nca4>.

With regards to the perception (and damage statistics) that severe weather events seem more frequent and more severe over the past decade, there are several factors in play. The first is the increasing vulnerability and exposure associated with increasing concentration of wealth in coastal and other disaster-prone regions. The second factor is natural climate variability. Many extreme weather events have documented relationships with natural climate variability; in the United States, extreme weather events (e.g. droughts, heat waves and hurricanes) were significantly worse in the 1930s and 1950s.⁸

While climate models predict changes in extreme weather events with future warming, the time of emergence of any man-made signal relative to the large natural variability in extreme weather events is not expected to be evident until late in the 21st century, even for the most aggressive scenarios of future warming.

When considering the predictions of additional climate change impacts in the NCA4, pay attention to the confidence level ascribed to their conclusions. The NCA4 defines the confidence levels as follows:

- “Low: Inconclusive evidence (limited sources extrapolations, inconsistent findings, poor documentation and/or methods not tested, etc.), disagreement or lack of opinions among experts.”
- “Medium: Suggestive evidence (a few sources, limited consistency, models incomplete, methods emerging, etc.), competing schools of thought.”
- “High: Moderate evidence (several sources, some consistency, methods vary and/or documentation limited, etc.), medium consensus.”
- “Very high: Strong evidence (established theory, multiple sources, consistent results well documented and accepted methods, etc.), high consensus.”

These categories defy the common understanding of the words used to describe them.⁹ The words used to describe ‘High confidence’ include ‘Moderate evidence, medium consensus,’ which are more descriptive of the common understanding of medium confidence. The words used to describe ‘Medium confidence’ include: ‘a few sources, limited consistency, models incomplete, methods emerging; competing schools of thought,’ that are more descriptive of the common understanding of low confidence.

Apart from these semantic issues, there are very few conclusions of meaningful impacts in the NCA4 that are associated with ‘very high’ confidence or even ‘high’ confidence. For conclusions associated with low, medium and even high confidence, there is substantial room for scientific disagreement.

THE CLIMATE CHANGE RESPONSE CHALLENGE

In response to the threat of man-made climate change, the United Nations Framework Convention on Climate Change (UNFCCC) has established an international goal of stabilization of the concentrations of greenhouse gases in the atmosphere.

This framing of the climate change problem and its solution has led to the dilemma of climate response policy that is aptly described by Obersteiner et al:¹⁰

The key issue is whether “betting big today” with a comprehensive global climate policy targeted at stabilization “will fundamentally reshape our common future on a global scale to our advantage, or quickly produce losses that can throw mankind into economic, social, and environmental bankruptcy.”

In their ‘Wrong Trousers’ essay,¹¹ Prins and Rayner argue that we have made the wrong choices in our attempts to define the problem of climate change and its solution, by relying on strategies that worked previously for ‘tame’ problems. A tame problem is well defined, well understood, and the appropriate solutions are agreed upon. Cost-benefit analyses are appropriate for tame problems, and the potential harm from miscalculation is bounded.

By contrast, climate change is better characterized as a ‘wicked’ problem, which is a complex tangle characterized by multiple problem definitions, methods of understanding that are open to contention, ‘unknown unknowns’ that suggest chronic

⁸ Curry, JA, 2014. Senate EPW testimony, <http://judithcurry.com/2014/01/16/senate-epw-hearing-on-the-presidents-climate-action-plan/>.

⁹ <https://judithcurry.com/2019/01/02/national-climate-assessment-a-crisis-of-epistemic-overconfidence/>.

¹⁰ Obersteiner, et al. (2001). Managing Climate Risk, <http://www.iiasa.ac.at/Admin/PUB/Documents/IR-01-051.pdf>.

¹¹ Prins and Rayner, 2007. The wrong trousers: radically rethinking climate policy, <http://eureka.bodleian.ox.ac.uk/66/>.

conditions of ignorance, and lack of capacity to imagine future eventualities of both the problem and the proposed solutions. The complex web of causality may result in surprising unintended consequences to attempted solutions, that generate new vulnerabilities or exacerbate the original harm. Further, the wickedness of the climate change problem makes it difficult to identify points of irrefutable failure or success in either the scientific predictions or the policies.

Overreaction to a possible catastrophic threat may cause more harm than benefits and introduce new systemic risks, which are difficult to foresee for a wicked problem. The known risks to human well-being associated with constraining fossil fuels may be worse than the eventual risks from climate change, and there are undoubtedly some risks from both that we currently do not foresee.

The wickedness of the climate change problem is further manifested in the regional variability of the risks. Balancing the risks of climate change and the policy response is very difficult across different regions and countries that face varying risks from climate change, energy poverty and challenges to economic development. Some regions may actually benefit from a warmer climate. Regional perceptions of a preferred climate or ‘dangerous’ climate change depend on societal values and vulnerability/resilience, which vary regionally and culturally. Climate has always changed, independently of human activity, so climate change is nothing new. Further, our current preferences for avoiding a particular climate of the future fail to account for human creativity and ingenuity in creating new technologies and social and political structures that will condition our perceptions and the consequences of climate change.

Climate-related decisions involve incomplete information from a fast-moving and irreducibly uncertain science. There are many different interests and values in play, the relevant timescales are long and there is near certainty of surprise. In the context of decision making, ‘deep uncertainty’¹² refers to:

- situations in which the phenomena are still only poorly understood and experts do not know or cannot agree on models that relate key forces that shape the future;
- modeling and subjective judgments are used rather than estimates based upon previous experience of actual events and outcomes; and
- experts cannot agree on the value of alternative outcomes.

The climate change problem arguably meets all three of these criteria for ‘deep uncertainty’.¹³ Acknowledgement of deep uncertainty surrounding a problem and its solutions does not imply that ‘no action’ is needed. Rather, it implies that decision-analytic frameworks should be selected that are consistent with deep uncertainty.

Robust and flexible policy strategies can be designed that account for uncertainty, ignorance and dissent. Robust strategies formally consider uncertainty, whereby decision makers seek to reduce the range of possible scenarios over which the strategy performs poorly. Flexible strategies can be quickly adjusted to advancing scientific insights and new conditions that arise.

Justification for addressing the climate change problem is transitioning away from precaution to a risk management approach that addresses the economics of preventing losses from climate change. The World Bank has a recent paper entitled *Investment decision making under deep uncertainty—application to climate change*¹⁴ that summarizes decision-making methodologies that are able to deal with the deep uncertainty associated with climate change, including robust decision making and Climate Informed Decision Analysis.

The Hartwell Paper,¹⁵ published by the London School of Economics in cooperation with the University of Oxford, argues that: “decarbonisation will only be achieved successfully as a benefit contingent upon other goals which are politically attractive and relentlessly pragmatic.” The Hartwell Paper analyzes many alternative policy approaches to decarbonization. The authors remind us that: “it is not just that science does not dictate climate policy; it is that climate policy alone does not dictate environmental or development or energy policies.”

The Breakthrough Institute has proposed Climate Pragmatism,¹⁶ a pluralistic approach based on innovation, resilience and no regrets. This pragmatic strategy centers on efforts to accelerate energy innovation, build resilience to extreme weather,

¹² Walker et al. (2016): Deep Uncertainty. doi:10.1007/978-1-4419-1153-7_1140.

¹³ Curry (2018). Climate uncertainty and risk. <https://indd.adobe.com/view/da3d0bde-1848-474d-b080-f07200293f91>.

¹⁴ <http://elibrary.worldbank.org/content/workingpaper/10.1596/1813-9450-6193>.

¹⁵ Hartwell Paper, <http://eprints.lse.ac.uk/27939/>.

¹⁶ http://thebreakthrough.org/blog/Climate_Pragmatism_web.pdf.

and pursue no regrets pollution reduction measures. Each of these three efforts has justifications independent of their benefits for climate mitigation and adaptation. Further, this framework does not depend on any agreement about climate science or the risks posed by CO₂ emissions.

THE URGENCY (?) OF CO₂ EMISSIONS REDUCTIONS

In the decades since the 1992 UNFCCC Treaty, global CO₂ emissions have continued to increase, especially in developing countries. In 2010, the world's governments agreed that emissions need to be reduced so that global temperature increases are limited to below 2°C.¹⁷ The target of 2°C (and increasingly 1.5°C)¹⁸ remains the focal point of international climate agreements and negotiations.

The original rationale for the 2°C target is the idea that 'tipping points'—abrupt or nonlinear transition to a different climate state—become likely to occur once this threshold has been crossed, with consequences that are largely uncontrollable and beyond our management. The IPCC AR5 considered a number of potential tipping points, including ice sheet collapse, collapse of the Atlantic overturning circulation, and permafrost carbon release. Every single catastrophic scenario considered by the IPCC AR5 (WGII, Table 12.4) has a rating of *very unlikely* or *exceptionally unlikely* and/or has *low confidence*. The only tipping point that the IPCC considers likely in the 21st century is disappearance of Arctic summer sea ice (which is fairly reversible, since sea ice freezes every winter).

In the absence of tipping points on the timescale of the 21st century, the 2°C limit is more usefully considered by analogy to a highway speed limit:¹⁹ driving at 10 mph under the speed limit is not automatically safe, and exceeding the limit by 10 mph is not automatically dangerous, although the faster one travels the greater the danger from an accident. Analogously, the 2°C (or 1.5°C) limit should not be taken literally as a real danger threshold. An analogy for considering the urgency of emissions reductions is your 401K account: if you begin making contributions early, it will be easier to meet your retirement goals.

Nevertheless, the 2°C and 1.5°C limits are used to motivate the urgency of action to reduce CO₂ emissions. At a recent U.N. Climate Summit, (former) Secretary-General Ban Ki-moon warned that: "Without significant cuts in emissions by all countries, and in key sectors, the window of opportunity to stay within less than 2 degrees [of warming] will soon close forever."²⁰ Actually, this window of opportunity may remain open for quite some time. The implications of the lower values of climate sensitivity found by Lewis and Curry²¹ and other recent studies is that human-caused warming is not expected to exceed the 2°C 'danger' level in the 21st century. Further, there is growing evidence that the RCP8.5 scenario for future greenhouse gas concentrations, which drives the largest amount of warming in climate model simulations, is impossibly high, requiring a combination of numerous borderline impossible socioeconomic scenarios.²² A slower rate of warming means there is less urgency to phase out greenhouse gas emissions now, and more time to find ways to decarbonize the economy affordably and with a minimum of unintended consequences. It also allows for the flexibility to revise our policies as further information becomes available.

