BUILDING A 100 PERCENT CLEAN ECONOMY: SOLUTIONS FOR ECONOMY-WIDE DEEP DECARBONIZATION

HEARING

BEFORE THE

SUBCOMMITTEE ON ENVIRONMENT AND CLIMATE CHANGE

OF THE

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C O N T E N T S

WITNESSES

SUBMITTED MATERIAL

[1] The prepared statement of Dr. Gattie has been retained in committee files and also is available at https://docs.house.gov/meetings/IF/IF18/20191205/110295/HHRG-116-IF18-Wstate-GattieD-20191205.pdf.

[2] Mr. Profeta did not answer submitted questions for the record by the time of printing.

[3] The letter has been retained in committee files and also is available at https://docs.house.gov/meetings/IF/IF18/20191205/110295/HHRG-116-IF18-20191205-SD003.pdf.

BUILDING A 100 PERCENT CLEAN ECONOMY: SOLUTIONS FOR ECONOMY-WIDE DEEP DECARBONIZATION

THURSDAY, DECEMBER 5, 2019

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON ENVIRONMENT AND CLIMATE CHANGE,
COMMITTEE ON ENERGY AND COMMERCE,
Washington, DC.

The subcommittee met, pursuant to call, at 10:33 a.m., in the John D. Dingell Room 2123, Rayburn House Office Building, Hon. Paul Tonko (chairman of the subcommittee) presiding.

Members present: Representatives Tonko, Clarke, Peters, Barragán, McEachin, Blunt Rochester, Soto, DeGette, Schakowsky, Matsui, McNerney, Ruiz, Pallone (ex officio), Shimkus (subcommittee ranking member), Rodgers, McKinley, Johnson, Long, Carter, Duncan, and Walden (ex officio).

Staff present: Adam Fischer, Policy Analyst; Jean Fruci, Energy and Environment Policy Advisor; Omar Guzman-Toro, Policy Analyst; Caitlin Haberman, Professional Staff Member; Rick Kessler, Senior Advisor and Staff Director, Energy and Environment; Brendan Larkin, Policy Coordinator; Mel Peffers, Environment Fellow; Nikki Roy, Policy Coordinator; Peter Kielty, Minority General Counsel; Mary Martin, Minority Chief Counsel, Energy, and Environment and Climate Change; Brandon Mooney, Minority Deputy Chief Counsel, Energy; Brannon Rains, Minority Legislative Clerk; and Peter Spencer, Minority Senior Professional Staff Member, Environment and Climate Change.

Mr. TONKO. Good morning, everyone. The Subcommittee on Environment and Climate Change will now come to order.

I recognize myself for 5 minutes for the purposes of an opening statement.

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

For the past several months, the committee has held a series of hearings and stakeholder meetings examining how our Nation can achieve net zero greenhouse gas emissions by mid-century.

Our past hearings have focused on sector-specific issues and solutions. We have examined the industrial, electricity, transportation, and building sectors. Today, we will turn our attention to economy-wide solutions, a category of policies that can result in emissions reductions from across multiple sectors.

We know, to achieve ambitious climate targets, innovations are needed in technology and policy and in finance to accelerate the clean-energy transition and reduce the cost of economy-wide decarbonization.

These crosscutting policies take many different forms. It can include how the data revolution can promote greater efficiency through digitization. It also covers how access to capital and financing opportunities can support deployment of new and needed technologies and infrastructure.

Low-emission solutions, ranging from energy-efficient appliances to electric buses, are commercially available and pay for themselves over time, but the upfront cost can be a barrier. Having financing options available can accelerate widespread adoption of these solutions.

Another potentially powerful policy is carbon pricing, which remains a proven, economically efficient method to put us on the lowest-cost pathway to achieving major emissions reductions.

Today, the costs of climate pollution are not borne by polluters. In my opinion, that is wrong, fundamentally wrong.

Carbon pricing connects—or corrects, rather—a market failure and establishes a long-term price signal to allow each firm to determine how to best manage its assets. While we know market-based policies, like carbon pricing, can be effective, the policy design really matters. We have seen bad programs fail and good ones succeed. And the last decade of experiences from State and foreign governments provides many, many examples of best practices and lessons learned.

Today, millions of Americans are already living under a carbon price in California and the RGGI states. The sky has not fallen, and industry has not crumbled. In fact, those residents are experiencing benefits in terms of public health and new revenue for investments in efficiency and infrastructure programs.

Pricing programs can and should be designed to minimize impacts to consumers, protect low-income households, and preserve the global competitiveness of U.S. energy-intensive, trade-exposed industries.

They should also provide flexibility for regulated entities to the extent that it does not undermine the integrity of the program or result in harmful, inequitable outcomes.

We know that multidecade climate targets require policy certainty. Congressional action can create predictability and credibility while sending the signals that will be necessary to impact long-term planning and investment decisions.

Despite some of the strengths of these types of policies, we must keep in mind that there is no silver bullet to achieving deep decarbonization. We must embrace a broad portfolio of solutions and commit to reinvesting revenues from a pricing program to support complementary policies.

Complementary policies that promote R&D, infrastructure deployment, workforce development, community and worker programs, environmental justice and restoration, resilience, and energy efficiency must be part of our efforts. These types of investments will ensure emissions reductions occur quickly, cheaply, and

fairly, with the benefits of a cleaner economy reaching every community.

We will also hear about another potential model based on existing environmental statutes that gives State governments greater responsibility and flexibility to direct their climate mitigation efforts and achieve nationally determined goals.

We know States and regions face unique climate challenges. I look forward to exploring how we might be able to translate the cooperative federalism model that has resulted in such significant air, water, and soil pollution reductions over the past four decades into the climate context.

I truly believe many of us share a common goal of putting forward cost-effective solutions that protect low-income consumers, promote U.S. competitiveness and invest in energy innovation and infrastructure while ensuring meaningful emissions reductions.

Designing economy-wide solutions that fit with effective sector-specific policies will be key to assembling a meaningful comprehensive climate package.

I thank our witnesses for joining us today. We look forward to your input and your perspective and providing the sort of information that we find very important to these discussions. I look forward to your testimony.

[The prepared statement of Mr. Tonko follows:]

PREPARED STATEMENT OF HON. PAUL TONKO

The Subcommittee on Environment and Climate Change will now come to order. I recognize myself for 5 minutes for the purposes of an opening statement.

For the past several months, the committee has held a series of hearings and stakeholder meetings examining how our Nation can achieve net zero greenhouse gas emissions by mid-century.

Our past hearings have focused on sector-specific issues and solutions. We have examined the industrial, electricity, transportation, and building sectors.

Today, we will turn our attention to economy-wide solutions, a category of policies that can result in emissions reductions from across multiple sectors.

We know to achieve ambitious climate targets, innovations are needed in technology, policy, and finance to accelerate the clean energy transition and reduce the costs of economy-wide decarbonization.

These cross-cutting policies take many different forms.

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It also covers how access to capital and financing opportunities can support deployment of new and needed technologies and infrastructure.

Low-emissions solutions, ranging from energy-efficient appliances to electric buses, are commercially available and pay for themselves over time, but the upfront costs can be a barrier. Having financing options available can accelerate widespread adoption of these solutions.

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Carbon pricing corrects a market failure and establishes a long-term price signal to allow each firm to determine how to best manage their assets.

While we know market-based policies, like carbon pricing, can be effective, the policy design really matters.

We have seen bad programs fail and good ones succeed, and the last decade of experiences from State and foreign governments provide many examples of best practices and lessons learned.

Today, millions of Americans are already living under a carbon price in California and the RGGI States. The sky has not fallen, and industry has not crumbled.

In fact, those residents are experiencing benefits in terms of public health and new revenue for investments in efficiency and infrastructure programs.

Pricing programs can, and should, be designed to minimize impacts to consumers, protect low-income households, and preserve the global competitiveness of U.S. energy-intensive, trade-exposed industries.

They should also provide flexibility for regulated entities to the extent that it does not undermine the integrity of the program or result in harmful, inequitable outcomes.

We know that multidecade climate targets require policy certainty. Congressional action can create predictability and credibility, while sending the signals that will be necessary to impact long-term planning and investment decisions.

Despite some of the strengths of these types of policies, we must keep in mind there is no silver bullet to achieving deep decarbonization. We must embrace a broad portfolio of solutions and commit to reinvesting revenues from a pricing program to support complementary policies.

Complementary policies that promote R&D, infrastructure deployment, workforce development, community and worker programs, environmental justice and restoration, resilience, and energy efficiency must be part of our efforts.

These types of investments will ensure emissions reductions occur quicker, cheaper, and fairer with the benefits of a cleaner economy reaching every community.

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We know States and regions faces unique climate challenges.

I look forward to exploring how we might be able to translate the cooperative federalism model that has resulted in such significant air, water, and soil pollution reductions over the past four decades into the climate context.

I truly believe many of us share a common goal of putting forward cost-effective solutions that protect low-income consumers, promote U.S. competitiveness, and invest in energy innovation and infrastructure while ensuring meaningful emissions reductions.

Designing economy-wide solutions that fit with effective sector-specific policies will be key to assembling a meaningful, comprehensive climate package.

I thank our witnesses for joining us and providing input into this important discussion. I look forward to your testimony.

Mr. TONKO. With that, I will now recognize Mr. Shimkus, Representative Shimkus, being the ranking member of our Subcommittee on Environment and Climate Change, for 5 minutes for his opening statement.

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

Mr. SHIMKUS. Thank you, Mr. Chairman.

And to my friends, a word of warning. When I was going over the testimony and what we have gone—you know, the Congress and where we are at today, it was only 8 years ago that we were trying to move to a cap-and-trade program, and we were moving to national healthcare under Obamacare. Done poorly, the results were politically a change in Congress. So it is just the facts that that is what occurred.

So I think for anyone to not focus on the cost of transition, you are going down a dangerous path. As we see what is going on in France with the yellow vests based upon gas prices, what we have just seen in Iran, based upon an increase in gas prices, for anyone to think that consumers are not going to be price conscious in this debate, I would just say a word of warning.

I am particularly touched by Dr. Gattie's testimony, and I would encourage my colleagues to look at the charts in his testimony, which highlight really a flat-line growth on fossil use and fossil

emissions in the developed world and an astronomical increase in the developing countries, especially the Asian-Pacific region.

So a cost burden on us with no international constraint—the recent announcement by China just yesterday—will indicate that we will do this for nothing. So that is where—you know, Ranking Member Walden talks about those issues of resiliency and efficiency and technology and being able to mitigate the changes that are going to occur, whether we are engaged or not.

So we have had a great series of hearings. As I talked to the panel, as I was able to a few minutes beforehand, which, as the chairman has noted, is going to—been addressing across the spectrum of our energy use, whether it is in the transportation sector, the manufacturing, the generation, and I applaud him for that, because it is really that holistic approach of looking at the entire economy.

But we should not not look at what is going on in the rest of the world when it impinges upon the fact of derailing a properly developed policy that—I think I even heard in the opening statement that—that costs will be increased, and the industries that will be charged will pass that along. That is just an economic fact and reality.

So I look forward to the hearing. I know they are all noted panelists, great testimony. We appreciate your time and your effort.

This is a tough issue. The majority has decided to wrap its arms around it and try to address it, and we are trying to not be in their way as we try to get to a point where there can be growth and development while we address the emission debate, not only in this country but across the country—across the world, actually.

So, with that, Mr. Chairman, I am going to submit my statement for the record. This is just off the heart, as you could tell.

And I yield back my time.

[The prepared statement of Mr. Shimkus follows:]

PREPARED STATEMENT OF HON. JOHN SHIMKUS

When the majority initiated this series of hearings in July, it made clear that its legislative goals would be bold and sweeping—and would touch pretty much every part of people's lives.

Transforming the American economy to produce net zero carbon dioxide emissions in 30 years, as the majority has proposed, requires forcing dramatic change on a scale that is hard for most people to comprehend. And the hearing record developed so far has just touched the surface of what any zero-emissions transformation in the United States would truly entail.

Over the course of the past 5 months, we've heard testimony on the industrial sector, the transportation sector, the power sector and discussed the practical, technological, and economic barriers to eliminating most of the emissions in those sectors.

Today's hearing rounds out the series with a look at "economy-wide deep decarbonization" measures—basically the regulatory approaches that the majority believes are necessary to cap and to tax and to otherwise restrict carbon dioxide emissions across the U.S. economy.

From the various proposals circulating in Congress, it appears that many proponents of deep decarbonization—regardless of the state of technology—aim to increase the cost of generating and transmitting electrical power, fueling vehicles, growing food, and making the products of modern infrastructure, manufacturing, and industry.

What is not often discussed is whether this drive to change our domestic energy and economic system is really the most appropriate and effective approach as a matter of U.S. policy to address climate risks.

From the beginning of this Congress, I have urged that we step back and keep our sights on the problems we are trying to solve. It is useful to revisit some core lessons of this year's climate hearings.

First, domestic decarbonization goals are not possible to achieve with current technology, regardless of the proposed regulatory programs. If we do not have the technology, no new regulation, standard, or international agreement is going to preserve affordable energy and the goods and services people rely upon in their daily lives. Raise the costs on this energy or goods and services and you lose public support. That will be true in the United States, and any other place in the world.

Second, the carbon dioxide emissions problem is a global issue and domestic policies must be considered against this persistent fact.

Recent data from the U.S. Energy Information Administration show some leveling of growth in global carbon dioxide emissions, but emissions will continue to rise as nations continue to seek the benefits of energy, power, transportation, and industrial development in their societies. This is particularly true for China, India and the rest of the developing world.

Third, climate policy exists under a broader umbrella of U.S. national interests relating to national and economic security.

You only need to review the latest natural gas arrangements relating to China and Russia or observe the tremendous benefits our shale revolution has brought to the security of our Eastern European allies to see that energy diplomacy is vital to our strategic interests and cannot be subordinated to anti-oil sentiments. And the same applies to our development and deployment of nuclear technology, which we'll talk about today.

As I've noted in previous hearings, focusing on global energy and economic realities will help us focus on where the real gains can be achieved in reducing future emissions and maintaining the prosperity necessary for addressing future climate risks. These gains will not come from radically and expensively transforming a mature, 20-trillion-dollar U.S. economy but from providing the modern, clean and low-emissions technologies to nations still putting their modern economies in place.

With this in mind, we should widen our focus and look at domestic climate policies through the lens of broader U.S. national security interests. For this reason, I would like to welcome our witness from the University of Georgia, David Gattie. His testimony, which focuses on the national security and climate benefits of nuclear technology, helps to reframe how we should think about our domestic climate policies.

Reorienting our climate policy into a policy of U.S. innovation leadership, much like the Nation pursued with its initial Atoms for Peace program or even our recent work to support our European allies with energy exports, represents a sound, positive approach to these global issues. The more we focus on this, and the innovation to make it happen, the better.

Mr. TONKO. The gentleman yields back.

And the Chair now recognizes Representative Pallone, Chairman Pallone of the full committee, for 5 minutes for his opening statement.

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

Mr. PALLONE. Thank you, Chairman Tonko.

Today's hearing is the seventh hearing in the committee's work to achieve a 100 percent clean economy by 2050. So far, we have examined ways to decarbonize specific sectors of the U.S. economy, including the electricity sector, buildings, transportation, and heavy industry. And we also discussed the impact of climate change on frontline communities.

Throughout these hearings, witnesses told us that we need sector-specific solutions for climate action, especially in sectors that are more difficult to decarbonize. But they also repeatedly pointed to the need for economy-wide measures to ensure we cut pollution across all sectors. So, today, we will explore those crosscutting

mechanisms and the role they should play in addressing the climate crisis.

This hearing couldn't come at a more important time. As we speak, world leaders are meeting in Madrid for the 25th Conference of the Parties to the United Nations Framework Convention on Climate Change, or COP25. President Trump is noticeably absent from the summit. This is the same President who just 1 month ago started the formal process of withdrawing the United States from the Paris Agreement. And if President Trump gets his way, we will be the only country to oppose and abandon the Paris Agreement.

And I had the privilege to travel to COP25 in Madrid with a bicameral congressional delegation, which included Representatives Castor, Peters, and Dingell from our committee. And on our visit, we reminded world leaders and activists that, despite President Trump's retreat from this global crisis, that we are still in. And they made it clear they were grateful that someone was there to represent the United States, because our leadership is so important.

Our continued commitment to the Paris Agreement is more important than ever. New information comes out each week stressing the urgent need for climate action. Just last week, for instance, the United Nations released its annual Emissions Gap Report showing the divergence between current emissions projections and the reductions needed to avoid catastrophic climate change. The report warned that we are on track to miss those targets—and not just by an inch, but by a mile.

The Paris Agreement adopted the science-based target of limited warming to 1.5 to 2 degrees Celsius by 2100. The U.N. report, however, warned that we are heading towards 3.9 degrees of warming by the end of the century. So think about that for a moment, that that's almost double the limit needed to avoid the most damaging consequences of climate change.

Not meeting these targets would have devastating consequences. It would lead to increasingly frequent extreme weather events, more damaging wildfires, rapid sea level rise, more persistent flooding and droughts, threats to entire ecosystems and food supplies, and countless other hazards.

Meanwhile, there was a report by the Global Carbon Project released just yesterday that showed that carbon dioxide emissions would hit an all-time high this year. And on Tuesday, the World Meteorological Organization reported that 2019 will be the second- or third-hottest year ever recorded.

And these are startling trends. But if there is one thing I learned in Madrid, it is that this is not a time for despair. It is time for bold leadership and ambitious action. One of the key reasons that the rest of the world is not meeting these targets is because of a lack of leadership they are seeing right now from the Trump administration. And we heard over and over again that, if the United States withdraws and doesn't participate in the future, the other countries are not likely to go along, because U.S. leadership is what most countries look at. And that is why we have to continue to exercise that leadership. And it is also why this committee is hard at working and developing our proposal to reach net zero emissions

by 2050. I think this is the consensus from the scientific community on what we have to do to avoid the worst impacts of climate change.

So, today, we are going to hear about options for robust comprehensive and economy-wide policy solutions to hit that target. We hear about the essential role the Federal Government can play. And, again, if I can go back to the weekend conference, I think that everyone knows that the State and the local governments continue to play a major role and can do a lot of the things that we need to do to reach the target of 2050, but it is not enough. The Federal Government has to get involved.

So, finally, we are going be to hear about how economy-wide climate action will not only reduce emissions but will also stimulate the economy. By investing in the low- and zero-carbon technologies of the future, the U.S. can become a world leader in clean energy innovation, and I look forward to hearing from our witnesses about that.

And thank you again, Chairman Tonko, and I yield back.

[The prepared statement of Mr. Pallone follows:]

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Today's hearing is the seventh hearing in the committee's work to achieve a 100 percent clean economy by 2050. So far, we have examined ways to decarbonize specific sectors of the U.S. economy—including the electricity sector, buildings, transportation, and heavy industry. We also discussed the impact of climate change on frontline communities.

Throughout these hearings, witnesses told us that we need sector-specific solutions for climate action, especially in sectors that are more difficult to decarbonize. But they also repeatedly pointed to the need for economy-wide measures to ensure we cut pollution across all sectors. Today, we'll explore these crosscutting mechanisms and the role they should play in addressing the climate crisis.

This hearing couldn't come at a more important time. As we speak, world leaders are meeting in Madrid for the 25th Conference of the Parties to the United Nations Framework Convention on Climate Change, or COP 25. President Trump is noticeably absent from the summit. This is the same President who, just 1 month ago, started the formal process of withdrawing the United States from the Paris Agreement. If President Trump gets his way, we will be the only country to oppose and abandon the Agreement.

I had the privilege to travel to COP 25 with a bicameral Congressional delegation, which included Reps. Castor, Peters and Dingell. On our visit, we reminded world leaders and activists that, despite the President's retreat from this global crisis, we are still in. And, they made clear that they were grateful that someone was there to represent the United States because our leadership is so important.

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Meanwhile, a report by the Global Carbon Project, released just yesterday, showed that carbon dioxide emissions will hit an all-time high this year. And on Tuesday, the World Meteorological Organization reported that 2019 will be the second or third hottest year ever recorded.

These are startling trends. But if there's one thing I learned in Spain, it's that this is not a time for despair. It's a time for bold leadership and ambitious action. One of the key reasons that the rest of the world is not meeting these targets is because of the lack of leadership they are seeing right now from the Trump administration.

That is why this committee is hard at work developing our proposal to reach net zero emissions by 2050. This is the consensus from the scientific community on what we must do to avoid the worst impacts of climate change.

Today we will hear about options for robust, comprehensive, and economy-wide policy solutions to hit that target. We will also hear about the essential role the Federal Government must play.

And finally, we will hear about how economy-wide climate action will not only reduce emissions, but will also stimulate the economy. By investing in the low- and zero-carbon technologies of the future, the United States can become a world leader in clean energy innovation. I look forward to hearing from our witnesses. Thank you, Chairman Tonko, and I yield back.

Mr. TONKO. The gentleman yields back.

The Chair now recognizes Representative Walden, the ranking member of the full committee, for 5 minutes for his opening statement, please.

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

Mr. WALDEN. Good morning, Mr. Chairman, and to our witnesses, thank you for being here.

I appreciate the work these hearings have been doing to inform our—your plans for decarbonizing the Nation by 2050. The hearings have provided useful information and necessary context to your plans, and that is helpful. I still hope we will have a hearing on the Green New Deal sometime, since it is talked about by a lot of leaders of the Democratic Party, and we haven't had that hearing in this context, and we should.

We have heard testimony that underscores the essential role of technological innovation and addressing the demand for cleaner energy, transportation, and industrial systems. This echoes the need for bipartisan work to find practical solutions so we can continue to lower emissions and unleash American innovation.

Republicans support realistic steps to reduce emissions and address current and future climate risks. This requires we examine the cost, effectiveness, and economic impacts of solutions proposed to address these risks and that we do not undermine the economic priorities of communities and States around the Nation. We can have a cleaner environment and a strong American economy.

Over the past year, we have pointed out that restructuring old top-down—excuse me—resurrecting old top-down policies, that will hurt American consumers and workers. We have invited our colleagues to work instead on bipartisan policies focused on the bottom-up benefits from incentivizing and deploying innovation that we can move into law.

In fact, we have a dozen bipartisan measures that we could turn into law that could help reduce emissions and spur jobs and innovations. Hopefully, Mr. Chairman, we will get to work on passing some of those measures soon.

Today's hearing offers two approaches to climate policy. One reflects the majority's preferred approach to impose what we would call costly carbon taxes and old cap-and-trade regulations and

schemes. These are some of the top-down regulatory policies that some of us have been warning about. Not only do these policies severely disrupt the American consumers, but they have no chance of becoming law.

Just read the papers around the world: Top-down energy policies are not working. From the Paris yellow vests protest last year to the riots across Chile, poor and middle class, fueled no doubt by some other resentments too, rejected increasing transportation costs in violent protests.

Ironically, the Chilean riots caused the International Climate Conference to have to move to Madrid. One can only imagine what will happen if the decarbonization schemes throughout Europe really begin to turn the regulatory screws on consumers as European bureaucrats seek to meet proposed emissions targets in 10 years. And by the way, their record under the Paris accords is not very sterling.

This is not the way to address global emissions. The more realistic approach is to focus on the advanced technologies, mainly developed in the United States, that can meaningfully address emissions where they are increasing the fastest, which are in poorer nations striving for the benefits of advanced energy and industrial system. They actually want electricity. Who knew, right? So let's do it in a more efficient way.

Recent Energy Information Administration data show that fossil energy, even with the tremendous growth of renewables, will remain a dominant form of energy in developing nations through 2050. This is where the United States can make a difference, providing the innovative fossil and other advanced cleaner technologies to meet this growing demand.

Tackling the emissions where they are growing the fastest represents the broader approach to climate policy that Professor Gattie can speak about this morning.

The deployment of our new nuclear technology to address climate change and to preserve our national security interests is an essential element in any real serious climate policy. This is not only a sensible way to address emissions; it is in keeping with our goals to resurrect our technological leadership in nuclear energy around the world for broader national energy security reasons, much as unleashing the U.S. LNG from our shale revolution restored our ability to counter Russia in energy markets while also driving cleaner technology and fuel switching that has resulted in carbon emissions reduction.

For our part on the Energy and Commerce Committee, we can work together, as we have in the past, to reduce barriers to innovation, to enable the United States to deploy new technologies.

So let's reject taxation and regulation that leads to economic stagnation and pursue practical policies of innovation, conservation, and preparation that can actually drive our economic engines and make realistic headway in curbing emissions from advanced carbon capture to nuclear technology to innovative hydropower.

[The prepared statement of Mr. Walden follows:]

PREPARED STATEMENT OF HON. GREG WALDEN

Thank you, Mr. Chairman, I appreciate your work in these hearings to inform your plans for "decarbonizing" the Nation by 2050. The hearings have provided useful information and necessary context to your plans.

We have heard testimony that underscores the essential role of technological innovation in addressing the demand for cleaner energy, transportation, and industrial systems. This echoes the central message Republicans have for the majority: Work with us. Work with us on practical solutions so we can continue to lower emissions and unleash American innovation.

Republicans support realistic steps to reduce emissions and address current and future climate risks. This requires we examine the costs, effectiveness, and economic impacts of solutions proposed to address the risks—and that we do not undermine the economic priorities of communities and States around the Nation. We can have a cleaner environment and a strong American economy.

Over the past year we have pointed out that resurrecting old, top-down policies that will hurt American consumers and workers. We've invited our colleagues to work instead with Republicans on the bipartisan policies—focused on the bottom-up benefits from incentivizing and deploying innovation—that we can move into law. In fact, we have a dozen, bipartisan measures that we could turn into law that would help reduce emissions and spur jobs and innovation. Hopefully, Mr. Chairman, we'll get to work on passing those measures.

Today's hearing offers two approaches to climate policy. One reflects the majority's preferred approach to impose costly, carbon taxes and old, cap-and-trade regulations and schemes. These are some of the top-down regulatory policies we have been warning about. Not only do these policies severely disrupt the American consumer, but they have no chance of becoming law.

Just read the newspapers. Around the world, top-down energy policies are not working, from the Paris yellow vests protests last year, to the riots across Chile, the poor and middle class, fueled no doubt by other resentments, rejected increasing transportation costs in violent protests. Ironically, the Chilean riots caused the international climate conference to relocate to Madrid. One can only imagine what will happen if the decarbonization schemes throughout Europe really begin to turn the regulatory screws on consumers as European bureaucrats seek to meet proposed emissions targets in 10 years.

This is not the way to address global emissions. The more realistic approach is to focus on the advanced technologies—developed in the United States—that can meaningfully address emissions where they are increasing the fastest, which are in poorer nations striving for the benefits of advanced energy and industrial systems.

Recent Energy Information Administration data shows that fossil energy, even with the tremendous growth of renewables, will remain a dominant form of energy in developing nations through 2050. This is where the U.S. can make a difference: providing the innovative fossil and other advanced, cleaner technologies to meet this growing demand.

Tackling the emissions where they are growing the fastest represents the broader approach to climate policy that Professor Gattie can speak about this morning. The deployment of our new nuclear technology to address climate change and to preserve our national security interests is an essential element in serious climate policy.

This is not only a sensible way to address emissions, it is in keeping with our goals to resurrect our technological leadership in nuclear technology around the world for broader national and energy security reasons—much as unleashing U.S. LNG from our shale revolution restored our ability to counter Russia in energy markets, while also driving cleaner technology.

For our part on Energy and Commerce, let's continue the work we have been doing in the past few Congresses that will reduce the barriers to innovation and enable the United States to deploy new technologies. Let's reject taxation and regulation that leads to economic stagnation and pursue practical policies of innovation, conservation, and preparation to drive our economic engines and make realistic headway in curbing emissions, from advanced carbon capture to nuclear technology to innovative hydropower.

Mr. WALDEN. With that, Mr. Chairman, I would yield to the ranking—the lead Republican on this.

Mr. SHIMKUS. Thank you.

The thing you highlighted and I want to highlight also, let's put this in another current technology. Why is Burisma in the news? Why is Ukraine in the news? Because a Russian pipeline goes through Ukraine. They are afraid of extortion by Russia. I do Eastern European issues all the time. This LNG debate is critical. And this—international security issues cannot be subordinated by anti-oil sentiment for freedom and democracy and rule of law in Eastern Europe.

Thank you.

Mr. WALDEN. I yield back.

Mr. TONKO. And the gentleman yields back.

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

I will now introduce our witnesses for today's hearing. We welcome them again and thank them for their input.

First, we have Mr. Daniel Esty, director the Center for Environmental Law and Policy and Hillhouse Professor of Environmental Law and Policy at Yale University.

Welcome Mr. Esty.