Is it possible that something truly dangerous and unforeseen could happen to Earth's climate during the 21st century? Yes it is possible, but natural climate variability (including geologic processes) may be a more likely source of possible undesirable change than man-made warming. In any event, attempting to avoid such a dangerous and unforeseen climate by reducing fossil fuel emissions will be futile if natural climate and geologic processes are dominant factors. Geologic processes are an important factor in the potential instability of the West Antarctic ice sheet that could contribute to substantial sea level rise in the 21st century.²³

Under the Paris Agreement, individual countries have submitted to the UNFCCC their Nationally Determined Contributions (NDCs). Under the Obama administration, the U.S. NDC had a goal of reducing emissions by 28 percent below 2005 levels

¹⁷ http://unfccc.int/essential_background/items/6031.php.

¹⁸ <https://www.ipcc.ch/sr15/>.

¹⁹ <http://www.carbonbrief.org/blog/2014/12/two-degrees-a-selected-history-of-climate-change-speed-limit/>.

²⁰ <http://unfccc.int/un-climate-summit-ban-ki-moon-final-summary/>.

²¹ Lewis and Curry (2018), <https://journals.ametsoc.org/doi/10.1175/JCLI-D-17-06667.1>.

²² <https://www.sciencedirect.com/science/article/abs/pii/S0360544217314597>.

²³ Curry (2018). Sea level and climate change. <https://curryja.files.wordpress.com/2018/11/special-report-sea-level-rise3.pdf> (section 4.2.2). Whitehouse et al. (2019) <https://www.nature.com/articles/s41467-018-08068-y>.

by 2025. Apart from considerations of feasibility and cost, it has been estimated²⁴ using the EPA MAGICC model that this commitment will prevent 0.03°C in warming by 2100. When combined with current commitments from other nations, only a small fraction of the projected future warming will be ameliorated by these commitments. If climate models are indeed running too hot,²⁵ then the amount of warming prevented would be even smaller. Even if emissions immediately went to zero and the projections of climate models are to be believed, the impact on the climate would not be noticeable until the 2nd half of the 21st century. Most of the expected benefits to the climate from the UNFCCC emissions reductions policy will be realized in the 22nd century and beyond.

Attempting to use carbon dioxide as a control knob to regulate climate on decadal to century timescales is arguably futile. The UNFCCC emissions reductions policies have brought us to a point between a rock and a hard place, whereby the emissions reduction policy with its extensive costs and questions of feasibility are inadequate for making a meaningful dent in slowing down the expected warming in the 21st century. And the real societal consequences of climate change and extreme weather events (whether caused by man-made climate change or natural variability) remain largely unaddressed.

This is not to say that a transition away from burning fossil fuels doesn't make sense over the course of the 21st century. People prefer 'clean' over 'dirty' energy—provided that all other things are equal, such as reliability, security, and economy. However, assuming that current wind and solar technologies are adequate for providing the required amount and density of electric power for an advanced economy is misguided.²⁶

The recent record-breaking cold outbreak in the Midwest is a stark reminder of the challenges of providing a reliable power supply in the face of extreme weather events, where an inadequate power supply not only harms the economy, but jeopardizes lives and public safety. Last week, central Minnesota experienced a natural gas 'brownout,' as Xcel Energy advised customers to turn thermostats down to 60 degrees and avoid using hot water.²⁷ Why? Because the wind wasn't blowing during an exceptionally cold period. Utilities pair natural gas plants with wind farms, where the gas plants can be ramped up and down quickly when the wind isn't blowing. With bitter cold temperatures and no wind, there wasn't enough natural gas.

A transition to an electric power system driven solely by wind and solar would require a massive amount of energy storage. While energy storage technologies are advancing, massive deployment of cost effective energy storage technologies is well beyond current capabilities.²⁸ An unintended consequence of rapid deployment of wind and solar energy farms may be that natural gas power plants become increasingly entrenched in the power supply system.

Apart from energy policy, there are a number of land use practices related to croplands, grazing lands, forests and wetlands that could increase the natural sequestration of carbon and have ancillary economic and ecosystem benefits.²⁹ These co-benefits include improved biodiversity, soil quality, agricultural productivity and wildfire behavior modification.

In evaluating the urgency of CO₂ emissions reductions, we need to be realistic about what reducing emissions will actually accomplish. Drastic reductions of emissions in the United States will not reduce global CO₂ concentrations if emissions in the developing world, particularly China and India, continue to increase. If we believe the climate model simulations, we would not expect to see any changes in extreme weather/climate events until late in the 21st century. The greatest impacts will be felt in the 22nd century and beyond, in terms of reducing sea level rise and ocean acidification.

RESILIENCE, ANTI-FRAGILITY AND THRIVABILITY

Given that emissions reductions policies are very costly, politically contentious and are not expected to change the climate in a meaningful way in the 21st century, adaptation strategies are receiving increasing attention in formulating responses to climate change.

²⁴ Lomborg (2015), <https://onlinelibrary.wiley.com/doi/full/10.1111/1758-5899.12295>.

²⁵ Curry (2017). Climate models for laypersons, <https://www.thegwpf.org/content/uploads/2017/02/Curry-2017.pdf>.

²⁶ Clack et al. (2017), <https://www.pnas.org/content/114/26/6722>.

²⁷ <https://www.powerlineblog.com/archives/2019/01/why-green-energy-is-futile-in-one-lesson.php>.

²⁸ <https://webstore.iea.org/technology-roadmap-energy-storage>.

²⁹ https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc_wg3_ar5_chapter11.pdf.

The extreme damages from recent hurricanes plus the recent billion dollar disasters from floods, droughts and wildfires, emphasize that the United States is highly vulnerable to current weather and climate disasters. Even worse disasters were encountered in the United States during the 1930s and 1950s. Possible scenarios of incremental worsening of weather and climate extremes over the course of the 21st century don't change the fundamental storyline that many regions of the United States are not well adapted to the current weather and climate variability, let alone the range that has been experienced over the past two centuries.

As a practical matter, adaptation has been driven by local crises associated with extreme weather and climate events, emphasizing the role of 'surprises' in shaping responses. Advocates of adaptation to climate change are not arguing for simply responding to events and changes after they occur; they are arguing for anticipatory adaptation. However, in adapting to climate change, we need to acknowledge that we cannot know how the climate will evolve in the 21st century, we are certain to be surprised and we will make mistakes along the way.

'Resilience' is the ability to 'bounce back' in the face of unexpected events. Resilience carries a connotation of returning to the original state as quickly as possible. The difference in impact and recovery from Hurricane Sandy striking New York City in 2012 versus the impact of Tropical Cyclone Nargis striking Myanmar in 2008³⁰ reflects very different vulnerabilities and capacities for bouncing back.

To increase our resilience to extreme weather and climate events, we can 'bounce forward' to reduce future vulnerability by evolving our infrastructures, institutions and practices. Nicholas Taleb's concept of antifragility³¹ focuses on learning from adversity, and developing approaches that enable us to thrive from high levels of volatility, particularly unexpected extreme events. Anti-fragility goes beyond 'bouncing back' to becoming even better as a result of encountering and overcoming challenges. Anti-fragile systems are dynamic rather than static, thriving and growing in new directions rather than simply maintaining the *status quo*.

Strategies to increase antifragility include: economic development, reducing the downside from volatility, developing a range of options, tinkering with small experiments, and developing and testing transformative ideas. Antifragility is consistent with decentralized models of policy innovation that create flexibility and redundancy in the face of volatility. This 'innovation dividend' is analogous to biodiversity in the natural world, enhancing resilience in the face of future shocks.³²

Similar to anti-fragility, the concept of 'thrivability' has been articulated by Jean Russell.³³

"It isn't enough to repair the damage our progress has brought. It is also not enough to manage our risks and be more shock-resistant. Now is not only the time to course correct and be more resilient. It is a time to imagine what we can generate for the world. Not only can we work to minimize our footprint but we can also create positive handprints. It is time to strive for a world that thrives."

A focus on policies that support resilience, anti-fragility and thrivability avoids the hubris of thinking we can predict the future climate. The relevant questions then become:

- How can we best promote the development of transformative ideas and technologies?
- How much resilience can we afford?

The threats from climate change (whether natural or human caused) are fundamentally regional, associated not only with regional changes to the weather/climate, but with local vulnerabilities and cultural values and perceptions. In the least developed countries, energy poverty and survivability is of overwhelming concern, where there are severe challenges to meeting basic needs and their idea of clean energy is something other than burning dung inside their dwelling for cooking and heating. In many less developed countries, particularly in South Asia, an overwhelming concern is vulnerability to extreme weather events such as floods and hurricanes that can set back the local economies for a generation. In the developed world, countries are relatively less vulnerable to climate change and extreme

³⁰ Webster, (2008). Myanmar's Deadly Daffodil. <http://webster.eas.gatech.edu/Papers/Webster2008c.pdf>.

³¹ Taleb, (2012). Antifragile: Things That Gain From Disorder. Random House.

³² Lynch: Policy Diversity: Creative Potential or Wasteful Redundancy? <https://slideplayer.com/slide/6265255/>.

³³ Russell, (2013). <https://www.amazon.com/Thrivability-Breaking-through-World-Works/dp/1909470287>.

weather events and have the luxury of experimenting with new ideas: entrepreneurs not only want to make money, but also to strive for greatness and transform the infrastructure for society.

Extreme weather/climate events such as landfalling major hurricanes, floods, extreme heat waves and droughts become catastrophes through a combination of large populations, large and exposed infrastructure in vulnerable locations, and human modification of natural systems that can provide a natural safety barrier (e.g. deforestation, draining wetlands). Addressing current adaptive deficits and planning for climate compatible development will increase societal resilience to future extreme events that may possibly be more frequent or severe in the future.

WAYS FORWARD

Climate scientists have made a forceful argument for a future threat from man-made climate change. Based upon our current assessment of the science, the threat does not seem to be an existential one on the timescale of the 21st century, even in its most alarming incarnation. However, the perception of man-made climate change as a near-term apocalypse and alignment with range of other social objectives has narrowed the policy options that we're willing to consider.