Dr. Noah Kaufman, research scholar, Center on Global Energy Policy at Columbia University.

Welcome, Dr. Kaufman.

And Mr. David Gattie, associate professor at the College of Engineering, University of Georgia.

We welcome you.

And then Mr. Tim Profeta, director of the Nicholas Institute for Environmental Policies Solutions at Duke University.

And welcome, Mr. Profeta.

So, before we begin, I would like to explain the lighting system. In front of you are a series of lights. The light will initially be green at the start of your opening statement. The light will turn yellow when you have 1 minute remaining. Please begin to wrap up your testimony at that point. The light will turn red when your time has expired.

And at this time, the Chair will now recognize Mr. Esty for 5 minutes to provide his opening statement, please.

STATEMENTS OF DANIEL C. ESTY, HILLHOUSE PROFESSOR OF ENVIRONMENTAL LAW & POLICY AND DIRECTOR, YALE CENTER FOR ENVIRONMENTAL LAW & POLICY, YALE LAW SCHOOL AND YALE SCHOOL OF FORESTRY & ENVIRONMENTAL STUDIES; NOAH KAUFMAN, PH.D., RESEARCH SCHOLAR, CENTER ON GLOBAL ENERGY POLICY, COLUMBIA UNIVERSITY SCHOOL OF INTERNATIONAL AND PUBLIC AFFAIRS; DAVID GATTIE, PH.D., ASSOCIATE PROFESSOR, COLLEGE OF ENGINEERING, AND RESIDENT FELLOW, CENTER FOR INTERNATIONAL TRADE AND SECURITY, UNIVERSITY OF GEORGIA; AND TIMOTHY H. PROFETA, DIRECTOR, NICHOLAS INSTITUTE FOR ENVIRONMENTAL POLICY SOLUTIONS, DUKE UNIVERSITY

STATEMENT OF DANIEL C. ESTY

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

Thank you, Ranking Member Shimkus. And thank you all for being here for what I hope will be a conversation that gets into the details of how we take up this critical issue of deep decarbonization but how we do it in a way that addresses not just climate change but the need for a vibrant American economy, for competitiveness, for jobs, and for careful attention to the transition that we need to undertake in the coming decades.

I have spent more than 30 years on this issue going back to time in the late 1980s and early 1990s as a negotiator for climate change on behalf of the U.S. Environmental Protection Agency, more recently as commissioner of Connecticut's Department of Energy and Environmental Protection.

But I do want to take you back just for a moment to 1992 when the Framework Convention on Climate Change was finalized. And I remember being taken aside by the guy who was the secretary general of the 1992 Rio Earth Summit.

And he said to me, "Dan, as you finalize this climate change agreement, remember there is only two possible outcomes: success and real success."

And at the time, I wasn't quite focused on what he was saying. But the point was, when you get 120 Prime Ministers and Presidents together, success is going to be declared. The real test is what occurs over the intervening decades.

And, frankly, we did not see success in a couple of decades after that agreement. And I think the committee, the subcommittee here today, now is doing the right thing of digging into the details of what is the policy framework that can deliver for us a decarbonized future but attentive to these other issues of competitiveness, of jobs, of economic security, and of a just transition that attends to those whose lives and communities will have to evolve as we move forward.

My own experience suggests four things are critical, four issues need to be given careful attention: the incentives for changed behavior, the need to drive innovation as the key pathway to a low-cost and serious decarbonization strategy, the opportunity to bring to bear information technology and a whole range of breakthroughs in science and knowledge that have occurred since we created our framework of environmental laws in the 1970s and 1980s, and, finally, a need to focus on investment and finance.

My own analysis suggests that the greatest weakness of the 20th century approach to environmental protection was not thinking about where the money would come from to do the things we need to do.

So let me quickly highlight what I think we can do and should do. Incentives are at the heart of what is required for a transition. We have to figure out how to change behavior. And innovation, I think, has to come broadly. We need technology breakthroughs, renewable power in various ways, but we need supporting technologies as well, better batteries and storage, smart grids, smart homes, smart appliances. And we really need to think about innovation even more broadly: How do we engage the public in innovative ways? What are the policies that we can do that are innovative, and what kind of partnerships will this transition require?

My own view is that we need to put much more time and attention into what I call a 21st century strategy of green lights for innovation. The 20th century approach was red lights, stop signs, don't do this, don't do that, don't pollute. The 21st century has to be signaling to our entrepreneurial class, to our innovators, to our creative spirits where answers are required and to really spur on the changes that we know are needed.

And I think we know how to do that. We do it in part with economy-wide price signals. My own preference would be for a slowly rising carbon charge beginning at $5 per ton of carbon equivalent and rising $5 per ton per year for 20 years.

The advantage of that is the early low price is not jarring to people that made choices based on prior expectations about energy prices and markets, but the final price of $100 a ton becomes the signal that people pay attention to for all new investments, and it ensures the transition is smooth and can accommodate those whose lives are going to change.

I think second, we have not paid—or third, we have not paid attention to the opportunities to bring to bear digital advances of the last 20 years. So special effort should be given to thinking about how we do that, including the ideas of benchmarking performance at the national scale, the State scale, the community scale, and the corporate scale, and ensuring that we can scorecard performance, identify leaders, spur on laggards, and find best practices.

Finally, think I think we need innovation in investment and finance. We need green bonds, green banks, and a whole new set of strategies for innovatively steering money to the investments that need to be made. And I would be happy to answer questions about my own experience helping to set up Connecticut's green bank that has done dramatic things in this regard. Thank you very much.

[The prepared statement of Mr. Esty follows:]

Congressional Testimony of
Daniel C. Esty
Hillhouse Professor of Environmental Law & Policy and
Director, Yale Center for Environmental Law & Policy
Yale Law School and Yale School of Forestry & Environmental Studies

Before the
Subcommittee on Environment & Climate Change
Committee on Energy & Commerce
U.S. House of Representatives
1st Session, 116th Congress
December 5, 2019

Chairman Tonko, Ranking Member Shimkus, distinguished members of the committee, thank you for inviting me here today to discuss opportunities to build a clean energy economy for the 21st Century. My name is Dan Esty, and I am a Professor at Yale University's Environment and Law Schools, as well as the Director of the Yale Center for Environmental Law & Policy. From 2011 to 2014, I took a leave from Yale to serve as Commissioner of the Connecticut Department of Energy and Environmental Protection. In the late 1980s and early 1990s, I served in a number of senior positions at the U.S. Environmental Protection Agency under EPA Administrator William K. Reilly and President George H.W. Bush — including work as a negotiator of the 1992 UN Framework Convention on Climate Change.

I am grateful for the opportunity to share my perspective on how best to move our society toward a sustainable future undergirded by a clean energy economy. My more than thirty years of work on climate change issues makes me well aware of challenges we face in decarbonizing, but I also want to highlight the equally important opportunities this energy transition offers our nation — and how we might structure policies to ensure that our pathway to decarbonization not only protects the planet but also lays the foundation for a vibrant American economy in the decades ahead, improves our national competitiveness, and provides a smooth transition for those whose lives and communities will be transformed by the shift away from fossil fuels.

I am an unusual professor having served in government in both Republican and Democratic administrations and having helped dozens of companies, foundations, and other organizations bring a focus on sustainability into their day-to-day strategies, as well as having spent decades researching what regulatory approaches deliver the best results. I have written about how our existing framework of environmental law and policy was built on a bipartisan

basis – and how it has improved water and air quality across the country, strengthened our management of waste, reduced our exposure to hazardous chemicals, and been broadened to try to ensure that environmental progress benefits all of our citizens.[1] But I have also chronicled how the 21st Century demands new environmental protection strategies that take advantage of the enormous advances of recent years in environmental public health and ecosystem science as well as the new technologies (such as the internet, Big Data, and smartphones) that have transformed many aspects of American life but have not been fully deployed in the environmental arena to ensure that our approach to pollution control is stronger and lighter as well as more flexible and efficient.[2] I have distilled the core lessons I have learned over the past 30+ years in the paragraphs that follow, centered on the need for a multi-dimensional climate change policy framework that emphasizes:

1. Incentives
2. Innovation
3. Information
4. Investment

To decarbonize our economy at the speed and scale necessary to tackle climate change will require a portfolio of policies — some of which entail economy-wide initiatives, including carbon pricing, but others of which might be advanced within specific sectors on a more targeted basis.

Incentives

Our 21st Century sustainability strategy must go beyond the *red lights* and stop signs that characterized environmental protection in the past. Instead of just telling people and companies what *not* to do, we need a structure of incentives — green lights, if you will — that encourages environmental problem solving.[3] Fundamentally, we need a broad framework of incentives that engages the creative spirits and entrepreneurial talent across our nation and around the world in delivering the breakthroughs that we need to ensure a cost-effective transition to a clean energy future. These incentives should take a number of forms.

First, polluters should pay for the harms they cause. The most important step toward a "green lights" framework of incentives to promote decarbonization would be the adoption of the *polluter pays principle*.[4] Instead of the government *permitting* pollution — literally issuing permits that license emissions — polluters should be held accountable for the harm they cause. This principle — that *externalities should be internalized* as economists might say — goes back 400 years in the Anglo-American legal tradition and has long been understood as fundamental to the protection of property rights. The same principle — that emissions should be stopped or paid for — could also be framed as *do no harm*, the ethical foundation of the medical profession.

In the context of decarbonization, the commitment to making polluters pay for the harm they cause means charging for the greenhouse gases they emit. This price signal would

provide a clear incentive to the business community, and to the public more generally, to reduce their emissions, while still allowing companies and individuals to determine *how* to adjust their practices.

Pricing pollution has produced major policy successes in the past. For example, the 1990 Clean Air Act Amendments (adopted with overwhelming bipartisan Congressional majorities in both the House and Senate) set up an emissions allowance trading system to control sulfur dioxide emissions and reduce acid rain. This "cap and trade" approach spurred creative means of reducing emissions that delivered environmental benefits at a fraction of the projected cost, while avoiding the need to have the government pick "winners" or specify technology requirements. Likewise, the escalating tax on chlorofluorocarbons (CFCs) in the 1990 Amendments helped spur the private sector to develop CFC substitutes across a range of uses – thereby protecting the Earth's ozone layer with minimal economic disruption and at low cost.

In a similar spirit, I think the transition toward a more energy efficient future based on carbon-free electricity could be advanced through a structure of economy-wide incentives. In this regard, I favor a gradual but steadily increasing greenhouse gas emissions charge that begins at $5/ton of CO_2 equivalent, escalating at $5/ton per year for twenty years to a final price of $100/ton. The low initial charge would make the burden on consumers and businesses modest in the early years, thereby ensuring that companies, communities, and families alike would have time to transition toward cleaner energy options and encouraging them to get on board the decarbonization train rather than seeking to derail it.

Note that the carbon-optimization calculus for *future* investments would change immediately. Anyone considering an energy-intensive capital investment — whether that might be a power plant, an industrial building, or even a new car — would factor the $100/ton long-term carbon charge into their choice. This carbon pricing framework would thus provide a clear incentive for commitments to energy efficiency and carbon-free electricity in a manner that minimizes transition costs and maximizes political appeal.

Any carbon pricing policy should be attentive to distributional consequences across a number of dimensions as well as economic efficiency. A carefully designed transition strategy should be adopted that would assist both lower-income Americans and those who live in rural areas, who might be more dependent on fossil fuels. These issues of equity can be – and should be – addressed through the distribution of carbon charge dividends. One possibility would be to lower payroll taxes, which represent a significant part of the tax burden on America's middle class.

Another revenue rebate possibility would be to distribute the funds collected to the 50 states, who could then reinvest the money in ways that best position their residents for economic success in the years ahead. Some states might choose to lower taxes, while others might invest in economic development strategies, healthcare programs, high-speed internet, or other initiatives that attend to the needs of those who might otherwise be overlooked during the

transition to a clean energy future. A variation on this theme might even adjust the level of each state's carbon charge rebate to reflect the state's carbon-intensity, ensuring the greatest level of transition support goes to the states undertaking the most substantial energy transformations.

And while a federal carbon charge would provide the broadest possible "green light" to encourage movement toward clean energy, some of the same advantages can be achieved by state-level greenhouse gas pricing systems such as those put in place by California's AB32 or the Regional Greenhouse Gas Initiative (RGGI) in the Northeast. Indeed, one of the other critical policy lessons of recent years might well be that a bottom-up framework of law and policy sometimes has advantages over top-down approaches.

Additional incentives for problem solving and innovation might be centered on specific clean energy challenges.[5] Just as the recently adopted 45Q tax credits have encouraged a focus on carbon capture and sequestration, targeted funding and incentives to promote research and development on other requirements for a clean energy future might be considered to advance cost-effective batteries or other modes of electricity storage, smart grids, distributed generation, and other technology breakthroughs.

Innovation

No element of environmental strategy is more important to the success of decarbonization than innovation. Broadly speaking, one of the most significant conclusions of social science in the 20th Century centers on the importance of *continuous improvement* through innovation. Organizations and institutions that reinvent themselves and promote fresh thinking dramatically outperform those that do not. Our 20th Century approach to environmental law and policy did not prioritize innovation; our 21st Century policy framework must do so.

I would therefore put innovation at the very heart of any policy push toward a clean energy future, not only as a way to protect the planet, but also to position America at the forefront of the emerging clean energy economy.[6] While the advances of the Information Age have transformed many sectors of society — from how businesses do marketing to how baseball teams pick players — we have just begun to deploy digital strategies in response to our energy and environmental challenges. We know, however, that if companies have to pay for their emissions, they will succeed in finding new and better ways of doing business that minimize their pollution charges. This spur to innovation means that enterprises think not only about how to improve their own performance, but also how they might solve their customers' energy and environmental problems.

In designing the policy framework to promote innovation, I would focus broadly and not just on technology breakthroughs. Indeed, we should also be looking for innovation in

policy design, incentives for changed behavior, public engagement, partnerships, and finance.

Information

A new emphasis on environmental performance data and metrics offers another way to promote sustainability broadly and movement toward a clean energy future in particular.[7] Thus, a new policy framework designed to promote decarbonization might establish a set of sustainability indicators that can be used to gauge the relative success of our country, states, cities, companies, and households in advancing toward a decarbonized future. By providing a methodologically consistent structure for reporting on sustainability performance, we can spur a healthy competition that celebrates leaders, calls out laggards, and highlights best practices. A commitment to a more data-driven and empirically rigorous policy structure would also help to ensure that our environmental protection efforts focus on implementation — and the delivery of "on the ground" progress on climate change and other issues.[8]

With a growing number of investors now wanting their portfolios to reflect their values, including their interest in addressing climate change, *sustainable investing* presents another "information" opportunity to promote decarbonization.[9] Specifically, while environmental, social, and governance (ESG) metrics already exist, much of the data available fails to inspire confidence among fund managers, investment advisors, or investors themselves. Doubts about the quality of data, methodological underpinnings, comparability, and integrity of the available corporate sustainability metrics represent a major obstacle to an expanded commitment of capital to projects, companies, mutual funds, and other investment vehicles promoting clean energy.

To encourage the flow of capital toward companies advancing solutions to climate change and away from those that are not doing so, ESG metrics need to be made as clear, consistent, and reliable as the financial data on which investors regularly rely. My own research suggests a number of ways that the existing structure of ESG metrics might be improved[10] — including the suggestion that as sustainability-related metrics in general and climate change indicators in particular become more *material* to investors, the Securities and Exchange Commission (SEC) might want to specify a core set of ESG metrics to be included in regular annual reporting.

Investment

Perhaps the greatest shortcoming of environmental policy in the 20th Century was the failure to think about where the money would come from for investments in pollution control. Creative strategies for finance — using limited public money to leverage private capital — must therefore be considered a priority in any policy framework to address climate change. In this regard, we should be looking for ways to support funds committed to

decarbonization through Green Banks, Green Bonds, and other creative sustainable finance tools.

Connecticut's Green Bank, launched in 2011, offers a valuable model in this regard, having used limited funding (some of which represents the proceeds of RGGI emissions allowance auction) to ramp up both energy efficiency and clean energy deployment.[11] The Green Bank has moved from having each dollar of public money leverage one dollar of private funding to a model that offers a nearly 7:1 leverage ratio. In addition to moving away from a "subsidy" model to a "finance" strategy for clean energy, the CT Green Bank has adopted a range of other policy innovations, including reverse auctions for renewable energy projects (harnessing competition to drive down ratepayer costs), a robust C-PACE program (which reduces the risk on clean energy loans by having the funds repaid alongside a company's property taxes), default risk-sharing to encourage banks to write clean-energy loans, a commitment to working with cities and towns to reduce the "soft costs" (related to building permits and other regulations) of clean energy projects, and rigorous cost-effectiveness assessments — all of which has translated into $1.7 billion of high-impact new clean energy investments in the past eight years.

Green bonds generally and climate bonds specifically are providing another source of new clean energy funding. Dozens of companies, the city of San Francisco, the European Investment Bank, and the World Bank have all launched fixed-income investment vehicles linked in some way to specific climate change solutions. While these initial green bond strategies have found some success in raising private capital, stronger verification of the "green" dimension of the projects being supported would be helpful.

Conclusion

With the right structure of incentives, emphasis on innovation, a commitment to re-designing our policy strategies to take advantage of the improved science and cutting-edge technologies of our Information Age, and a fresh approach to financing clean energy investments based on using limited public funds to leverage private capital, we can advance decarbonization, improve environmental outcomes more generally, strengthen our economy, enhance America's global competitiveness, and promote the required energy transition in an efficient and equitable way. As I indicated at the outset, after working in the environmental arena at the global, national, state, and local levels across four decades, I am confident that the United States can lead the world toward a sustainable future. But my experience also suggests that transformative change of the kind required to respond to climate change is almost impossible to deliver under the American political system on a one-party basis because the swing of the political pendulum means that policies that lack a broad base of support will almost certainly be undone when the other party takes power. The decarbonization agenda that I have outlined above will not please all Democrats nor all Republicans, but it offers a number of elements around which a policy compromise might be fashioned and thus a successful response to climate change constructed.

[1] Esty, Daniel C. "Introduction," *A Better Planet: 40 Big Ideas for a Sustainable Future*, Daniel C. Esty (editor), Yale University Press, 2019.

[2] Esty, Daniel C. "Environmental Protection in the Information Age." *NYU Law Review*, 30 July 2003.

[3] Esty, Daniel C. "Red Lights to Green Lights: From 20th Century Environmental Regulation to 21st Century Sustainability," *Environmental Law* 47(1): 1-80 (April 2017).

[4] Nordhaus, William D. *The Climate Casino: Risk, Uncertainty, and Economics for a Warming World*, Yale University Press, 2015.

[5] Dernbach, John C. and Michael B. Gerrard (editors). *Legal Pathways to Deep Decarbonization in the United States*. Environmental Law Institute, 2019.

[6] Esty, Daniel C. "Red Lights to Green Lights: Toward an Innovation-Oriented Sustainability Strategy," *A Better Planet: 40 Big Ideas for a Sustainable Future*, Daniel C. Esty (editor), Yale University Press, 2019.

[7] Esty, Daniel C. "Measurement Matters: Toward Data-Driven Environmental Policy-Making," *Routledge Handbook of Sustainability Indicators*, Simon Bell and Stephen Morse (editors), Routledge, 2018.

[8] Esty, Daniel C. "Regulatory Transformation: Lessons from Connecticut's Department of Energy and Environmental Protection," *Public Administration Review*, vol. 76, no. 3, 2016.

[9] Karpilow, Quentin, and Daniel C. Esty. "Harnessing Investor Interest in Sustainability: The Next Frontier in Environmental Information Regulation," *Yale Journal on Regulation*, vol. 36, no. 2, 2019.

[10] Esty, Daniel C., and Todd Cort. "Corporate Sustainability Metrics: What Investors Need and Don't Get," *Journal of Environmental Investing*, vol. 9, no. 1, 2017.

[11] *Connecticut Green Bank*, https://ctgreenbank.com/

Mr. TONKO. Thank you, Mr. Esty.

Now, we will recognize Dr. Kaufman for 5 minutes, please.

STATEMENT OF NOAH KAUFMAN, PH.D.

Dr. KAUFMAN. Chairman Tonko, Ranking Member Shimkus, members of the committee, it is an honor to be here. Thank you for the invitation.

To build a clean economy, we need to align the incentives, the producers, consumers, and investors across the entire U.S. economy with the long-term goal of net zero emissions.

Any economist will tell you that one critical piece of a deep decarbonization strategy is a price on carbon. That is because a carbon price encourages emissions reductions wherever and however they can be achieved at a low cost without needing to know beforehand what those reductions will be. Minimizing the cost of decarbonization means less of a burden on all of us, which should enable faster decarbonization.

Research led by the Center on Global Energy Policy at Columbia University suggests that any of the eight carbon prices proposed to Congress this year would dramatically change the future pathway for U.S. emissions from roughly flat to rapidly declining, far beyond the U.S. commitments to the Paris Agreement.

So putting a price on carbon should be a no-brainer. But how a carbon price is integrated into a broader-struck policy strategy will influence its effectiveness and also the public's support. Here are four suggestions.

First, protect those who can't afford to pay more. The payments of the carbon price can be returned to Americans as carbon dividends. As a general rule of thumb, returning 10 percent of the revenue to the bottom 20 percent of the income distribution can ensure that these households receive more in carbon dividends than they pay in higher prices. If you want to protect more households, simply use a larger portion of the revenue. Under a well-designed carbon price, those who can't afford to pay more don't have to.

Second, keep U.S. businesses on a level playing field with foreign competitors. One of many ways to do this is with a border carbon adjustment, which requires importers of carbon intensive products to pay the carbon price and provides rebates to exporters. The United States would be implementing its climate policy on the global marketplace.

Third, improve economic opportunities for communities that are dependent on the coal industry, which is the only U.S. industry likely to experience immediate, significant harm from a well-designed climate policy.

Over one-third of U.S. coal production comes from one county. Nearly 90 percent comes from just 50 counties. These communities helped power the American economy for generations, often at the expense of their own well-being. They have earned the support of their country as it transitions away from coal.

Fourth, and finally, surround the carbon price with policies that enable even faster and cheaper emissions reductions, which include efficiency standards that overcome barriers to reduced energy use, funding innovations in low-carbon solutions, and supporting the early stage deployment of these solutions that gives them a fair

shot at competing against incumbents like gasoline vehicles and furnaces.

Not every policy will enable faster, cheaper emissions reductions. We may not need to regulate the same emissions that are covered by the carbon price or to subsidize mature technologies, especially if the carbon price has been designed to be consistent with a desired pathway to net zero emissions.

I want to conclude by applauding the committee for taking on this challenge. A few years ago, I helped to build a deep decarbonization strategy for the United States. So I know that the scope of this problem can be daunting. You have hundreds of decisions to make. You will hear strong and sometimes conflicting opinions about every single one of them.

My advice is don't let this complexity distract you from actions that can really move the needle. Let's establish an incentive to reduce net emissions across the entire economy. Let's support low-carbon solutions so that they can compete on a level playing field. Let's protect American families and businesses who can't afford price increases, and let's support coal communities.

With that, I look forward to your questions and comments.

[The prepared statement of Dr. Kaufman follows:]

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CONGRESSIONAL TESTIMONY OF **NOAH KAUFMAN, PHD**

Research Scholar, Center on Global Energy Policy, Columbia University School of International and Public Affairs

BEFORE THE SUBCOMMITTEE ON ENVIRONMENT & CLIMATE CHANGE OF THE COMMITTEE ON ENERGY & COMMERCE, UNITED STATES HOUSE OF REPRESENTATIVES, 116TH CONGRESS

Thank you for inviting me here today to discuss solutions for economy-wide deep decarbonization. My testimony begins by describing the need for comprehensive, economy-wide climate policies and the benefits of including a price on carbon dioxide emissions. Then, I will propose four principles for integrating a carbon price into a broader policy strategy.

A comprehensive solution that focuses on emissions is critical for addressing climate change

The risks of climate change worsen as temperatures rise, and temperatures will only stabilize when global carbon dioxide emissions fall to net zero.[1] A net zero pathway requires a strategy that addresses sources of emissions across the entire economy. No other country, particularly in the developing world, will adopt strategies consistent with net zero emissions targets unless the United States commits to its own comprehensive climate strategy.

Focusing on technological progress alone will not work. Consider an analysis by the Department of Energy (DOE) that asked each DOE clean energy program for "stretch" technology goals and assumed all goals would be successfully achieved. Even if that scenario, which no risk manager would recommend counting on, U.S. emissions are projected to fall by less than one-third over the next few decades.[2]

Instead, we need a strategy that focuses on the policy objective: reduced emissions. And we need broad incentives that filter down into the nooks and crannies of our economy, eliminating the market failure that causes producers, consumers, and investors to ignore the impacts on the climate of their day-to-day decisions.[3]

A carbon price should be part of a comprehensive climate policy

A price on carbon is a fee on each ton of carbon dioxide emissions, making those responsible for the emissions pay for the damages they cause.

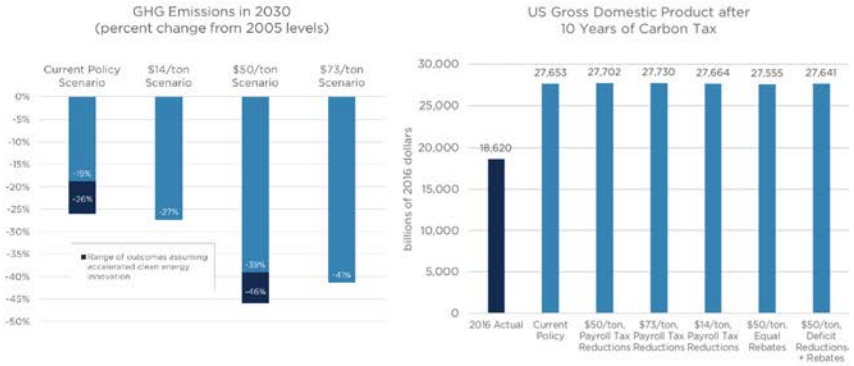
A comprehensive climate policy could be designed without a carbon price, but a carbon price is unique in encouraging emissions reductions wherever and however they can be achieved at a low cost, without needing to know beforehand what those opportunities will be. Specifically, the policy creates a financial incentive to take advantage of any opportunity to reduce emissions that costs less than the carbon price. In contrast, policies will be more costly if they dictate that emissions reductions must occur from specific sources or sectors or technologies.[4]

That is a key reason why a federal carbon price would achieve large emissions reductions at a small cost. Analysis led by the Center on Global Energy Policy at Columbia University finds that a slowly rising carbon price starting at $50 per metric ton could cause net emissions to fall to 39-46 percent below 2005 levels in the first decade.[5] That is the impact of the carbon price by itself—far greater reductions could be achieved as part of a broader strategy and over a longer time horizon.

Further, the analysis shows that the differences in U.S. gross domestic product between scenarios with and without a carbon price are well under 1 percent (see Figure 1).[6] These studies are of course imperfect—for example, they ignore the economic benefits of avoided regulations and the innovation stimulated by the carbon price—nevertheless, given the large emissions reductions the carbon price would achieve, it is notable that studies suggest roughly zero impacts on the overall growth of the U.S. economy.[7]

Minimizing the costs of emissions reductions is not only beneficial to top-line indicators like economic growth, but also means a lower economic burden on everyone, and these lower costs should enable a more rapid pace of emissions reductions. For any policymaker with the goals of deep decarbonization and a strong economy, putting a price on carbon dioxide emissions is a no brainer.

Figure 1: Impacts of a Federal US Carbon Price on Emissions and Gross Domestic Product



Notes: The analysis examined three scenarios with carbon taxes starting in 2020, as well as the current policy scenario for comparison. In the a $14/ton scenario, the tax starts at $14 per metric ton (in 2016 dollars) and rises by about 3 percent annually (above inflation); in the $50/ton scenario: the tax starts at $50 per metric ton and rises by about 2 percent annually; in the $73/ton scenario, the tax starts at $73 per metric ton and rises by about 1.5 percent annually. The emissions analysis was conducted by the Rhodium Group, and the economic analysis was conducted by Rice University's Baker Institute.

Source: Kaufman N. & Gordon K. "The Energy, Economic & Emissions Impacts of a Federal US Carbon Tax." Columbia University Center on Global Energy Policy. July 2018.