Effectively responding to the possible threats from a warmer climate is challenging because of the deep uncertainties surrounding the risks both from the problem and the proposed solutions. The wickedness of the climate change problem provides much scope for disagreement among reasonable and intelligent people.

With regards to energy policy and its role in reducing emissions, consider the following three options:

1. Do nothing, continue with the status quo.
2. Rapidly deploy wind and solar power plants, with the goal of eliminating fossil fuels on the timescale of 1–2 decades.
3. Re-imagine 21st century electric power generation and transmission systems with new technologies that improve energy security, reliability and cost while at the same time minimizing environmental impacts.

The current climate/energy policy debate seems to be #1 versus #2; in my opinion, neither of these options gets us where we want to be in terms of thriving economically and minimizing the environmental impact of energy generation. #3 in principle can usher in a new era of abundant, clean energy, but we can't put an arbitrary timetable/deadline on this; it will require substantial research, development and experimentation. In the meantime, muddling along with some combination of #1 and #2 can improve the situation somewhat. Ironically, acting urgently on emissions reduction by massively deploying solar and wind power could entrench natural gas in the power system and turn out to be the enemy of a better long-term solution. Focusing on #3 has the potential to eliminate the current gridlock of debating #1 versus #2, and provides the best option for a long-term solution.

A regional focus on adapting to the risks of climate change allows for a range of bottom-up strategies to be integrated with other societal challenges, including growing population, environmental degradation, poorly planned land-use and over-exploitation of natural resources. Even if the threat from global warming turns out to be small, near-term benefits to the region can be realized in terms of reduced vulnerability to a broad range of threats, improved resource management, and improved environmental quality. Securing the common interest on local and regional scales provides a basis for the successful implementation of climate adaptation strategies and addressing near-term social justice objectives.

Bipartisan support seems feasible for pragmatic efforts to:

- accelerate energy innovation
- build resilience to extreme events
- pursue no regrets pollution reduction measures

Each of these three efforts has justifications independent of their benefits for climate mitigation and adaptation. These three efforts provide the basis for a climate policy that addresses near-term economic and social justice concerns and the longer-term goals of mitigation.

The role for climate science and climate scientists in the policy process has been complex. In the past 20 years, dominated by the IPCC/UNFCCC paradigm, scientists have become entangled in an acrimonious scientific and political debate, where the issues in each have become confounded. This has generated much polarization in the scientific community and has resulted in political attacks on scientists on both sides of the debate. A scientist's 'side' is often defined by factors that are

exogenous to the actual scientific debate. Debates over relatively arcane aspects of the scientific argument have become a substitute for what should be a real debate about politics and values.

Scientific progress is driven by uncertainty and disagreement; working to resolve these uncertainties and disagreements drives the knowledge frontier forward. Attempts by government policy makers to intimidate climate scientists³⁴ whose research or public statements are perceived to be in opposition to preferred policy narrative are enormously detrimental to scientific progress.

I am making one 'ask' today: please allow climate science and the research process to proceed unfettered by political attacks on scientists. We need to acknowledge that climate-related decisions involve incomplete information from a fast-moving and irreducibly uncertain science. Uncertainty and disagreement is what drives the knowledge frontier forward; please help that process to flourish. Only in the most simple-minded policy making frameworks does scientific uncertainty and disagreement prescribe 'no action.'

It is up to the political process (international, national, and local) to decide how to contend with the climate problem, with all of its uncertainties, complexity and wickedness. The challenge is to open up the decision-making processes in a way that is more honestly political and economic, while giving proper weight to scientific reason, evidence and uncertainty.

QUESTION SUBMITTED FOR THE RECORD BY REP. HICE TO DR. JUDITH A. CURRY,
PRESIDENT, CLIMATE FORECAST APPLICATIONS NETWORK

Question 1. Dr. Curry, as you are probably aware, Dr. William Happer, Professor Emeritus of Physics and Princeton University, suggests that climate modeling is an extremely difficult problem because the climate involves the interaction between the atmosphere and the oceans, which are both extremely turbulent fluids. He notes that it is not difficult to write the partial differential equations that describe our climate, but that even our most powerful supercomputers cannot solve these equations leading scientists to replace them with simplified computer models that toss out much of the detail of the real atmosphere and oceans leading us to less robust data and conclusions.

How would you respond to that?

Answer. To answer questionssuch as the one put forward by Representative Hice, in 2017 I wrote a report entitled "Climate models for the layman" that explains how climate models work and their limitations. An online link to the report: <https://www.thegwpf.org/content/uploads/2017/02/Curry-2017.pdf>.

With regards to Representative Hice's specific question regarding a statement by Dr. William Happer, I regard Dr. Happer's statement to be correct. The justification for my conclusion is summarized in the report linked to in the previous paragraph.

The CHAIRMAN. Thank you very much, and to the whole panel, our appreciation for your valuable and important testimony.

Let me turn to my colleague, Mr. Neguse, for questions.

Mr. NEGUSE. First, I want to thank the Chairman for holding this hearing. It is a breath of fresh air, particularly for us new Members who have just joined the Congress, that the Natural Resources Committee is undertaking this important work, and that its first hearing is on such an important topic.

I would respectfully disagree with Dr. Curry, in terms of your framing around the existential nature of this issue. I think climate change is an existential threat.

I think of this in the context of being a new, young father. I am 34 years old. My wife and I just had our first child, a daughter, Natalie. She is 5 months old. Much of our work here in the Congress is ultimately making sure that the world she inherits is

³⁴ <http://www.hillheat.com/articles/2015/02/24/rep-grijalva-asks-for-conflict-of-interest-disclosures-from-gops-go-to-climate-science-witnesses>.

a better one than perhaps the world that we inherited. And one need look no further than the IPCC report and a variety of other studies to see just how catastrophic the consequences of climate change will be for her generation if we don't take decisive action, and if we don't do so now.

And I can tell you that, certainly in my community in Colorado, we are feeling the impacts of climate change already. I have a report here that I will respectfully ask be submitted into the record, the most recent report from the Department of the Interior with respect to the impacts of climate change in Rocky Mountain National Park.

I represent Colorado's 2nd Congressional District, Northern Colorado. Fifty-two percent of my district is Federal public land, and we see very clearly the impacts of climate change in Rocky Mountain National Park and elsewhere. My constituents see it every day. Rising temperatures have led to snow melting faster, which causes increased flooding and erosion, and negatively impacts Colorado's fresh water supply, 70 percent of which comes from our snow. At Rocky Mountain National Park, the studies have shown that temperatures have risen 3 to 4 degrees, significantly affecting the plants and animals that call the park home.

I am very excited about the opportunity to take comprehensive, holistic, and significant action to solve this issue, actions like the Green New Deal, which I support, along with several of my colleagues. I have introduced legislation to protect over 400,000 acres of public lands in my state, in Colorado, so that we can ensure that those lands are not sold to the highest bidder and opened up to oil and gas development and the rest.

So, at the end of the day, I think this was the defining issue of our time. And I thank the witnesses, with respect to their activism, in trying to push for common-sense solutions that will ultimately protect the planet for all of our children.

My question goes to Mr. Hollie. I heard your testimony with respect to energy poverty, I think, as you described it, and the issues around affordability. I don't know if you are aware of this—I think you referenced natural gas as being “clean.”

According to the NAACP's Clean Air Task Force report, African-American communities face an elevated risk of cancer due to air toxic emissions from natural gas development, and over 1 million African-Americans live in counties that face a cancer risk above the EPA's level of concern from toxins emitted by natural gas facilities. I am curious how you would respond to that statistic.

Mr. HOLLIE. My response would be all of our energy sources have some type of downside to them, even coal. We look at the wind turbine——

Mr. NEGUSE. Well, I would agree with you there, Mr. Hollie.

Mr. HOLLIE. Right, right.

Mr. NEGUSE. Coal certainly has a negative impact, as does natural gas——

Mr. HOLLIE. If I could finish, sir.

Mr. NEGUSE. Proceed.

Mr. HOLLIE. Even the wind turbines this winter, a couple weeks ago, couldn't operate. The downside. But we know for a fact that

liquid gas, natural gas, is the cleanest way and the most affordable way right now for people in this country.

Mr. NEGUSE. Well, I am not sure I understand your comparison of windmills to the toxins and potential cancer risks associated with natural gas emissions.

But nonetheless, I will say, I understand that you have written a number of editorials. And obviously, from your testimony today, support the development of fossil fuels, coal, and natural gas.

Mr. HOLLIE. Energy exploration.

Mr. NEGUSE. And I understand that your organization, Reaching America, that you have utilized that organization to make those views known. Is that a fair—

Mr. HOLLIE. That is a fair assessment.

Mr. NEGUSE. I also understand that your organization is a partner with a group called Explore Offshore. Is that correct?

Mr. HOLLIE. We are a member of that organization, yes.

Mr. NEGUSE. OK, and that is a project of the American Petroleum Institute.

Mr. HOLLIE. They are associated with them, yes.

Mr. NEGUSE. OK. Does your organization receive any funding from fossil fuel companies or corporations?

Mr. HOLLIE. No, we do not.

Mr. NEGUSE. With that, I yield back. Thank you, Mr. Chair.

The CHAIRMAN. Thank you very much.

Mr. Gohmert.

Mr. GOHMERT. Thank you, Mr. Chair.

I am curious, Reverend Yearwood. From your testimony it sounds like you support the Green New Deal. Is that fair?

Rev. YEARWOOD. That is correct.

Mr. GOHMERT. You had mentioned your position as a chaplain in the military. And some of us have real concerns about closing every base and cutting our military by 50 percent, but that is interesting that you support those.

Rev. YEARWOOD. Well, the military was one of the key institutions of our government that actually has spoken about the threats of climate change.

Mr. GOHMERT. Right. And Green New Deal is going to take care of that by making us basically indefensible. With a 50 percent cut, we will not be able to protect ourselves properly from the threat of Russia, China, or even ISIS from there, and closing all bases overseas, but that is interesting.

Also, I couldn't help think back as I listened to Mr. Hollie, your testimony, to the giant here in the U.S. Congress named John Dingell. He was chairman of the Energy and Commerce Committee when Democrats took the majority back in January 2007 through January 2011. For 50 years he and, as I understand, his father had wanted some kind of universal health care, and he was thrilled that he was going to get to chair that into being.