Integrating a carbon price into broader policy strategy

The decision to include a carbon price in a comprehensive climate policy strategy should be easy,[8] but *how* a carbon price is integrated into a broader policy strategy will influence its effectiveness and its acceptability to the American people. In what follows, I will offer four policy principles that address valid concerns with economywide climate solutions:

#1. Protect those who cannot afford price increases

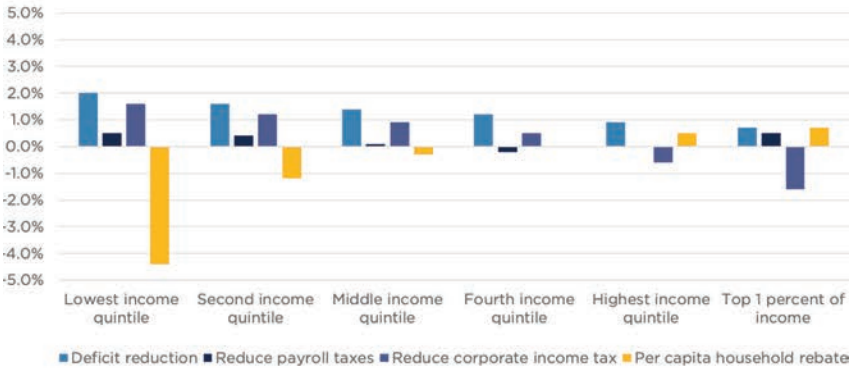
Americans who have trouble paying energy bills or maintaining adequate heating or cooling services cannot afford to pay more. With a well-designed carbon price, they do not have to.

The payments of the carbon price become government revenue. The most straightforward way to protect those who cannot afford price increases is to use the revenue to provide compensation for the increase in expenditures caused by the carbon price: such payments are often called "carbon dividends."

As a general rule-of-thumb, using ten percent of the revenue from the carbon price for carbon dividends to households in the bottom twenty percent of the income distribution ensures the carbon dividend payments to these households are larger than the payments of the carbon price from these households.[9]

Some policymakers will prefer to provide larger payments to low-income households, to ensure that even outlier households are protected. Others will prefer to protect middle-class households as well. These goals can be readily achieved by using more than 10 percent of the revenue for carbon dividends. For example, one recent proposal in the House of Representatives and Senate would use over half of the carbon pricing revenue to pay a monthly carbon dividend to households with annual incomes below $150,000.[10] Another proposal, which has more than 70 cosponsors in the House of Representatives, uses nearly all revenues for carbon dividend payments to all Americans, which creates a highly progressive policy (see Figure 2).[11]

Figure 2: Change in Tax Burden as a Percent of Pre-Tax Income in 2025 for a $50/Ton Carbon Tax Scenario



Notes: Assumes a carbon tax of $50 per metric ton (in 2016 dollars) is implemented in 2020 and increases by 2 percent annually (above inflation). Each bar in the figure reflects a different assumption about how 100 percent of the carbon tax is used. The "per capita household rebate" scenario assumes all revenues are used for carbon dividends. The analysis was conducted by the Urban-Brookings Tax Policy Center.
Source: Kaufman N. & Gordon K. "The Energy, Economic & Emissions Impacts of a Federal US Carbon Tax." Columbia University Center on Global Energy Policy. July 2018.

Time and again, we see people around the world respond with outrage when energy prices are raised in ways perceived as unfair.[12] Notably, a recent national election in Canada saw about two-thirds of the country vote for parties that support the national carbon pricing policy that includes protections for low- and middle-income households.[13]

A well-designed carbon price will not impose additional burdens on Americans who cannot afford them. What Americans truly cannot afford are ever-increasing climate change impacts, which disproportionately harm the poor.[14]

#2. Keep U.S. industries on a level playing field with foreign competition

Imposing economywide climate policies raises concerns about the competitiveness of domestic companies compared to foreign companies whose products are not taxed or regulated comparably. A poorly designed climate policy could cause U.S. businesses to lose market share or flee the country, risking economic harm and emissions leakage (i.e. emissions sources relocating abroad).

Fortunately, there are multiple ways to avoid these outcomes. The most common approach, included in all eight carbon prices proposed in Congress this year, is a border carbon

adjustment (BCA).[15] Under a BCA, policy makers define a set of industries that are most at risk based on their energy-intensity and trade-exposure (e.g. steel, cement), require importers of these products to pay a fee, and provide rebates to exporters of the same products. The United States, which is the major trading partner for so many countries, would thus be implementing its carbon price in the global marketplace.

Another way to keep industries on a level playing field is to provide compensation to offset the payments of the carbon price, similar to the protection for households described earlier. Economists have proposed paying trade-exposed industries an amount equal to the expected payments of the carbon price for a representative company in each industry. That way, if these companies can reduce their emissions, they will receive the same subsidy but pay less in taxes.[16]

Of course, U.S. businesses do not need protection from foreign competitors that face comparable climate policies. The European Union and Canada are two of the three largest trading partners of the United States, and they are well ahead of the United States in terms of the stringency of their climate policies.

#3. Improve economic opportunity in coal-dependent communities

Only one US industry is likely to see immediate and significant harm from a well-designed climate policy strategy: the coal industry.[17]

Coal production in the United States fell by one-third between 2007 and 2017, while its market share in the U.S. electricity system fell from about one-half to about one-quarter. Projections of the U.S. energy system show this decline continuing gradually under current policies. However, even a moderately stringent climate policy could create existential risks for the U.S. coal industry (see Figure 3).[18]

Coal is no longer needed for reliable and affordable electricity in the United States, and the rapid decline of coal use would be great news for our public health and for the climate. After all, coal is the most carbon-intensive fossil fuel, and it produces harmful local pollutants that cause diseases and pre-mature deaths.[19]

These benefits would be small consolation to regions of the country that are highly dependent on the coal industry, many of which are already struggling mightily due to the decline in production over the past decade (caused primarily by low natural gas prices[20]). In the most coal-dependent counties, the industry is directly responsible for one-third to one-half of county government revenues. The decline of a dominant industry risks downward spirals in local governments' fiscal conditions, including the inability to raise revenue, repay debt, or provide basic public services.[21]

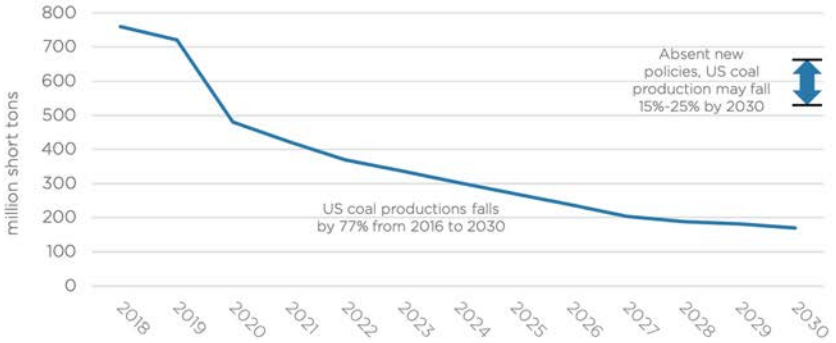
Fortunately, compared to the resources of the federal government, the size of this problem is small because the production of coal is so geographically concentrated. Over one-third of US coal production is from one county in Wyoming and nearly 90 percent of U.S. production is from just 50 counties.[22] The coal mining industry employs just over 50,000 workers, down from 860,000 in the 1920s.[23]

A small fraction of revenue from a federal carbon price in the United States could fund billions

of dollars in annual investments that provide economic opportunity to coal-dependent communities and direct assistance to coal industry workers, including fulfilling pension obligations. Alternatively, support for coal communities could be provided in separate legislation, or perhaps as part of a broader program to support rural communities across the country that have similarly seen rapid declines in their dominant industries.

Coal industry workers spent generations, often at the expense of their own well-being, providing the energy that powered a good part of the American economy.[24] These communities have earned the support of their country as it transitions to a low-carbon economy.

Figure 3: Projected US Coal Production with a $25/ton Carbon Price in the Electricity Sector



Notes: The projections assume a carbon price is applied to the U.S. power sector starting at $25 per metric ton in 2020 and increasing at 5 percent (above inflation) each year.

Source: The $25/ton carbon price scenario is a "side case" from U.S. Energy Information Administration's (EIA) Annual Energy Outlook 2018 report. The projections absent new policies are from EIA's Annual Energy Outlook 2019 and Rhodium Group's 2018 "Taking Stock" report.

#4. Surround the carbon price with policies that enable even faster and cheaper emissions reductions

A carbon price will be most effective when implemented across the entire economy (where feasible). However, even a price that covers all emissions is just one part of an economywide climate strategy.

Policymakers should strive to adopt measures that enable more cost-effective reductions of greenhouse gas emissions than a carbon price would achieve on its own (see Figure 4).[25] Categories of policies and regulations that fall into this category include the following:

- ***Funding innovation***. Accelerating innovation in low-carbon technologies will not lead to deep decarbonization by itself, but it will ease the shift away from carbon-intensive

activities, both in the United States and abroad. In the hardest-to-decarbonize sectors, innovation is needed to create viable low-carbon alternatives.[26] In sectors where viable solutions already exist, innovation will enable faster and cheaper transitions. Absent government support, the private sector will underinvest in technological progress because it does not capture the full benefits of the emergence of new and improved goods and services. Private investors also prefer short-term payoffs with minimal risk, while the most important innovations often arise from long-term investments with many failures along the way. Governments can fill these voids with policies that encourage low-carbon solutions throughout the innovation process.

- ***Supporting the emergence of low-carbon solutions***. Displacing incumbent carbon-intensive options requires more than simply developing low-carbon solutions. Consumers are often hesitant to shift to new products because they are perceived as risky (sometimes they are right). Early adopters of technologies provide benefits for those who come later through "learning-by- doing" (i.e., production costs fall as manufacturers gain experience) and "learning-by-using" (i.e., future producers have more information about the characteristics and success of the technology).[27] The federal government should encourage these early adopters with subsidies and supportive infrastructure. For example, in the electricity sector, this may include temporary tax incentives for the critical applications of a low carbon grid.[28] In the transportation sector, it may include funding infrastructure that makes drivers more comfortable shifting to alternative-fueled vehicles or shifting away from vehicles altogether.

- ***Encouraging energy savings***. A carbon price alone will not fully address barriers to cost-effective reductions in energy use, particularly in the residential sector. After all, consumers often have insufficient or inaccurate information, they may lack investment capital, and they may heavily discount the future. Moreover, those purchasing major appliances (e.g., landlords) may not be the same as those who pay the monthly bills. Well-designed policies, such as energy efficiency standards and programs, can overcome these barriers and reduce the demand for energy at a relatively low cost.[29]

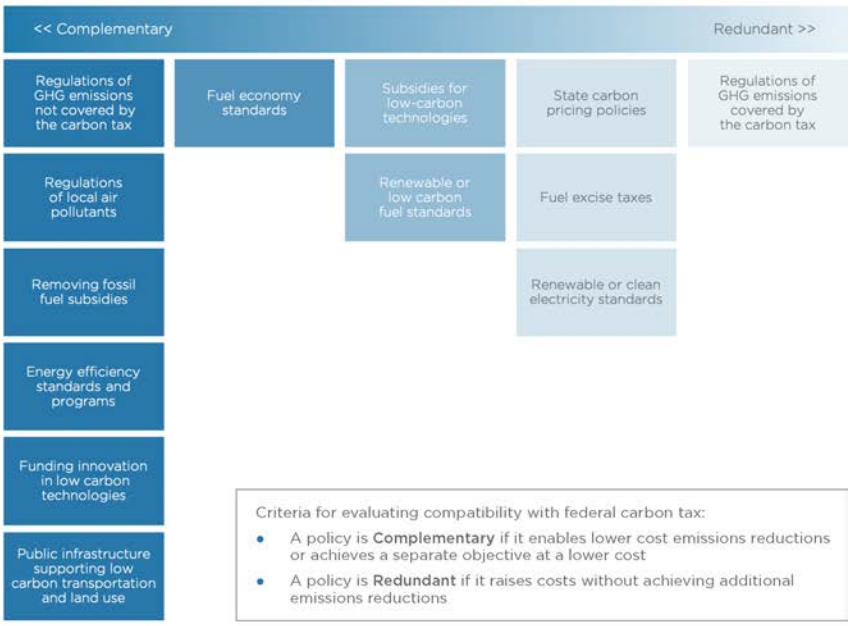
- ***Encouraging reductions in net emissions that are uncovered by the carbon price***. All recently proposed carbon prices cover about 80 to 90 percent of gross U.S. greenhouse gas emissions, including nearly all carbon dioxide emissions from the energy system. However, administrative difficulties (e.g. monitoring) will prevent covering all sources and sinks of carbon dioxide emissions with a carbon price. The land sector is a prominent example, where emissions from agriculture and livestock contribute roughly 10 percent of U.S. gross emissions and forests and soils sequester roughly 10 percent of emissions.[30] Well-designed policies can provide incentives to reduce net emissions from U.S. lands and other sources left uncovered by the carbon price.[31]

Other policies are more redundant with a carbon price, meaning they may impose administrative or compliance costs without achieving significant additional emissions reductions. Depending on the policy details, categories of policies that may not be necessary alongside a carbon price include:[32]

- Federal regulations of the same emissions covered by the carbon price.

- Subsidies for the deployment for relatively mature and widely used technologies.

Figure 4: The Compatibility of a Federal Carbon Tax and Other Policies that Reduce Emissions



Notes: The criteria and categorizations are not exact sciences. It is often difficult to identify a policy's objective or evaluate its cost-effectiveness. In addition, the extent to which a policy complements a carbon tax depends on the nature of the carbon tax. For example, with a lower carbon tax rate, fewer emission reductions would be achieved, and additional policies may be needed to make up the difference between the outcome and a science-based emissions reduction target.

Source: Gundlach J, Minsk R, and Kaufman N. "Interactions between a Federal Carbon Tax and Other Climate Policies." Columbia University Center on Global Energy Policy. March 2019.

By implementing a comprehensive suite of climate polices, including carbon prices that are designed for consistency with emissions targets[33], the United States can put itself on a pathway to deep decarbonization while meeting the growing demands on its energy system and lands and maintaining a thriving economy.[34]

Conclusion

I want to applaud the Committee for taking on the challenge of crafting a strategy to build a 100% clean economy. It is the quintessential role of government to protect Americans from the harmful consequences of greenhouse gas emissions. However, as I learned when I helped to develop the United States Mid Century Strategy for Deep Decarbonization, the scope of this problem can make the task seem overwhelming. You have hundreds of decisions to make, and you will hear strong opinions about every single one.

My advice is, don't let the complexity distract you from the actions that can move the needle.

Let's establish an incentive to reduce net emissions across the entire economy. Let's develop low-carbon solutions and enable them to compete on a level playing field. Let's protect American families and businesses that cannot afford price increases, and let's support coal communities.