But my understanding was the Speaker of the House, now Speaker again, wanted two things out of his Committee. They wanted the universal health care bill, Obamacare, and cap and trade. And he made the public statement, because that jacks up the cost of energy, like you have been talking about. And, as you know, the people that are impacted, it isn't the rich, they can afford it.

So, he made the statement the cap and trade bill is not only a tax, it is a great big tax. And, of course, the Nation's poor were the ones that would be most impacted. But because of his comment he was fired as chairman of the Energy and Commerce Committee. Mr. Waxman was made chairman. And, as he famously said, "We not only don't want your input, we don't need your votes." So, he pushed it through, and it never became law.

But as you testified, that does come back to mind. And I had an 80-year-old lady say, "I am scared. My cost of energy to heat my home is going up. And I was born in a home that only had a wood-burning stove, and I am afraid I am going to die in a home that can only afford a wood-burning stove."

And I said, "I am really sorry to be the bearer of bad tidings, but probably your wood-burning stove is going to end up being illegal."

But it is tragic. And it is the poor that suck it up, when we push these kinds of things. So, I appreciate your perspective very much.

Dr. Curry, let me ask you very quickly. Has there ever been any climate change more dramatically than what killed off the dinosaurs?

Dr. CURRY. Climate has always varied. Sometimes there are extreme events that maybe get an asteroid or comet impact, or something like that. But the ocean, volcanic eruptions, there are many sources of natural variability on all timescales.

So, when you see the climate changing, you can't immediately assume that it is all caused by humans. There is a strong natural——

Mr. GOHMERT. Do you think we are causing the polar ice caps on Mars to melt?

Dr. CURRY. No.

Mr. GOHMERT. That is probably the sun, apparently.

But let me—my time is running out, but I appreciate all our witnesses. But the comparison of the civil rights effort, I mean, that was unconstitutional activity by the government, and it just strikes me so ironic that if the climate change and the Green New Deal comes into law, it is saying we are giving up our freedom and putting all our faith in the government because of the civil rights violations to begin with. It is just rather ironic.

But my time has expired, I yield back.

The CHAIRMAN. Mr. Levin.

Mr. LEVIN. Thank you, Chair, for this opportunity to finally, after many years, have a hearing on climate change. And I want to thank our witnesses, along with our governors, who signaled a bipartisan desire to see strong Federal action.

Let's cut to the chase. The overwhelming scientific consensus has left no doubt—no doubt—that we are facing a climate crisis. And it is long past time to stop undermining science and evidence. The report that we saw this morning from NOAA and NASA shows that the 5 warmest years recorded since 1880 are the last 5 years. This isn't that hard to figure out. Now must be the time to accept reality. This is reality. And we have to begin focusing on solutions.

And I want to thank the young people who are here for leading the way on initiatives like the Green New Deal.

We must not wait to accelerate the deployment of renewable energy or energy-efficient buildings or electrify our transportation infrastructure.

I am from the great state of California, where I have been involved in climate and energy policy for a long time, and I have heard the nay-sayers every step of the way. But what we have done is we have demonstrated beyond any shadow of a doubt that, if you protect the environment and innovate with the clean energy jobs of the future, you will grow the economy at the same time. And our solar industry in California is a clear example of that.

We must also not advocate our global leadership on the issue of climate change, or subcontract our energy and environmental policies to a handful of big polluters who ignore science and common sense. And we must not sit by as unprecedented climate change impacts the health and safety and the economy of our communities.

I am confident that a strong majority of the American people are with us, and even a strong majority of my colleagues in the House and Senate. The question is whether we have the courage to act on climate. And this hearing is just one step of many that we are going to need to take in that direction.

The transition to a more sustainable future has been my life's work, and will be a critical aspect of my service in Congress. I hope that we can put politics aside, if even for just a moment, and focus instead on science and evidence and our future.

And like my friend, Mr. Neguse, I have two young children at home, and this is about leaving the planet better for them than how I found it.

With that, I actually do have a couple of questions for Dr. Cobb.

Dr. Cobb, I want to thank you for your work. We have seen numerous studies over the past few months that climate change is wreaking havoc on ecosystems, and that we have potentially lost two-thirds of all species that were on the planet before the Industrial Revolution. Why is the preservation of biodiversity so important for resiliency to climate change, and what steps can we take to preserve biodiversity, particularly as the Natural Resources Committee?

Dr. COBB. Thank you for that question, the opportunity to address that.

I think I made clear in the testimony that I provided that any number of indicators of our ecosystem's health are already showing steady declines with respect to climate change impacts. The National Climate Assessment lays that out item by item.

But to your question about biodiversity. Diversity of species is critical to the function of ecosystems, and, in turn, those ecosystem services that we rely on. We might turn to the functioning of coastal ecosystems and recognize the importance of functioning ecosystems that provide fishermen with livelihoods and many other kinds of tourist-related services, as well.

So, this has a distinct value to Americans that has been shown again and again and again. And certainly science tells us some of the ways that this Committee can help to promote biodiversity and increase ecosystem resilience and, therefore, support the communities that depend on these services. Some of those ways include, as I mentioned, protecting the lands that these species depend on,

and using the best science and evidence to inform the support of these ecosystems and the critical species that support their function. So, that is just one way.

Thank you very much.

Mr. LEVIN. I represent a district, California's 49th District, with over 50 miles of coastline. And my friends at the Scripps Institute of Oceanography agree with you, Dr. Cobb, that we absolutely must face the reality, the changing temperature of our oceans, the obvious coastal erosion, unprecedented. And if we don't act, future generations will regret our lack of action. Now is our moment to lead. This should not be a partisan issue; this should be based on science and evidence. And if we can actually focus on facts for a change, maybe we will get somewhere. I yield back.

Ms. YEAMPIERRE. I would like to, if possible, make a comment, as one of two women of color that is on this panel, particularly because climate change is going to impact front-line communities more than any other. And the people who are leading the women of color in these communities, their children are the ones that are going to be impacted.

We can't talk about these ecosystems devoid of talking about the impact on human rights and on the people affected. More than 5,000 Puerto Ricans died. That is not nothing. That is not just an ecosystem. That was an entire island that was affected.

In the Philippines around 2012, 10,000 Filipinos died. We have had Superstorm Sandy that affected life all over New York City and New Jersey, and the infrastructure was destroyed.

So, I just really don't want to talk about this in silos, we are not talking about whole communities, and not treating this issue in a way that is holistic. If we don't lead with how this is going to impact the people least responsible for creating climate change, the people who live within their carbon footprint, the people who are engaged in urban forestry, doubling the amount of open space, stopping the siting of power plants, then we will—

Mr. GRIJALVA. I am not cutting you off—

Ms. YEAMPIERRE [continuing]. Miss the reason why we have this panel.

The CHAIRMAN. The time is up, and we want to stay within the protocol.

Ms. YEAMPIERRE. All right. Thank you, I appreciate it, but I just want to make sure—

The CHAIRMAN. With all due respect. Thank you.

Ms. YEAMPIERRE [continuing]. That folks address those things.

The CHAIRMAN. Mr. McClintock, please.

Mr. MCCLINTOCK. Thank you, Mr. Chairman. I do want to talk about science and evidence.

Professor Curry, are we experiencing the highest temperatures in the planet's history.

Dr. CURRY. No.

Mr. MCCLINTOCK. When have we seen higher temperatures?

Dr. CURRY. Oh, a very long time ago, and at least in some regions, they may be equally as high about 1,000 years ago, during the Medieval warm period.

Mr. MCCLINTOCK. So, long before the Industrial Revolution?

Dr. CURRY. Yes.

Mr. MCCLINTOCK. Are we experiencing the highest levels of atmospheric carbon dioxide in the planet's history?

Dr. CURRY. No. Historically, we are a little bit on the low side, actually, in the current era.

Mr. MCCLINTOCK. Are we experiencing the worst droughts in recorded history?

Dr. CURRY. Definitely not.

Mr. MCCLINTOCK. Are we experiencing the most ferocious hurricanes in recorded history?

Dr. CURRY. No. In recent history, in the 1950s in the Atlantic, the land-falling hurricanes were actually worse than what we have seen in recent decades.

Mr. MCCLINTOCK. I am reminded of a poem by Ogden Nash, who wrote, "The ass was born in March, the rains came in November. 'Such a flood as this,' he said, 'I scarcely can remember'."

But our recorded history, as well as our paleoclimatology informs us that there have been periods where carbon dioxide levels have been much higher than they are today, temperatures have been much higher and lower than they are today, and long before the significant carbon dioxide emissions of human civilization. Is that correct?

Dr. CURRY. Yes.

Mr. MCCLINTOCK. A study published in Lancet a few years ago noted that cold weather kills far more people than warm weather. What do you see as the greater threat?

Dr. CURRY. Well, obviously, it depends on the location. But I think the statistics, overall, across a wide variety of locations do support that cold weather kills more than hot weather.

Mr. MCCLINTOCK. During the recent cold wave, those states that relied excessively on wind and solar saw electricity outages. Would you say that the greatest single threat in extreme weather, either hot or cold, is a lack of electricity?

Dr. CURRY. Yes. Even during hurricanes, what kills a lot of people is the lack of electricity, which has all sorts of trickle-down effects on other things that are needed to save lives during those experiences.

Mr. MCCLINTOCK. How does an over-reliance on wind and solar generation affect our ability to provide abundant, reliable, and affordable electricity?

Dr. CURRY. Well, it doesn't work without natural gas. Natural gas is the perfect partner for wind and solar, because of the intermittency, because you can fire up a gas burner and fire it back down. And energy trading, natural gas trading, is what has, I think, stabilized the price of natural gas that actually helps make wind and solar be affordable.

So, until such time as there are advanced storage technologies, we are going to rely on natural gas as a partner.

Mr. MCCLINTOCK. Let me get to that, if I can.

Mr. Hollie, we heard earlier from the governor of Massachusetts about all of their green energy policies, also the governor of North Carolina. My home state of California has adopted even more radical policies. They say they are helping the poor, but I just checked. In Massachusetts, those policies have produced the 11th highest gasoline prices in the country. California now has, as a result of

these policies, the 2nd highest gasoline prices in the country. Massachusetts and California are tied for the 6th highest electricity prices in the country.

How are poor people helped by paying needlessly sky-high prices for gasoline and electricity?

Mr. HOLLIE. Sir, I don't have a lot of research to point to. All I have is my anecdotal research. The thousands of people that I speak to struggle every single day to pay their electric bill. And the one thing that they talk about is just the need for affordable, reliable energy that we have here in this country. So, if we can find a way to reduce the regulations that allow people access to that energy, I think it would go a long way in helping them to reduce the cost of energy for them.

Mr. MCCLINTOCK. Dr. Curry, a gridlocked car creates twice the NOx contaminants and six times the carbon contaminants per mile traveled as a car moving at peak efficiency. Doesn't it make more sense to add highway capacity to resolve our chronic traffic congestion if carbon emissions are the goal of reducing?

Dr. CURRY. A transportation policy is much tougher to figure out than power production. It is a very complex issue, and I would like to see us re-envision what that should be for the 21st century, rather than adding patches to our current system.

Mr. MCCLINTOCK. If we are going to be able to store less moisture in the mountains as snow, does it make sense to build more dams, so that we can store surplus water from wet years so that we have it in dry years?

Dr. CURRY. It certainly does. Water resource management is a big issue, but there are environmental challenges associated with dams and reservoirs, also. So, it needs a lot of planning to make all this do what you really want it to do.

Mr. MCCLINTOCK. Thank you.

The CHAIRMAN. Ms. Haaland.

Ms. HAALAND. Thank you, Chairman. Welcome to all of you and thank you so much for taking time to be with us today. I would like to take this opportunity to thank you and my colleagues for entrusting me with the responsibilities of Vice Chair of this Committee and the chairship for the Subcommittee on National Parks, Forests, and Public Lands. I look forward to working with you and my colleagues to protect our public lands and to meet our obligations to our indigenous communities.

To that point, this hearing is important and an appropriate place to begin this Congress. As we heard from all our witnesses, climate change poses an unprecedented threat to our communities and our environment.

Last year, in my state of New Mexico, the Ute Park Fire burned tens of thousands of drought-stricken acres, while the city of Santa Fe experienced a once in 1,000-year flood. Meanwhile, a vast methane cloud hovers over the northwest corner of New Mexico, and this Administration has worked to weaken the rules on methane emissions from oil and gas operations.

Methane is more than 80 times more powerful than carbon dioxide at trapping heat, and is responsible for about a quarter of the warming we are experiencing today.

Nearby in Arizona, Hurricane Rosa inundated the Tohono O'odham Nation, nearly overtopping their dam, trapping residents behind impassible roads, and forcing evacuations. Hurricanes have almost never reached this part of Arizona before.

Climate change has forced us to live in a new normal, in which fires, floods, droughts, and hurricanes wreck our communities and our national heritage. And it is now time for us to act.

I first would like to just thank Ms. Nazar for your commitment and your sacrifice to the things you believe in. I almost want to apologize to you and the youth of this world, who go to bed every night worrying about what will happen to our communities because of climate change. And I just want to recognize your presence here. It means a great deal to me and to many of us. So, thank you very much.

Ms. Yeampierre, I think you are best equipped to answer this question, so I will ask it to you.

Right now, the EPA and Interior Department are run by former lobbyists for coal and oil companies. The *New York Times* reported last year that a coal magnate was essentially getting his entire wish list of energy de-regulations approved by this Administration.

What role do you believe this corporate capture of the Administration will play in being able to address the climate crisis?

Ms. YEAMPIERRE. I think that the de-regulation is exacerbating the climate crisis, particularly in front-line communities and in indigenous communities.

You are from New Mexico, where you have nuclear energy and uranium in the lungs and the water and people. It is affecting 60 nations and tribes. The decisions that are being made to support an old-school way of thinking about energy are really racing us toward extreme catastrophic events.

The truth is that even in places like Kentucky, people are moving away from coal. One of our organizations, which is with the Climate Justice Alliance, Kentuckians for the Commonwealth, are working at operationalizing just transitions that move people away from having to depend on an economic system that has destroyed their lives and limited their livability.

So, while people in communities are doing that, you have an EPA that is racing toward, actually moving policies that are basically taking us back in time. It is really dangerous, and it is a contribution to actually making us look like the day after tomorrow.

And it is unfortunate that this old-school, dated way of thinking about how we basically consume and use energy is really creating more problems for our communities. I think that, honestly, people in different parts of the world are way ahead of us, and that the United States is really looking like this clunky old-school machine that can't keep up, not only with the technology, but the science. So, it is frightening.

EPA has always had people in there that are in the pockets of the lobbyists, really slowing down the cogs and making it impossible for us to move as fast as the climate is changing. So, now what we are seeing is really dangerous. That is what I would contribute.

Ms. HAALAND. I appreciate that very much.

Mr. Chairman, in the interest of time, I will submit other questions in writing. Thank you.

The CHAIRMAN. Thank you very much.

Mr. HERN.

Mr. HERN. Thank you, Mr. Chairman. Thank you all for testifying today as expert witnesses on climate change. Each of you has spent your careers involved in climate policy and have helped to generate various solutions to the problem of climate change.

Mr. Hollie, your work to reduce energy poverty has been truly remarkable, and your testimony today reflects your well-versed stances on climate change issues. One part of your testimony that interests me a lot was where you wrote, "The government requires environmental impact studies to estimate the effects of projects like roads and buildings on nature. Shouldn't the government act similarly when it comes to how regulations impact the population?"

Mr. HOLLIE. Yes, sir.

Mr. HERN. Would it surprise you that we tried to put that into a rule last week and it was voted down by our friends across the aisle? So, we would evaluate the impact of our policies on a cost benefit analysis.

Mr. HOLLIE. Sure. No, I did not know that, sir.

Mr. HERN. Thank you.

Dr. Curry, your testimony reflects your wealth of knowledge on these issues, and gives great insight into the climate change debate. In particular, you discuss the increasing concern you have that the climate change problem has been over-simplified. I agree with this statement, as I feel that an overly simple, one-size-fits-all—we are smarter than everybody else in Washington, DC—as we heard our opening statements today from our Ranking Member—approach to climate change should lead to serious issues, as what may work for one state may not work for another.

Would you please elaborate on the problems that an expensive, one-size-fits-all, top-down solution might cause, if implemented?

Dr. CURRY. Well, a whole host of unintended consequences, some of which we can't even imagine right now. And because of that, we need to avoid the hubris of thinking that we can predict what the future climate will do, and that we can actually control the climate.

If we were somehow successful in putting all these policies into place and getting CO₂ emissions down to zero, I think we would be unpleasantly surprised at how little impact this actually has on the things that worry us most about extreme weather events, and things like that.

Sea level rise is not—we are not going to turn that one on a dime, things like that. It is very tough to change the climate, has a whole lot of inertia in the system. Many timescales. The Pacific responds very slowly. So, even with success in reducing the CO₂ emissions down to zero, it would be a long time to turn the corner on having that actually impact the climate.

So, we need to do some of the more bottom-up type things. And the states are wonderful laboratories for trying out all these adaptation resilience kind of policies, and I think we should try to figure out how to help that flourish, the so-called innovation dividend.

Mr. HERN. Since you brought that up, last week I had the fortunate opportunity—we have an organization called Grand River

Dam Authority that is a public-private partnership in our state of Oklahoma that has been around since the 1930s that was formed originally by the government through some grants to build some dams to lock up energy so that we could use that to handle flooding on the Arkansas River, the McClellan-Kerr Navigation System, as it came to be in the 1960s.

We also have in our industrial park in Pryor, Oklahoma, the largest Google server farm in their company. It relocated there to take over a Gatorade plant with the qualification that they would only use renewable power. We had a conscious decision, even though it is not in my district—the state, the GRDA had a conscious decision to make on free-market enterprise. Do we want that there? Do we want to go through the cost of upgrading the grid, upgrading the technology to conform to the purchase of Google's 100 megawatts? And we felt like the cost benefit analysis of that made sense.

It was a small plant at that time. It has since quadrupled in size. And, from all the Google people that I have talked to, they are so proud of the relationship in a free-market environment, working with renewable credits to get to where they are at so that, on the grid, GRDA has a great mixture of hydro, solar, wind, coal, and natural gas.

To the testimony from Mr. Hollie earlier, that you have to have backups on this, so that the cost of having a battery-type environment when you don't have solar and you don't have wind, that you can actually have power to fuel and to warm our homes and businesses around our particular districts and our states and our country.

Thank you for your time. Thank you for testimony. I yield back my time.

The CHAIRMAN. Thank you, sir.

Mr. McEachin.

Mr. MCEACHIN. Thank you, Mr. Chair.

First of all, thank you for your leadership on the most urgent threat facing our planet: climate change.

I want to thank the panelists for being here today. And in particular, I am very happy to see my good friend, Reverend Yearwood, here today.

Reverend, I have enjoyed working with you over the past 2 years, and I look forward to our continued partnership. In that vein, Reverend, I want to start with you.

Amazingly, it has been articulated today that there is a mistaken idea that moving toward a clean energy economy will hurt low-income communities and communities of color. I need you to speak to what the rising health and economic costs of climate change would be for those communities, specifically if we fail to move in that direction.

Rev. YEARWOOD. Thank you, Congressman, for that question.

First, we can definitely fight poverty and pollution at the same time. And let me say clearly that the assessment that Mr. Hollie—respectfully, I disagree completely with what he put forth as the idea that people of color are not concerned about the climate, about climate change, about the environment, about their health.

Mr. HOLLIE. I didn't say that.

Rev. YEARWOOD. We know that 200,000 Americans are dying yearly because of air pollution. We know that we have millions of children and millions of adults who have asthma, emphysema, and are getting cancer. We know that 68 percent of people of color, black people, are living within 30 miles of coal-fired power plants. We know that the de-regulations or the mercury rule and the car rule and many of the rules being rolled back by EPA would hurt people of color.

So, one of the things here that I just want to say. And, Mr. Hollie, please understand the reason why I was making this assessment is this. For me, as a minister, having buried a young girl because of asthma, that mother no longer cares about how much that utility bill would have cost. That child I had to bury because of asthma. She would have much more been concerned about dealing with a particular matter in the atmosphere.