With that, I look forward to your comments and questions.

Notes

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6. Ibid.

7. Barron A, Fawcett A, Hafstead M, McFarland J, & Morris A. "Policy Insights from the EMF 32 Study on US Carbon Tax Scenarios. Climate Change Economics", Vol. 9, No. 1 (2018).

https://www.worldscientific.com/doi/abs/10.1142/S2010007818400031.

8. There are two primary methods of pricing carbon: carbon taxes and cap-and-trade programs. Carbon taxes directly establish a price on carbon in dollars per ton of emissions. A cap-and-trade program limits the total quantity of emissions per year. This limit is enforced using tradable emissions permits that any emissions source must own to cover its emissions. The market for buying and selling these allowances creates the carbon price in a cap-and-trade program. Real-world policies often combine elements carbon taxes and cap-and-trade programs, therefore ensuring some degree of certainty for future emissions outcomes and carbon prices.

9. See page 4 of: Caron J, Cole J, Goettle J, Onda C, McFarland J, & Woollacott J. 2018. "Distributional implications of a national CO_2 tax in the U.S. across income classes and regions: A multi-model overview." Climate Change Economics, 9(1), 1840004. Also, see page 15 of: Kaufman N, Larsen J, Mohan S, Herndon W, Marsters P, Diamond J, & Zodrow G. "Emissions, Energy, and Economic Implications of the Curbelo Carbon Tax Proposal." Columbia University Center on Global Energy Policy. Working Paper. July 2018. https://energypolicy.columbia.edu/sites/default/files/pictures/CGEP_CurbeloCarbonTaxBillAnalysis_0.pdf.

10. Press release from Senator Chris Coons. "Sens. Coons and Feinstein, Rep. Panetta introduce bill to price carbon pollution, invest in infrastructure, R&D, and working families." July 25, 2019. https://www.coons.senate.gov/news/press-releases/sens-coons-and-feinstein-rep-panetta-introduce-bill-to-price-carbon-pollution-invest-in-infrastructure-randd-and-working-families.

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12. Prominent recent examples include the "Yellow Vests" protests in France and the protests in Ecuador following the proposed ending of certain government fuel subsidies.

13. The only major political party in Canada to oppose carbon pricing in advance of the 2019 election was the Conservatives, receiving 34 percent of the vote.

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19. In 2016, there were 64,200 premature deaths in the U.S. due to ambient particulate matter (PM2.5) air pollution, of which 8,600 were due to coal combustion. Impacts are largests on minorities and low-income households. See: Lancet 2019; 394: 1836–78. https://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736(19)32596-6.pdf.

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27. Kaufman N, Krause E, and Desousa K. "Achieving U.S. Emissions Targets with a Carbon Tax." World Resources Institute. June 2018. https://wriorg.s3.amazonaws.com/s3fs-public/us-emission-targets-with-carbon-tax.pdf.

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Mr. TONKO. Thank you, Dr. Kaufman.

And, next, we will move to Dr. Gattie. You are recognized, sir, for 5 minutes, please.

STATEMENT OF DAVID GATTIE, PH.D.

Dr. GATTIE. Thank you, sir.

I want to thank the chairman, the ranking member, and members of the subcommittee for the opportunity to come before you today.

My testimony aligns with the following points: America is facing two national security threats, one around climate change and the other around the U.S. nuclear power enterprise.

Climate change is global in cause and impacts, and as carbon emissions increase globally, those impacts won't stop at U.S. borders simply because we have an aggressive domestic climate policy.

The U.S. economy and its industrial capacity should be leveraged to innovate and deploy low- and zero-carbon technologies in developing economies where carbon emissions are of greatest concern. Nuclear power should be central to U.S. policy, with a strategy to develop advanced reactor technologies for domestic and international deployment, and America must engage in climate issues globally with national security as the overarching objective.

Globally, energy consumption and carbon emissions are increasing, not decreasing. From 2000 to 2018, 90 percent of the increase in carbon emissions originated in Asian-Pacific countries, predominantly China and India, while emissions in the U.S. declined.

Under the most aggressive carbon policy, eliminating all U.S. emissions would reset global emissions to 2006 levels, meaning if climate change was a threat in 2006 with U.S. emissions, climate change is a threat in 2018 without U.S. emissions.

While exponential growth in nonhydrorenewables is elevating hopes that renewables are closing the gap on fossil fuels, that gap isn't closing, it is expanding. For the past 10 years, over 81 percent of global wind and over 82 percent of global solar were concentrated in countries with substantial fossil fuels, nuclear, and/or hydro built into their economies, meaning traditional energy resources have provided the foundation for renewables to expand.

This recommends a global triage approach with resources and efforts directed toward regions where the issue is acute or emerging. In developing regions, countries are at various stages of economic growth. Therefore, it is necessary to determine which energy technologies can be deployed effectively to sustain low-carbon economic development. One such technology is nuclear power.

Early U.S. nuclear policymakers recognized the strategic importance of America's nuclear enterprise. To them, nuclear wasn't just another energy commodity, the fate of which should be dictated by political calculus, popular opinion, or market forces alone. Rather, it was central to America's foreign policy. So their approach was principled and strategic, not populist and transactional. A key objective was to create the world's most advanced nuclear technology base from which mutually beneficial global partnerships could be established within the emerging liberal international order.

The 21st century is undergoing geopolitical shifts, and China and Russia are leveraging state-owned nuclear enterprises as exten-

sions of the state to establish long-term energy and technology dependencies. If U.S. policy orients our technology trajectory away from nuclear, it will signal to the world that America has set aside its commitment to be a reliable partner in nuclear development, thus opening the door for China and Russia.

Efforts to decarbonize the U.S. economy will require investment. If the return on that investment is only a near-term reduction in U.S. carbon emissions, the U.S. will remain vulnerable to climate change over the long term as global emissions increase.

The U.S. cannot insulate itself from the impacts of global climate change through domestic policies targeting only the U.S. economy. Therefore, U.S. climate policy must be global and strategic, keeping in mind that if the U.S. transitions away from current energy interdependencies, those interdependencies can develop into vulnerabilities open to exploitation by energy-rich and technology-advantaged countries that don't share America's values.

To that end, U.S. policy should focus on developing energy and technology relationships within developing regions, cultivated as international investment opportunities for U.S. industry and coupled to diplomatic efforts of U.S. engagement and goodwill.

Lastly, the national security implications of U.S. nuclear power simply cannot be overstated. While nuclear has proven its value to America, its contributions remain on the horizon as economic development, climate change, and national security converge into a perfect storm of 21st century global challenges that nuclear is capable of addressing.

The U.S. cannot be an energy and climate island. America must engage globally, and it must do so with national security as its overarching objective.

Thank you, and I look forward to your questions.[1]

Mr. TONKO. Thank you, Dr. Gattie.

And, finally, Mr. Profeta, you are recognized, sir, for 5 minutes, please.

STATEMENT OF TIM PROFETA

Mr. PROFETA. Thank you. Thank you, Chairman Tonko, Ranking Member Shimkus. Thank you for the opportunity to testify today.

My name is Tim Profeta, and I direct the Nicholas Institute for Environmental Policy Solutions at Duke University.

Our institute was founded as a nonpartisan resource for decision-makers like yourselves striving to solve the most pressing environmental challenges of our time, including climate change.

We do not seek to tell policymakers what do to. Rather, we provide economic, scientific, and legal expertise to help policymakers most effectively achieve what they wish to accomplish.

Today's hearing seeks to explore the best means by which to achieve economy-wide solutions to climate change. The central point of my testimony today is that Congress should consider a model that has been successfully proven through our Nation's history: the Federal/State partnership.

[1] The prepared statement of Dr. Gattie has been retained in committee files and also is available at https://docs.house.gov/meetings/IF/IF18/20191205/110295/HHRG-116-IF18-Wstate-GattieD-20191205.pdf.

First, climate change is a challenge like none other. It is perhaps the test of our generation and one of the greatest collective action challenges in history. In the interest of time, I will not discuss the reason for acting in my oral testimony, as I believe the committee has declared an intent to do so. Instead, let me focus on the options for acting to reduce the amount of greenhouse gases that are released into the atmosphere. Such an effort is the most important step we can take to tackle the climate challenge.

In the absence of Federal actions, many States have been rising to that challenge, working aggressively to reduce their emissions. But the national emissions picture is less encouraging without a Federal climate policy in place. As emissions go down in some States and sectors, they are going up in others. The net effect: We have made insufficient progress towards reductions needed to abate climate change. Nationwide carbon emissions, in fact, rose in 2018, the biggest increase in 8 years.

Now, there are many options for economy-wide policies, many of which I have worked on over the years. A Federal price on carbon, either set through a cap-and-trade program or a carbon fee, is an economically effective way to drive investment and innovation. If Congress could muster the political will to pass such a proposal, it may still be the most effective approach for securing nationwide reductions. But those of us that work on climate policy, however, have witnessed the political resistance noted by the ranking member to such a proposal.

Today, I am proposing another way to solve this conundrum. Congress should consider a model that has been successfully proven through our Nation's history, the Federal-State partnership. America can adopt a 50-State climate strategy that supports the vital role of States in cutting emissions, an economy-wide system that allows for the differences between the States.

Instead of attempting to sell all concerns about the program's costs and impacts at the Federal level, Congress could determine a national level of reductions needed to achieve our climate goals and then divvy up the goals to the States. State governments would then be empowered to execute plans to reach those goals.

Successful Federal-State partnerships permeate our environmental law, as well as many other areas of government action. I would like to highlight five benefits, if you would take this approach.

First, a Federal/State partnership approach would involve all 50 States in America's pursuit of greenhouse gas reductions, ending the current state of fragmentation. By aligning all States toward common outcomes, overall U.S. emissions could be reduced more quickly and businesses would face more consistent framework across State boundaries, boosting innovation.

Second, a Federal/State climate partnership promotes regional fairness by tailoring action plans to each State's circumstances and strengths.

Third, if any revenues are raised through climate programs, the money would be kept circulating within the State's economy. States can determine best how to use the revenue to reduce emissions, prepare for climate change, and fairly distribute the economic opportunities and costs.

Fourth, a Federal-State climate partnership may be appealing to a wide range of States. States that are already leading on climate change can continue on the paths they have started. Other States get flexibility and Federal assistance to develop and implement their own plans, or they can defer to a simple Federal backstop plan.

Finally, a comprehensive Federal/State climate partnership backed by new legislation in Congress can solve some of the legal questions that arise without it. Many of our States hope to pool their obligations under a plan by creating multi-State programs. But it is unclear whether the Clean Air Act authorities will allow such efforts. Such linkages could be explicitly authorized under new legislation.

In summary, a comprehensive Federal/State partnership could achieve fast and significant greenhouse gas reductions and might just be able to overcome political stalemate with cooperative solutions.

My written testimony presents a more detailed description of this concept. I thank you for your time today, and I look forward to answering your questions.

[The prepared statement of Mr. Profeta follows:]

TESTIMONY OF TIMOTHY H. PROFETA

DIRECTOR

NICHOLAS INSTITUTE FOR ENVIRONMENTAL POLICY SOLUTIONS

DUKE UNIVERSITY

before the

SUBCOMMITTEE ON ENVIRONMENT AND CLIMATE CHANGE

of the

U.S. HOUSE COMMITTEE ON ENERGY & COMMERCE

Dec. 5, 2019

Thank you for the opportunity to testify today. My name is Tim Profeta, and I direct Duke University's Nicholas Institute for Environmental Policy Solutions. Our Institute was founded to be a non-partisan resource for decision-makers striving to solve the most pressing environmental challenges of our time, including climate change. We do not seek to tell policy makers what they should do. Rather, we provide economic, scientific, and policy information and expertise to help policy makers most effectively achieve what they wish to accomplish.

Today's hearing seeks to explore the best means by which to achieve economy-wide solutions to climate change. The central point of my testimony today is that Congress should strongly consider a model that has been successfully proven through our nation's history: the federal/state partnership.

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Climate change is a challenge like none other. It is not an understatement to say that climate change is the test of our generation and one of the greatest collective action challenges in history. Climate change is a perfect tragedy of the commons, with the atmosphere serving as the common resource, absorbing all of civilization's greenhouse gas pollution without any individual or nation having singular accountability for the problem or singular ability to solve the problem.

To address the climate challenge, the most important step the world can take is to reduce the amount of greenhouse gases that are released into the atmosphere. As the second largest annual emitter today, and the largest historic emitter, the United States is fundamental to that solution. And, having added nearly double the amount of greenhouse gases into the atmosphere as any other country since the Industrial Revolution, the United States' inaction creates a barrier to global collective action, as other nations struggle to justify their efforts to constrain emissions while allowing the greatest emitter to continue releasing greenhouse gases unabated.

By pointing its powerful engines of innovation at solving the climate problem, the United States could greatly accelerate global progress. No nation has driven human inventiveness through recent history more than the United States, as the home of the greatest economy the world has ever seen.

Is Congressional Action Necessary?

The first questions Congress needs to ask as you explore an economy-wide climate solution is how much time we have to get started, and at what scale. The answer is that time is of the essence, and the sooner Congress acts, the greater the prospects for boosting innovation, cutting emissions, inspiring global action, and avoiding the worst-case climate scenarios.

The most significant warning on timeframes is the 2018 Special Report by the Intergovernmental Panel on Climate Change that cited more than 6,000 scientific references and involved thousands of expert and government reviewers worldwide. The report's findings include three items of particular relevance for your consideration.

First, "rapid and far-reaching" action is needed to cut global net emissions of carbon dioxide by about 45 percent from 2010 levels by 2030. That gives us little time—less than a decade—to significantly reverse the current trend of rising global CO_2 emissions.

Second, we must achieve global "net zero" emissions by around 2050. "Net zero" means reaching the point where any remaining human-caused emissions are balanced by removing CO_2 from the air.

Third, annual global investments in low-carbon energy technologies and energy efficiency need to be boosted by roughly a factor of six, and overall annual global investments need to be increased by about $830 billion.

This last point about the needed global investment speaks strongly to the enormous opportunity and imperative for the U.S. to act quickly to advance climate solutions. Without America's economy producing clean technologies and driving solutions, we cannot get where the best science tells us we need to go.