So, the health concerns are one of the key concerns that are within the communities of color. The idea that we are not also concerned about our future and the future generation is, frankly, absurd. The idea that we don't care that we first and worst will be hurt by climate change is outlandish.

The fact, for me, being from Louisiana and seeing what happened with Hurricane Katrina, or Harvey in Houston, those are the kind of things that have a huge impact on communities of color. So, to sit up here honestly at this critical moment and to then purport the idea that people of color are somehow making the decision that they are more concerned about their energy bill than their health, their energy bill than their life, then that is literally ludicrous.

If you think anybody—and it was come to earlier about this was Black History Month and civil rights. The idea that poverty is also put upon with communities of color is also outlandish. This is not about this poor people of color, but poor white people also, as a matter of fact, want clean air and clean water.

As I said earlier, climate change is a civil rights issue.

Mr. MCEACHIN. Thank you very much, Reverend.

Am I pronouncing this correctly? Is it Yeampierre, Ms. Yeampierre?

Ms. YEAMPIERRE. It is Yeampierre, yes.

Mr. MCEACHIN. How do we make sure that, as we move toward a clean energy economy, that we invest greener technologies in low-income communities and communities of color so they are not left behind? How do we do that?

Ms. YEAMPIERRE. Whether it is in Michigan, whether it is in Detroit or in Brooklyn, New York, or Richmond, California, whether it is fracking going on in people's backyards, communities of color and front-line communities, whether they are in Indian Country, are working on operationalizing just transitions. They are looking at different economies of scale, anything from community-owned solar to trying to figure out how they can create food systems that will withstand the changes that are coming.

And there has to be an investment in those communities. And we also need to start thinking about governance differently. Climate change is going to disrupt governance. The idea is that we need to start creating transformational partnerships with communities that

are on the front line, and that are engaging in this kind of transformation.

The other thing is that the needs are different everywhere in the country. So, the needs of a rural community are not the same as an urban community. Folks that are dealing with mountain-top removal in Appalachia are dealing with different kinds of challenges. So, it isn't cookie-cutter, but it is a commitment to try to work with people on the ground, and being led by the ground in partnership, because that is what it is going to take.

Climate change is not going to—top-down solutions are not going to be sustained over time. They just don't work. People on the ground are going to have to lead. And we are going to have to be partners in those kinds of decisions, and sharing and creating a space where we share expertise and information with each other.

When the Reverend is talking about Louisiana, in my mind all I am thinking about was those floating black bodies. As people of African ancestry, that is the truth for all of us all over the United States, right? I think about Puerto Rico, I think about Louisiana. So, I think that it is really important that those communities that are leading and are doing the work, that they not be marginalized, and that they be supported and invested in.

The CHAIRMAN. Thank you—

Mr. MCEACHIN. Thank you so much.

I yield back, Mr. Chairman.

The CHAIRMAN. Thank you.

Mr. Lamborn.

Mr. LAMBORN. Thank you, Mr. Chairman. I am going to concentrate with my questions and comments on the proposals that are out there to deal with climate change. I don't want to talk about climate change, the science behind it, the man-made role. I want to talk about the proposals that are on the table to deal with it.

And the main proposal that I have seen so far is the Green New Deal. I hear that my colleagues on the other side of the aisle may have some proposals coming forward to flesh this out, but right now, all we have is the Green New Deal, and we already have presidential contenders endorsing it.

We have the Green Party, that has talked a lot about it. I am going to use a few of their facts and figures. They say—and if you go to GP.org—that the transition to a Green New Deal will cost \$13 trillion.

Right now, here is our dependence on hydrocarbons: 82 percent of U.S. electricity is generated from coal, natural gas, and nuclear, leaving 18 percent from renewables and hydropower.

When it comes to transportation, we have 30,000 commercial air flights a day. I don't think a single one of those is powered by renewables. We have 250 million cars and trucks on the road. People in the United States travel 11 billion miles a day, and the vast majority of that is hydrocarbon powered. Some electric vehicles, some alternatives like propane and bio-fuel.

The Department of Defense, in particular—I am also on the Armed Services Committee—they spend a lot of money on energy, \$13 billion a year. Much of that, if not most of that, is hydrocarbon-based.

According to the Green Party, in their plan for the Green New Deal, we would have to close all overseas bases and we would lay off 1.4 million people, both military and civilian.

To me that is very extreme. And this has to do something with the goal of no hydrocarbons by the year 2030, 11 years from now. So, I am going to just ask—I will start with you, Dr. Hollie. Is that realistic?

Mr. HOLLIE. No, sir. And you actually mentioned that 80 percent of our total energy sources come from fossil fuels. I know that it has been that way since the turn of the century. It was that way when my grandfather was a black coal miner in southwest Virginia. It was that way when I was working for Norfolk Southern. And even the last EPA Director, Gina McCarthy under the Obama administration, stated that we were going to need fossil fuels at least through 2050.

Mr. LAMBORN. And Dr. Curry?

Dr. CURRY. The problem that I see with a massively ambitious top-down policy like the Green New Deal is: (a) what if we can't do it? What if we are wrong? And there are all sorts of things. It is not a problem that is amenable to that kind of a solution. That is why I propose more of a bottom-up kind of approach, the so-called innovation dividend, so we can try lots of different things, lots of solutions, and see what works.

Mr. LAMBORN. I have to really agree with you. I think that the ingenuity and hard work and creativity of the American people is a real solution here, and should not be left out. We shouldn't—like you said, top-down from government coercion, government control, that sounds too much like a Soviet, 5-year plan, or something like that, which is simply not going to work.

I understand that if someone comes into Congress—you only have to be 25 years old to be a Member of Congress, and we have young people that bring a lot of great qualities, but maybe they don't bring a lot of life experience. So, I guess I can understand if someone hasn't a lot of life experience, and they are proposing something that is extremely unrealistic. Well, impossible, impossible.

But what I don't understand is if adults and grown-ups, who are older and more mature, are also advocating something that is impossible. And I see that with some of the presidential contenders who are throwing their names out there. They are plugging for something that is literally impossible.

With that, Mr. Chairman, I am going to yield back the balance of my time.

The CHAIRMAN. Well, let me put a pitch in for myself.

Ms. YEAMPIERRE. Mr. Chairman, with all due respect, I just want to say—

The CHAIRMAN. No, we have to follow—

Ms. YEAMPIERRE [continuing]. Our movements have been led by young people.

The CHAIRMAN. We have to follow the protocol.

Ms. YEAMPIERRE. Our movements of civil rights divestment in South Africa, all led by young people. Let's not try to put them in a box.

The CHAIRMAN. Ma'am, the protocol and decorum for this, with all due respect, please. I mean we are trying to run this meeting in the way that is orderly. And while you might have an opinion and want to interject it at that moment, unless you are recognized, you can't. I appreciate that.

Let me put in a plug for myself, Mr. Lamborn. As an old-timer, I happen to agree with some of what our colleagues are saying here today, and some of our witnesses have said today. I don't know if that puts me out of step with my age group, but I would suggest that the vast majority of Americans feel the way I do.

But anyway, Ms. Velázquez.

Ms. VELÁZQUEZ. Thank you, Mr. Chairman and Ranking Member.

I am very proud to be the Representative of a leading voice, an activist on climate change, Ms. Elizabeth Yeampierre.

Thank you for your service and for your activism. I would like to ask you the first question. As an advocate for climate justice with its ethical and political implications, what would you say to someone who thinks we should ignore climate change, despite low-income communities being disproportionately at risk from its impact?

Ms. YEAMPIERRE. Congresswoman, it is wonderful to see you. You have been a champion for environmental justice for years, since even before it became a sexy thing. You have been doing it for all of your districts for so many years that I am honored to be speaking in front of you.

I don't engage climate deniers. I think it slows us down and wastes our time. I engage people who are at the margins, who don't know that they are living at the intersection of injustice and climate change. And I try to inspire and provide information to those people, so that they know that their lives are at risk and the future of their children is at risk.

I want folks in our communities to know that things like power plants that are run by gas produce NOx, SOx, PM2.5 and all of those particulates that get trapped in the air passages of our children and our elders because our elders are going to be tremendously vulnerable in the face of climate change.

So, that is what I do. I try to reach people's hearts and minds. But first they need to have hearts and minds.

Ms. VELÁZQUEZ. Thank you.

Ms. DiPerna, in which countries do you see businesses making the greatest efforts toward addressing climate change? And why is that the case?

Ms. DiPERNA. Thank you.

Ms. VELÁZQUEZ. And I am sorry if this question has been asked.

Ms. DiPERNA. No, no.

Ms. VELÁZQUEZ. I was absent from this important hearing because I am the Chair of the Small Business Committee and we were holding a hearing on the government's shutdown impact on small businesses.

Ms. DiPERNA. Well, first of all, the question wasn't asked. And second, as a New Yorker, I am also delighted to see you. And thank you for your decades, years of service.

With regard to companies in our country, it isn't that they are not doing anything. On the contrary, they see the risks, as I said earlier, and are being driven to take proactive measures to protect their business supply chains, and so on.

But with regard to your question, these companies operate in a global environment more and more. For example, you have the European Union, which has instigated very, very strong regulations, particularly looking at the fiduciary responsibility of companies and are they operating within parameters that recognize the risks they may face. And, of course, shareholders are ordinary people very often. They are not just rich people—401(k)s are involved.

With regard to some interesting things going on, for example, China—I know there is lots of controversy about China, but China has declared an ecological civilization. It is built into their national program. They are making tremendous investments in solar energy. Morocco has taken tremendous steps to establish targets.

And with all due respect to all the debate, this is not an either-or situation. Precisely, we need an energy mix. Precisely, we have to use a bit of natural gas to make renewables less expensive. I mean, this is definitely not an either-or. And it is certainly not a choice between top-down or bottom-up. This is a very complex problem, which has been stated. Everybody has a stake in it. And companies are very much benefiting and would benefit from a smoothing of the requirements, so that they don't have to have different operations, one country to the other. That is very expensive.

Ms. VELÁZQUEZ. Thank you.

Ms. DiPERNA. Thank you.

Ms. VELÁZQUEZ. Ms. Yeampierre, a huge barrier for sustainable communities, whether large or small, seems to be management, waste management. As a member of the Transform Don't Trash campaign, how can we urge largely populated cities to be aggressive when asking steps toward zero waste?

Ms. YEAMPIERRE. I was invited to speak in Amsterdam by an international organization that is trying to get businesses to become more sustainable and take responsibility for their practices. All over the world, businesses know that they will suffer and they will lose income because of climate change.

And, then, locally, we have been working with small businesses to become climate adaptable, because they are literally the heart of, the economic driver in our community.

So, I think, going toward zero waste is really important. When we started working with the small businesses, and we were trying to get them to move away from Styrofoam, we also presented them with alternatives that were affordable and the idea of creating co-operatives, so that they could reduce the cost. There are all kinds of things that we can do with businesses so that we can move them away from using products and working in a way that makes them unsustainable. So, that is happening locally.

Ms. VELÁZQUEZ. Thank you.

I yield back my time.

The CHAIRMAN. Thank you.

Mr. Gosar.

Dr. GOSAR. I thank the Chairman. I just heard that we are citing China as being a good actor. A net increase in new coal plants were

built in 2017 with China accounting for 34 of the 61 megawatts that were actually generated. Wow, China is the biggest polluter in the world. India right behind them.

Mr. Hollie, I have to come back to you. I have heard statements that climate impacts different communities.

Mr. HOLLIE. Yes, sir.

Dr. GOSAR. What communities are hit most by the policies like the Green New Deal?

Mr. HOLLIE. Minority and low-income communities, just because we cannot afford the rise in cost that will be associated with these policies.

And, like I said, many people are struggling right now to pay their energy bills.

Dr. GOSAR. Well, this is interesting, because I keep hearing this thing about energy. Are you familiar with baseload energy versus intermittent energy?

Mr. HOLLIE. Somewhat.

Dr. GOSAR. OK. So, I guess what we have to look at is baseload energy happens all the time, 24/7. But intermittent, like solar and wind, if the wind doesn't blow and the sun doesn't shine, it isn't going to work.

Mr. HOLLIE. Right.

Dr. GOSAR. OK? There is a very big difference along those applications.

The problem that we have with baseload energy, with new technology, is molten-salt batteries don't work real well. The other side is not interested in rare earths, and the mining capacities of those that actually help us with new technology called battery capacity. So, we have a problem.

Because it is convenient in Phoenix, Arizona, when you need energy at the middle of the day, when you don't get it, or at night time, when temperatures are at 120. It is kind of hard to tell minority groups, "Just live with it."

Mr. HOLLIE. Yes, sir. I would agree with that. And that is one of the things that I would disagree with the Reverend here is I never said that, we don't agree that climate change does not exist. However, my point is until we find a way, a solution to harness those renewables to sustain ourselves, then we have to use what we've got. And we have an abundance of affordable and reliable energy in this country, and we need to use it.

Dr. GOSAR. Oh, I agree. In fact, one of the companies in northern Scottsdale in Arizona uses sun during the day and gas at night, because it delivers uniform delivery on our grid. So, very important to do that.

But I want to concentrate on something else. I am a dentist, so science is a big deal to me. And if we are talking about carbon sequestration, it seems to me like what we want to have is a very dynamic, engaging forest.

Dr. Curry, would you agree?

Dr. CURRY. I think land use is a very big deal, including—

Dr. GOSAR. I want to get more specific: photosynthesis, like plants take in clean oxygen, right, and produce carbon dioxide. No, they take in carbon dioxide, produce oxygen. They take in dirty water, produce clean water.

So, it seems to me, if we really want to address this, we want to look at the best carbon trap we have, which is a healthy, vibrant forest. And I have heard over and over again that climate change is the problem with our forest burning up. That is not the case.

I am from Arizona. Ponderosa forests are 40 to 60 trees per acre. That is fact. That is what a healthy forest should look like. But what we have, because of lawsuit after lawsuit after lawsuit, we have 800 to 1,000 trees per acre. These starving trees raise to the sunlight, and what ends up happening is when we get these fires, they are no longer landscape fires on the grasslands, they are tree-top fires.

And I want to quote exactly what we saw last year. Wildfires—this is PolitiFact: “Wildfires produce more of one key pollutant, particulate matter, than cars both in California and nationwide. Particulate matter is a mixture of microscopic particles and liquid droplets that, when inhaled, can affect the heart and lungs and cause serious health problems.”

I heard this all along this panel right here, about asthma and all that stuff. Listen to this: “According to U.S. Geological Survey, wildfires in California in 2018 released enough—roughly equivalent of 86 million tons—of heat-trapping carbon dioxide, the same amount of carbon emissions that are produced in a year providing electricity for an entire state.”

So, if we are going to concentrate on this carbon sequestration, I think we ought to be looking at our forests being adaptive. I am part of the Western Caucus. We had a number of different opportunities to look at good neighbor. In fact, one of the most liberal bastions in my state, Coconino County, passed a bond levy to actually start thinning the forest so they had a dynamic interface to stop the fire, Number 1, and Number 2 is get it more dynamic for carbon sequestration.

Would you agree with all those synopses, Dr. Curry?

Dr. CURRY. Most of it. The life cycle of a forest is—it has a complex interaction with CO₂. At some point it becomes not so much of a sequestration. So, managing forests to prevent wildfires and to maximize the CO₂ uptake is certainly a sensible policy.

Dr. GOSAR. And one quick indulgence. A dynamic forest is young trees, medium-growth trees, and old-growth trees, because what we know is young and medium-growth trees produce more oxygen than they do carbon, as the older the tree gets the less they do.

Thank you, Mr. Chairman.

The CHAIRMAN. Thank you very much.

Mr. Horsford.

Mr. HORSFORD. Thank you very much, Mr. Chairman. I am very excited that you have given us this opportunity to really have a robust discussion around climate change. This is an issue that is very important to each of us individually, collectively, to the future of our children.

My oldest son, who is now a freshman in college, asks me all the time, “When is Congress going to act to address the issues of climate change?”

As we have heard here today, the impacts of climate change become greater every year. In my home state of Nevada, a desert state, it is particularly vulnerable to the changing climate. By

2050, it is projected that the city of Las Vegas will experience 106 days per year with temperatures upwards of 105 degrees.

To provide context, Las Vegas currently averages 70 days per year with temperatures more than 100 degrees. It is hot in Vegas. But the fact that we are having those many days per year over 100 degrees is just one example.

Even more concerning, by 2050 the typical number of heat-wave days in Nevada is projected to increase from 15 days per year to 55 days per year. According to the Ready Public Service campaign of the Department of Homeland Security, extreme heat results in the highest number of annual deaths among all weather-related hazards.

Mr. Chairman, sadly, seniors and children are at greatest risk of death during heat waves. Lake Mead, which supplies water to more than 90 percent of Las Vegas, and roughly 25 million people throughout Nevada, California, and Arizona, continued to deplete at an alarming rate, due to increasing temperatures caused by climate change. And in 2016, Lake Mead, which is fed by the Colorado River, reached its lowest level on record, and now holds just 37 percent of its original capacity.

As occurrence of extreme heat rises, the depletion of the Colorado River and Lake Mead is projected to worsen in the future. Additionally, more than 1.2 million people living in Nevada, or 46 percent of our state's population, live in areas at elevated risk of wildfire. As extreme temperatures increase, especially in drought years, the risk of wildfires will continue to rise.

So, the people of Nevada, like people across the United States, are looking for solutions. And they are looking for this Congress to act.

Ms. DiPerna, I want to ask you whether your organization, which works with businesses to understand the business investor impacts, if you can talk to me about the heat waves and drought and how they are a significant concern, and how water issues, particularly around companies and investors, are dealing with this particular issue, and if there are examples that you know in our home state of Nevada.

Ms. DiPERNA. Well, as a matter of fact, today we are having our supply chain conference in Las Vegas. And, as I mentioned in my testimony, Caesar's Entertainment is very concerned about the cost of water. They have facilities in very dry areas, southern Africa, and so on. Dr. Pepper, I mentioned, is also concerned. Every company is worried about water.

And Dr. Cobb mentioned the carbon pricing. I think it would be interesting for you all to know that most companies in the country, including Oklahoma Gas and Electric, are using internal carbon prices to gauge the potential cost of these sort of hidden hitchhikers, which are these carbons that go up into the atmosphere that we don't see, but which cost us something. So, people are using an internal carbon price in anticipation of regulation, or to deal with existing regulations in the jurisdictions where they are covered by regulation.

On the water matter, because of increasing water scarcity, companies have begun to also set an internal water price, because they need to begin to come to terms with the increase in cost of water,

the increasing scarcity. And even more to the point, the increasing lack of usability. Water is potable or usable. We are beginning to have less potable and certainly less usable, unless we spend a lot of money to clean it.

Now, here is where the impact on the poor is potentially catastrophic, because they will have to pass that cost on. There will never be one other drop of water on this Earth. It is all here. You can't make water, so we are into an ultimate scarcity there. And I think that I can provide you with a lot of information from our water disclosure. Company after company is concerned about water. And the IT industry, in particular, because they need to cool those data centers with water. So, their energy costs are climbing. Cooling is becoming a very big cost.

So, it is a complex system. You can't tease out one little bit. But you are the government of the entire country, and so we all look to you to put all the pieces together.

Thank you.

The CHAIRMAN. Mr. Graves.

Mr. GRAVES. Thank you, Mr. Chairman.

Dr. Cobb, I missed some of your comments earlier, but I understand you had raised concerns about energy production and fisheries, and I just wanted to make note that my home state of Louisiana, we produce more offshore energy in the Federal waters than any other state. In fact, I think we would take the other five states that produce and multiply times four, that is how much offshore energy we produce.

We are also the top fisheries producer, in terms of commercial fisheries in the continental United States. There is a habitat that is created by the energy infrastructure. I don't think we have done a great job managing that, in regard to—I think we can take advantage of rigs to reefs programs and others. But I did just want to make note that that is really the hotbed ecosystem or habitat for many of the fisheries in Louisiana.

In the first panel, I brought up a letter from May 2018. That letter was signed by Senators Schumer, Cantwell, Menendez, and Markey. That letter was written to the President of the United States, asking that the President work with our OPEC allies to increase—to increase—global oil production.