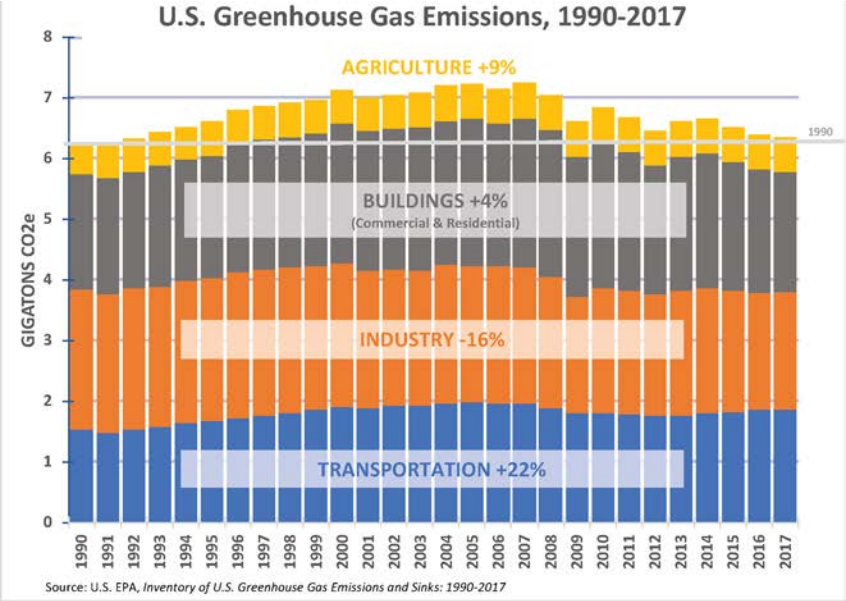
Approaches to Economy-Wide Solutions to Climate Change

Congress must next examine the best options to move fast and far to meet the urgency of the situation.

There are many options. Over the last 15 years, researchers at the Nicholas Institute have been identifying, considering, and evaluating these many options, which range from last decade's legislative efforts to pass an economy-wide cap-and-trade program, to the development of carbon tax proposals, to the design of regulations under the Clean Air Act.

As a threshold question, policy makers must decide whether we should look to the private sector alone to drive the greenhouse gas reductions we need without any government intervention, or if government action is needed.

We need only look at the nation's emission trajectory for the answer. Essentially, federal government inaction has not resulted in the progress we need. It is true that we have made some progress over this time—as the chart below demonstrates, our national emissions have bent downwards since their peak in 2007. But these reductions have stalled and emissions increased in 2018 at the very time we need to be increasing the pace of emissions reductions.



If we are going to decarbonize our economy, this pace of progress is not proportional to the scale of the problem.

To move quickly, however, the United States must find a path that actually works. And in saying that it "actually works," I mean not only something that drives reductions in an economically effective manner, but something that is politically durable so that the nation may plan and depend on it.

At the outset, I must say that a single federal price on carbon, either set through a cap-and-trade program or carbon fee, has long been the preferred approach among economists and other climate policy experts. It certainly "works" in terms of its economic effectiveness. A carbon price will create market value for greenhouse gas reductions, and the private sector will drive investment to secure those reductions. If Congress could muster the political will to pass such a proposal, it still may be the most effective approach for securing nationwide reductions. Those of us that work on climate change policy, however, have witnessed the political resistance to such a proposal.

Today, I want to propose that there may be another way to solve this conundrum. America can create a 50-state climate strategy that supports the vital role of states in cutting emissions—an economy-wide system that allows for the differences between the states. Instead of attempting to settle all concerns about a program's costs and impacts at the federal level, Congress could determine the national level of reductions needed to achieve our climate goals and then divvy up that goal to the states. State

governments, which are more in touch with the equitable tradeoffs of their populations and directly accountable to their communities, would then be empowered to execute plans to reach those goals.

This approach has worked through the years. Federal/state partnerships permeate environmental law, as well as many other areas of government action. The federal voice ensures that the policy reaches national goals, and it protects against adverse competition among the states undercutting the national objective. Meanwhile, the state leadership allows the creation of programs that account for the cultural and political heterogeneity of the states, and enables citizens to engage more local leaders, in whom they usually have more trust, in the creation of the solutions.

There is no reason that such a federal/state partnership cannot work to address climate change as it has in numerous instances before. Given the political uncertainty of our ability to achieve any other alternatives, the urgency of climate change demands that we consider it as the path of least resistance to achieve our climate objectives.

Without a 50-State Climate Strategy, States Are Pulling Against Each Other Rather Than Pulling Together

Many states have stepped up their efforts on climate change in recent years, but their laudable actions are not sufficient to overcome the absence of an effective economy-wide climate strategy for all 50 states.

Twenty-five governors have joined the U.S. Climate Alliance, aiming to reduce state emissions 26-28 percent below 2005 levels by the year 2025. Nineteen states in the U.S. Climate Alliance are at least halfway to their emission reduction goals. And action is being taken to reduce emissions further. Nine states—California, Colorado, Hawaii, Maine, Nevada, New Mexico, New Jersey, New York, and Washington—have passed legislation setting 100 percent zero carbon electricity goals and/or economy-wide emissions reductions targets.

Midwestern states collectively cut carbon emissions 9 percent annually from 2009 through 2016, the latest year that state data are available. At the same time, the Midwest's economy grew by 3 million jobs as the region built its way out of the Great Recession.

Since 2009, Ohio, Michigan, Iowa, Indiana, Kansas, and North Dakota have each cut their carbon intensity by more than 20 percent, shifting to lower-emission energy sources while reducing their dependency on coal-fired electricity. Many states in other regions have also made significant progress.

All of this encouraging progress at the state level, however, is being undermined by the federal climate policy vacuum and lack of a cohesive 50-state climate strategy. As emissions go down in some states, they are going up in others. The net effect: nationwide carbon emissions rose rapidly in 2018—the biggest increase in eight years.

State efforts, while significant, therefore are not sufficient in their own right. The federal government is needed to ensure the signal toward reductions is felt across the entire U.S. economy.

A Comprehensive Federal/State Climate Partnership

A comprehensive federal/state climate partnership would allow the federal government to do what it is best suited to do—set the level of ambition necessary for the United States as a whole to do its share in

the fight against climate change. This inquiry is part scientific and part political. Science can provide a sense of what the overall target should be, within bounds of uncertainty. But the federal political process can decide how much risk to accept, how much of the global challenge is equitable for the United States to address, and how the obligations should be divided amongst the states.

After the federal government sets the targets—both overall for the nation and individually for the states—then state governments would be empowered to do what they have done well throughout our history—design policies that fit with the culture and economies of their states. In this way, the program will respect the leadership of the states that have been active over the past decades, empowering each of these leadership states to carry their programs forward as long as they can reach the federally designated target.

A comprehensive federal/state climate partnership could have several appealing advantages that would enable the U.S. to respond adequately to the climate change challenge.

First, a comprehensive federal/state climate partnership approach would involve all 50 states in America's pursuit of greenhouse gas reductions, ending the current state of fragmentation. By aligning all states toward common outcomes, overall U.S. emissions would more quickly be reduced, and businesses would face a more consistent framework across state boundaries, boosting innovation.

Second, a comprehensive federal/state climate partnership promotes regional fairness by tailoring action plans to each state's circumstances and strengths. Relying on the states to execute their own plans ensures that the states may design programs to minimize distributional effects about which they are more knowledgeable.

Third, if any revenues are raised through climate programs, the money would keep circulating within the state's economy rather than growing the federal budget. State leaders can surgically design the use of any revenues to where they may determine resources would be best used to reduce emissions, prepare for climate change, and fairly distribute the economic opportunities and costs of climate policies.

Fourth, a comprehensive federal/state climate partnership may be appealing to a wide range of states. States that are already leading on climate change could align behind this proposal, as state leaders will see the approach as reinforcing rather than a threat to their autonomy. Instead of fighting early acting states through preemption, the federal government will allow them to continue their good work under their own plans.

States that have been less aggressive can receive several benefits from this approach as well. They would get flexibility on how to develop and implement their own plans. Further, under an effective and comprehensive federal/state climate partnership, states would receive financial and technical support from the federal government to inventory and track their emissions and develop needed policy tools. Such states should would have the voluntary option of falling back on a federally designed program to ease administration and ensure parity for regulated sources across state boundaries.

Fifth, a program devolved to the states will have the advantage of being familiar to the professionals responsible for its implementation. Throughout environmental statutes, states are given the task of achieving federally delineated targets for pollution control. In particular, for nearly all of the major air pollutants, states are responsible for achieving federally designated air quality targets through state plans. And many states have already created proposals to reach greenhouse gas reduction targets on

their own—these proposals will just have to be reassessed when given a federal target. A federal/state proposal that uses a state planning approach will have the advantage of running a familiar path for all and the ability to harvest the early work of many.

Finally, a comprehensive federal/state climate partnership backed by new legislation in Congress can solve some of the legal questions that rise without it. For example, many of the states hope to pool their obligations under that plan to create multistate programs, but it is unclear whether the Clean Air Act authorities would allow such efforts. Such linkages could be explicitly authorized under new legislation. This would provide more certainty and flexibility to businesses that are currently operating in a highly fragmented environment with states moving in different directions.

Key Elements of a Comprehensive Federal/State Climate Partnership

To provide more guidance, I would like to suggest a few important elements of a federal/state climate partnership, and early thoughts on how such elements could be designed. In particular, a federal/state plan needs to cover, at a minimum, the following concepts: (1) level and distribution of state obligations; (2) assessment of the sufficiency of the state plans; (3) provisions to allow for multistate efforts and other desired mechanisms; and (4) provisions to support states with incentives and ensure action for states that opt not to act on their obligations.

Level and Distribution of State Obligations

The overall national commitment to greenhouse gas reduction should be consistent with a global effort to avoid the worst effects of climate change, as detailed in the aforementioned 2018 IPCC report. Given the long-term planning horizons of many affected industries, a long-term target would be desirable.

Once the overall targets are created, the cumulative national target will need to be divided among the states. As a starting point, the U.S. could set the emission reduction range expressed as a percentage emission reduction that each state applies to its own emissions baseline. For example, the 26-28 percent reduction from 2005 emission levels that the U.S. initially agreed to under the Paris Agreement has been adopted by the states in the U.S. Climate Alliance. That range could be extended to 2030 and through 2050. To provide added flexibility from state to state, states might be allowed flexibility in setting the base year by which percent reductions are measured. In that scenario, states that have reduced their emissions can get credit for those reductions while states with higher emissions today can set targets based on their current circumstances so that they are not put at a disadvantage.

Assessment of Plan Sufficiency

Once each state has its own emissions target, the proposal will require the state to design a plan capable of meeting that target. It will be the role of the federal government to judge the sufficiency of the state plan. How it will be judged should be clear and transparent to all parties from the outset.

Given the likely diversity of plan approaches—governors could choose to design a cap-and-trade system, implement a carbon tax, impose flexible emissions standards, or select any number of other options or combinations—the sufficiency of a plan should likely be assessed by a general economic model or the combination of several. The model should be transparent and available as a tool to states to assist planning. As a result, the proposal should allow the federal government to designate a particular independent model, or combinations of such models, that will be used to determine sufficiency of a

state plan. Any plan that meets the state's target using the designated models would be deemed sufficient.

Removing Legal Barriers to State Leadership

State governments, and the businesses that bridge their borders, likely will want to pursue the most economically efficient means of achieving greenhouse gas reductions in the development of their plans. In past efforts, however, there have been some legal uncertainties about states' ability to pursue all such options. Regional compacts between states have been challenged, although thus far unsuccessfully, under the U.S. Constitution's Compact Clause. Efforts by states to prevent leakage—or the export of operations and their associated emissions—to states without greenhouse gas constraints have been challenged as violating the U.S. Constitution's Dormant Commerce Clause with some, but not universal, success. And efforts to pool the obligations of multiple states or multiple sectors of the economy were argued to be outside the limitations of the Clean Air Act.

A new legislative proposal for the comprehensive federal/state climate partnership could clarify and secure the needed legal authority for these efforts. As most, if not all, of the constitutional objections are based in an argument that states are acting in the realm given to the federal government, federal legislation could clearly authorize such efforts. A new law could also make clear that the efficient grouping of states—say, all of those that share a common electric grid—or the merging of sectoral targets are explicitly permitted so that the system could seek the most efficient reductions across the economy.

Federal Incentives and Backstop

One common concern about this proposal is the possibility that a state simply would refuse to create or enforce its plan for greenhouse gas reductions, thereby undercutting the effectiveness of the program. First, one would hope this concern would not arise. In particular, this proposal can be paired with resources to empower the states to take action. Whether it be authorized funding for the planning processes or infrastructure investments and tax incentives pegged to the path to decarbonization, federal resources could be added to incentivize participation and avoid the likelihood of states' inaction.

If a state still does not engage in the planning process, however, the proposal could create federal backstops that would minimize federal government intervention but still meet the state's obligation. One concept would be the creation of a simple carbon fee administered out of the Treasury Department for states that opt for this approach or decline to put forward their own plan. To ensure that there is no fear that this proposal would once again grow the federal budget, the approach could recycle the carbon fee revenue back to the affected state, where it could put the revenue to use on issues of the greatest importance.

Conclusion

A comprehensive federal/state partnership could achieve fast and significant climate action and create new pathways to overcome political stalemate with cooperative solutions. Our network of state governments has provided politically acceptable solutions to a number of societal problems through our country's history, and perhaps it is time to embrace their role in the climate fight fully. This may be the best bet to find success legislating on one of our most dire and pressing societal challenges—climate change.

Mr. TONKO. Thank you, Mr. Profeta.

And I thank, again, our panelists for their input here this morning, and thank you for what will be interesting dialogue.

Dr. Kaufman, I am of the belief that, if we continue to invest in research and infrastructure, the cost of emissions reductions will decrease significantly. But I see very high-cost estimates, some over $1,000 per ton in two or three decades, to achieve meaningful reductions in the transportation sector.

Do you have any idea of how high a carbon price needs to be set?

Dr. KAUFMAN. Thank you for the question.

How high the carbon price needs to be set depends on what your goals are in terms of emissions outcomes, it depends on what policies you are surrounding the carbon price with, and it also depends on, you know, the assumptions you make about the evolution of technologies, you know, gas and oil prices, and a number of other factors.

What our research suggests is that, if you want to get on a pathway, say, to the Paris commitments of the United States, a carbon price alone of $25 to $35 a ton would be sufficient. If you doubled those prices, you added in a bunch of complementary policies with them, you could get on a much steeper emissions reduction curve.