I am going to say that again. Senators Menendez, Markey, Cantwell, and Schumer, May 2018, asking the President to work with OPEC to increase oil production, saying that increased production will result in lower energy prices.

Yet, it was interesting in that the first panel, some of the governors that were here, talked about how their efforts to help to reduce emissions were benefiting everyone. But I looked, for example, at the state of Massachusetts that was represented here. Their kilowatt hour electricity cost was more than twice that, more than 200 percent that of my home state of Louisiana, which I just thought was interesting.

Mr. Hollie, I am just curious. Could you share any reflections on just that balance of how do we pursue a climate policy agenda legislation, while at the same time not adversely affect our citizens? How do we strike that balance?

Mr. HOLLIE. Yes, sir. I actually had the chance to visit your state over the summer.

Mr. GRAVES. Come back any time, any of you.

Mr. HOLLIE. Down to Port Fourchon, where we had the opportunity to see where all the on-shore operations take place for all the offshore.

And also when I took the tour of Port Fourchon, they talked about how countries come from around the world to study the Gulf because it is so rich in wildlife and the environment.

So, what that says to me is that energy exploration can co-exist with wildlife and the environment. So, as long as we have that to look at and use as a gauge, I think that is a great place to start.

Mr. GRAVES. Thank you. And let me be clear, we have some extraordinary coastal challenges.

Ms. Yeampierre—did I do that OK? We can engage. I am not a climate denier, I just have really struggled with how we find the right balance in sort of criteria that we use here to move forward on legislation.

I am curious, Dr. Curry. One of the rule changes that I tried to make in this Committee last week was a rule that would cause us to evaluate the job impacts and economic impacts, and try to quantify temperature and sea rise impacts and other things on legislation we progressed.

Do you have any thoughts on how do we properly use criteria or metrics to determine which legislation is actually going to be helpful, in balance, in what may be weighted too hard toward job losses, or too hard toward other things that is just not really advancing a public win or a public goal? Does that make sense?

Dr. CURRY. Well, sort of. This is why I called climate change a wicked problem, why myself and others refer to it as a wicked problem. It is hard to even define the problem. The boundaries just seem to ever expand. The impacts are very wide. No matter what policy we propose, there is bound to be unintended consequences. So, it is a big challenge to sort through all that.

And the approach to me that seems to work the best is where communities and states work to secure their common interests, which are very specific to their location, their economy, their population, their vulnerabilities, as we try to sort through this, rather than a big, top-down mandate.

So, that is my thinking on the subject. I wish there was a simple silver-bullet solution, but there isn't.

Mr. GRAVES. Thank you. And to comply with my commitment, I am going to yield back my 8 seconds.

The CHAIRMAN. You are very kind, thank you.

The bell was about votes being called. Before adjourning the meeting, let me thank the panel, the second panel. As many of the questions, the perspectives my colleagues have brought up when they asked you questions—and rather than repeat the same ones over again, let me just thank Ms. Nazar. Thank you very much. I think your presence here and your testimony talks about us looking beyond our nose, as Members of Congress, to think about the future, your generation, generations to follow.

And this issue of climate change, what I did learn today is that maybe we are not in full-blown, full-throated denial as we were.

We are into a different phase, which is climate change avoidance. And what can we do to stall, change, tinker with the science, raise issues that are meant to slow any solution-seeking or policies or legislative initiatives to deal with this very urgent problem.

Ms. Yeampierre and Reverend, thank you very much. The front-line communities and communities most impacted in a disparate way by unabated climate change and no solution seeking and an afterthought in the policy making, you made sure that those are front and center in the discussion around issues of justice, equity, access, and inclusion, and I want to thank you for that. That is very, very important.

Too often, we make policies at this level, and then have to back-track because, obviously, the impact was never dealt with. And as we seek solutions, that equity has to be part of the discussion all the way down.

Dr. Cobb, thank you very much for bringing to bear what I think is essential in the solution seeking, that is empirical information and science, and we will go from there. That having been absent in the last 2 years, that is no longer going to be the case. Our guidepost needs to be science and facts and empirical information. And if those are the guideposts, we can move forward. And I have every intention of making sure that is central to the discussion.

I also want to thank Ms. DiPerna for bringing to light about businesses. And with or without regulations, that, in anticipation of what is coming, they are preparing. And just as the economic engines of this country of us in this world are preparing for climate change, we should be preparing for everyone else, to make sure that we confront this and deal with it. So, I appreciate your information very much.

And on that note, let me thank you. It is the first hearing. I appreciate your indulgence, as I failed to manage the clock accurately, but it all worked out. And we will go forward. Each Subcommittee will now take upon itself from this Committee to have a similar hearing dealing with that jurisdiction, as we go forward.

This Committee, as Mr. Bishop said, has a lot under the jurisdiction. We feel we over 20 percent of the legislative adaptation and solution—public lands, waters, oceans, and the jurisdiction that is brought, and we intend to pursue it that way. It is a task that we can't ignore, and your testimony today made it abundantly clear that it is something we can't ignore, and in urgency we must deal with it with haste, and not stall, avoid, or ignore it.

Thank you very much.

The meeting is adjourned.

[Whereupon, at 1:36 p.m., the Committee was adjourned.]

[ADDITIONAL MATERIALS SUBMITTED FOR THE RECORD]

PREPARED STATEMENT OF THE HON. DEBBIE DINGELL, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF MICHIGAN

Thank you, Chairman Grijalva and Ranking Member Bishop, for convening this hearing to discuss the threat of climate change and next steps to address this issue.

As a Member of Congress from Michigan, the Great Lakes State, I understand firsthand the importance of addressing climate change and safeguarding our environment for future generations.

The Great Lakes are fundamental to our Nation's environmental and economic well-being. As the single largest surface freshwater source on Earth, the Great Lakes watershed supports countless wildlife and serves as an important source of fresh drinking water to tens of millions of Americans, whose health is directly tied to that of the Great Lakes ecosystem.

Climate change threatens to destabilize this ecosystem, putting the health and well-being of my constituents and millions of others at risk.

Additionally, we have already seen the impact of climate change through increased incidence of deadly wildfires in the western United States, as well as stronger and more destructive hurricanes on the Gulf and Atlantic Coasts.

The cause of these extreme events is indisputable. According to the Trump administration's own National Climate Assessment released last year, "Earth's climate is now changing faster than at any point in the history of modern civilization, primarily as a result of human activities."

Simply put, climate change is already threatening our public health, our economy, and our national security.

The magnitude of this threat demands bold action, and we must work to address this urgent issue without delay.

We must promote renewable energy, commit to investing in new technology, and redouble our conservation efforts to mitigate, adapt, and reverse the growing climate threat.

Additionally, we must rejoin our partners in the international community by committing to the Paris Climate Accord and taking strong action to limit future greenhouse gas emissions.

There is not a single American who will be unaffected by climate change, and I look forward to working with all my colleagues, regardless of background or party, to take serious action to address climate change.

It is my hope that today's hearing underscores the need for bold climate action. We must put our differences aside and take the aggressive actions needed to safeguard our planet for future generations.

PREPARED STATEMENT OF THE HON. JODY B. HICE, A REPRESENTATIVE IN CONGRESS
FROM THE STATE OF GEORGIA

Look, everyone knows I'm a dyed-in-the-wool Georgia Bulldogs fan, and it sure was fun seeing our two running backs face off in the Super Bowl this past Sunday. However, I would be remiss if I did not thank former Georgia Tech professor, Dr. Judith Curry and current Georgia Tech professor, Dr. Kim Cobb for being with us today. The Georgia Institute of Technology is one of the most important public research universities in our Nation and the world, and we thank you both for lending your expertise to us here today.

FACEBOOK,
WASHINGTON, DC

February 8, 2019

Hon. RAÚL GRIJALVA, *Chairman*,
Hon. ROB BISHOP, *Ranking Member*,
House Committee on Natural Resources,
1324 Longworth House Office Building,
Washington, DC 20515.

Dear Chairman Grijalva, Ranking Member Bishop, and distinguished members of the Committee:

We appreciate your leadership in convening the hearing, "Climate Change: Impacts and the Need to Act," and we thank you for the opportunity to submit this statement. Climate change deserves close attention and creative solutions by both policymakers and industry leaders.

At Facebook, we are prioritizing our work to combat climate change, especially as it relates to our own sustainability objectives. As you know, sustainability within corporations is more than simply operating responsibly. We are working to minimize the impact of our energy, emissions, and water usage, protect workers and the

environment in our supply chain, and partner with others to develop and share solutions for a more sustainable world. Our goal is to support the communities we are a part of and to make a bigger positive impact on the world.

Creating and maintaining facilities that contribute positively to our communities is a top priority for our company. Specifically, Facebook has set a science-based target to reduce our emissions by 75 percent by 2020. Between 2011 and 2017, Facebook avoided emitting over 2 million metric tons of CO₂ thanks to these efforts—the equivalent of taking 266,000 vehicles off the road for a year.

Facebook was one of the first companies to commit to supporting our facilities with 100 percent renewable energy in 2011, and our goal is to hit that target by 2020. Our data centers are among the most energy efficient in the world. For each new data center Facebook builds, we add new renewable energy to the same electric grid as our facilities, and we do it in a way that often increases options for other businesses in those communities. We are proud that just last month, a report from Bloomberg New Energy Finance found that Facebook was the largest corporate purchaser of renewable energy last year worldwide.

Facebook embraces our responsibility and opportunity to impact the world beyond our operations. For example, we use rigorous sustainable design standards to ensure that our facilities are constructed with responsible materials, utilize natural daylight, and are energy and water conscious. All of our data centers have achieved LEED Gold certification.

As the Committee continues its work on climate change, we look forward to being part of the conversation on how companies like Facebook can have an impact on this important issue.

Sincerely,

KEVIN MARTIN,
Vice President, U.S. Public Policy.

[LIST OF DOCUMENTS SUBMITTED FOR THE RECORD RETAINED IN THE
COMMITTEE'S OFFICIAL FILES]

Submission for the Record by Rep. Grijalva

—NOAA Report, U.S. and Global Climate for 2018.

Submission for the Record by Rep. Neguse

—“Climate Change in Rocky Mountain National Park,” National Park Service, U.S. Department of the Interior, March 2014.