Some of these estimates that you describe that suggest hundreds of dollars a ton, typically they assume that the carbon price is doing all the work by itself as opposed to as a part of a broader strategy, and they assume very little advances in innovation. So harder-to-decarbonize sectors don't get any easier over time. I think we can create policies that overcome those challenges.

Mr. TONKO. And I think—and to your point, as we have seen over the last 10 years, a lot of dynamics of change have occurred, some beyond protected anticipation. So that is encouraging.

What roles do a credible and steady price play to spur innovation and ensure emissions reductions occur more cheaply and quickly than currently estimated?

Dr. KAUFMAN. Well, we would expect a carbon price to spur innovation in the private sector in a couple different ways.

So, first of all, by just, you know, encouraging a ton of deployment in the near term in low-carbon solutions, we start doing more of them, we get better at doing them, right? We have seen that time and time again over the years. So that's one source of innovation.

And then it also puts in place this price signal in the long term that investors see. So they see if I create this low carbon solution, the market share will be there when it is—when it is created over time.

So, you know, a carbon price isn't sufficient by itself. You still need government role in spurring innovation. But it could be transformative.

Mr. TONKO. And with a goal of 100 percent clean by 2050, I want to be sure our price signal is effective toward ultimate goals. How should environmental certainty be included as part of a carbon pricing program?

Dr. KAUFMAN. Well, I mean, the carbon—if you use a carbon tax, for example, you know, you have control over the prices and the cost, and you have less control over the emissions outcomes.

So what you can do and what you see in a lot of the proposals in Congress for carbon taxes are mechanisms that make the tax rates contingent on the emissions outcomes.

All right. So, if we are seeing emissions fall the way you would like to see them, the tax rate continues as originally stipulated in the bill. If you are not seeing the emissions directions that you want, the bill says that the tax rate can increase even higher to achieve those reductions.

Mr. TONKO. And you talk about complementary policies. And I believe almost everyone now agrees that carbon pricing does require complementary policies.

What makes for a good complementary policy that advances the goals of a price?

Dr. KAUFMAN. Well, you want policies that can lead to even faster and cheaper emissions reductions than the carbon price would achieve on its own. So I think there are a lot of policies that fall into this category. You know, you can think about innovation, which, you know, a lot of my friends here were talking about. You can think about efficiency standards where price signals alone aren't going to be sufficient. You can think about infrastructure, especially in the transportation sector. And also, if we are talking about agriculture and land, you know, these might be areas that the carbon price can't feasibly cover. So you absolutely want to think about complementary policies in those areas also.

Mr. TONKO. And Dr. Gattie, DOE's loan program office has issued a total of up to $12 billion in loan guarantees to support the construction of the Vogel project.

Do you believe the Federal Government has and should continue to play a constructive role in providing financing assistance for innovative technology deployment?

Dr. GATTIE. I do.

Mr. TONKO. Thank you.

And, Professor Esty, from your experience, can the public sector help spur innovation in clean energy deployment by providing access to capital and financing support?

Mr. ESTY. Absolutely. And I think we have seen that with the emergence of green banks. And, frankly, a model that is using limited public money to leverage private capital, and I think that has got to be part of the package that we put forward to address climate change.

Mr. TONKO. Thank you very much.

And, again, I appreciate the panel appearing before the subcommittee today.

The Chair now recognizes Representative Shimkus, our subcommittee ranking member, for 5 minutes to ask questions.

Mr. SHIMKUS. Thank you, Mr. Chairman.

Mr. Profeta, is that your son behind you? Who is that young man? What is his name?

Mr. PROFETA. Duncan.

Mr. SHIMKUS. Hi, Duncan. Welcome to the hearing. We are glad to have you here.

And this is a great panel. Thank you all. It gives a lot of food for thought.

I am going focus on Dr. Gattie on my questions.

You state in your testimony that efforts to decarbonize the U.S. economy will require investment. If the return on that investment is a near-term reduction in U.S. carbon emissions, the U.S. will remain vulnerable to climate change over the long term as global emissions increase.

Would you like to expand on that?

Dr. GATTIE. Yes. Thank you for your question, Representative Shimkus.

The U.S. carbon emissions, if—as I pointed out in my testimony, if we zeroed those emissions out, there is going to be probably a cost associated with that. If the return on that investment is only a reduction in U.S. emissions, and yet we are still exposed to global carbon emissions—and again, my point here is this is global climate change, it is not U.S. climate change. As long as the source of the emissions remains unchecked, we are still vulnerable to climate change impacts, regardless of the domestic policy.

Mr. SHIMKUS. And I see some of your panelists shaking their heads. And I would refer folks to your testimony and these charts. They are just unbelievable, figure 4, 5, 6, 7, and 8. And the last one, figure 9, it actually goes from 2000 to 2018, showing 721 reduction in CO_2 emissions per million metric tons versus—that is the U.S., which is the greatest reduction in CO_2, without doing any of this stuff.

Now, you are a climate change believer, and you want us to be engaged, and so I am not trying to spin a story that you are in the denier category.

Dr. GATTIE. No. I accept the science on climate change.

Mr. SHIMKUS. But your position is, if—we could be doing all of this internal gymnastics for naught if we don't address the Asian-Pacific region and all of these other ones that you have highlighted.

Dr. GATTIE. Correct. If we are disengaged from the global community's efforts to reduce carbon, then we are not addressing the cause and the source of those carbon emissions.

Mr. SHIMKUS. So how can we be engaged? So, accepting the premise—we need to do that—how do we get engaged?

Mr. SOTO. Paris.

Mr. SHIMKUS. No, Paris failed. So I hear rumblings by my colleagues over here, and it is my time, and I appreciate that. But you—in testimony today, Paris is not meeting its agreements or its levels. So let's address the problem.

So how would you say we should be engaged?

Dr. GATTIE. So I would start with—again, these emerging economies, they want a couple of things, and Representative Walden pointed it out. They want electricity. They need electricity. They need reliable and affordable electricity. I have heard testimony before this subcommittee before that those emerging regions will do what is necessary to provide electricity to their economies.

Mr. SHIMKUS. Regardless of the emissions?

Dr. GATTIE. They will worry about the emissions later.

Mr. SHIMKUS. Correct.

Dr. GATTIE. Unless they have a reliable substitute for things like coal and natural gas, they are going to build coal plants. The projections for coal plants—I think I may have included that. We are still building coal plants throughout the world.

Mr. SHIMKUS. Yes, sir.

Dr. GATTIE. They are not—they are not going down. They are increasing.

Mr. SHIMKUS. Let me turn to Mr. Profeta, because I see him shaking his head on some of these answers, but also I want to make sure that his son hears you get grilled in a question. No.

But you're agreeing to some of this. So can you give me your analysis?

Mr. PROFETA. First, I think the analysis is that it is a global problem, and there needs to be a global solution. So we need do need to be engaged in the international negotiations.

If Paris is not acceptable to you—it sounds like Paris wasn't even aggressive enough to meet those targets. We need to find a way that global emissions are going down.

But U.S. leadership is essential. Every time we have had success in these international courts is because the U.S. has come to the table and found ways, and the U.S. needs to be part of this global solution.

The U.S. is not increasing at the pace of Asia, but it is still about one-sixth of the problem. So we do need to show some leadership there as well in our own domestic emissions if we are going to be able to inspire our colleagues around the world to act as well.

Mr. SHIMKUS. And, again, I do appreciate—the testimony has been great. Thank you for being here.

And I yield back my time, Mr. Chairman.

Mr. TONKO. The gentleman yields back.

The Chair now recognizes Representative Peters for 5 minutes, please.

Mr. PETERS. Thanks, Mr. Chairman.

Thanks to all of the witnesses for being here.

You know, Mr. Tonko is right: There is no silver bullet. I was just jotting down all of the things we have to work on: decarbonizing electricity, which Mr. Gattie addressed, transportation, industry, buildings, agriculture, aviation. We have to deal with the effects of wildfires, which Mr. Walden has been avid on. We have to deal with short-lived climate pollutants: methane, black carbon, hydrofluorocarbons, which aren't necessarily going to be responsive to—with cheap gas to these price signals by themselves.

We have to develop negative emissions technology, like carbon capture, utilization, and sequestration, and we have to deal with carbon price incentives. So this is a welcome hearing. We have to deal with all of those things.

Mr. Shimkus is right, that this is an international problem. And I would just say—and I don't mean to be rude, but I just got back from Madrid. People meet on this every year. And I was honored to go, but I will give my seat up to Mr. Shimkus, because we all have to be involved in this. And being the only country not there and saying that it is an international problem just is too incongruous. We have to show up. And this committee has been—this Congress has been supportive of engaging in the Paris Agreement. We are the only country not in it. So that is obvious to me, and I would love to take you next year to——

Mr. SHIMKUS. But it wasn't bipartisan. It wasn't bipartisan. We weren't invited.

Mr. PETERS. No. Well, that's not true. Actually we——

Mr. SHIMKUS. No, we weren't invited.

Mr. PETERS. Well, we can talk about that later, but—you should have been invited if you weren't, but I believe you were.

Second, Mr. Shimkus is right, that it should not just be one party. And I hope that we will—if we are talking about something as—on the scale of World War II or on the scale of sending someone to the moon, that can't be a one-party thing.

So I hope that we will take this seriously. There is no dispute about the science here. Everyone understands the target is net neutrality by mid-century. I hope that we can count on Republicans and Democrats to work together on this issue because it really is an existential threat.

The one thing I would agree with Mr. Shimkus on, though, is that there is no benefit economically to us. We know that, if we don't do something about climate change, that the world GDP will decrease by 30 percent and that the cost to the American taxpayers directly will be billions of dollars by the end of 2020—'30s. That is from GAO.

So let's get to work on this. And I think that one of the things we are—the thing you are talking about today, carbon price incentives, is widely understood to be the backbone—the backbone strategy for this.

Carbon tax—according to The Wall Street Journal's assessment of 40 of the world's most esteemed economists, carbon tax offers the most effective lever to reduce carbon emissions at the scale and speed that is necessary.

I also would just state for my own purposes that you have all come out with different views that—suggestions that I think—I am open to any of them. I do think that, if it is true that there are eight proposals before Congress now, and any of them would reduce emissions in a dramatic way, as I think Dr. Kaufman said, we should support the one that will pass.

And I am open to a cap-and-trade. That is what California does. I think that we had some difficulties with that last time. I am open to the clean-power-plant kind of structure that Mr. Profeta was outlining. That wasn't as popular politically as I thought it might be. I think, you know, if a carbon tax is more directly effective, I think we should support that. And we have Republicans who have cosponsored those two.

So, with the time left, I guess I would ask if maybe, Mr. Esty, you might talk a little bit about how a carbon price is—how fundamental design choices are made in the economy by a carbon price. Just can you give us a little bit of explanation for people who may not have been studying it as carefully as you?

Mr. ESTY. Sure. What a carbon price does is to make sure that people are thinking about the fossil-fuel-emitting activities they undertake and trying to reduce their emissions. And I think it not only encourages every business, but every family, every industry, to think hard about what they are doing and to try to do things in new and different and better ways from a point of view of decarbonization.

The other thing it does—and it was really central to my suggestions to the committee here today—is that it spurs innovation. It

means that you have got many, many companies that are out there thinking not only about how to reduce their emissions but, frankly, how to reduce their customers' emissions and to bring more low-cost technologies and products to the marketplace.

So you set off a spirit of competition to be the best at decarbonizing, and I think it really engages the private sector. And I would say one of the great joys of America is how good we are at innovation with the right policies to drive that process.

Mr. PETERS. Right. And so we talk about the polluter pays. I mean, I think one of the things we really fail to understand is that all of us are driving to work, all of us are driving this—this pollution. We all need an incentive to understand what those choices are, and price is the one that makes the biggest difference.

And so I appreciate you being here, I appreciate all of the testimony, and I look forward to working to land this plane.

And I yield back.

Mr. TONKO. The gentleman yields back.

The Chair now recognizes Mr. Carter from Georgia for 5 minutes, please.

Mr. CARTER. Thank you, Mr. Chairman, and thank all of you for being here. This is extremely important, and I appreciate it very much.

Professor Gattie, it is good to see you always. Go, Dawgs. I appreciate you being here. But—and I especially appreciate your view, because I share the same view. I am not a climate denier. I believe in climate change. I believe it is real. And I believe we have to address it, and we have to address it on a global scale.

And whenever we talk about that and whenever the panel—or whenever the Members here have been asking questions, everybody has been nodding yes. Everybody agrees with that. It is a global problem. And I am not going to get into the Paris Agreement and where we felt like we were having to carry too much of the burden. That is not what I want to get into.

What I do want to get into, though, is that, Dr. Gattie, what you said about the Asia-Pacific region, and specifically what you said that we needed to triage where the problems are, can you kind of elaborate on that for me a little bit?

Dr. GATTIE. Thank you for your question. I tried to invoke a medical term here.

Mr. CARTER. And I appreciate that very much.

Dr. GATTIE. Yes. It is a good two-syllable word, and it works well. Sounds a little French, so I thought I would put it in the——

Mr. CARTER. That is the way we do it in the South.

Dr. GATTIE. We try hard.

The point here is, if you are in a condition, and there are patients, some are acutely sick, some are getting sick, some are somewhat healing, where do you focus your efforts and your resources? There are several approaches that you take. But you certainly have to evaluate where you allocate your resources and your efforts to have the maximum impact.

My point here with this approach does not disengage the U.S. from engaging in climate solutions. We have to lean in. We are responsible for leaning in. We should reduce our own emissions.

My proposal here is we look at those regions of the world where the problem is most acute, that we can deploy—develop and deploy U.S. technologies—and we have all mentioned those this morning, it is carbon capture and storage, it is advanced nuclear reactors, small modulars, and on down the line—to these countries that are going to burn fossil fuels with us or without us. We need to have a strategy.

If the Paris Agreement had looked at it that way, as a strategic triage effort, rather than a somewhat disaggregated "everybody go home and do something individually," I think we would have had a more ecological outcome than perhaps what we are headed towards now, where we are not headed in the direction that we need to go.

Mr. CARTER. And I appreciate you saying that, because I agree with you. I understand the United States should be the leader, and that's why I tell people all the time I am excited about the opportunities that exist here. The greatest innovators, the greatest scientists in the world are right here in the United States of America. We can solve this. I am convinced of that, and I believe it can be a boom for our economy because, if we can send the innovation overseas, I think it would be tremendous for us. So I agree with that.

Now, I want to jump into it right now because, as everyone knows, there are only two nuclear reactors under construction right now. And they are Plant Vogtle in Georgia. So I want to talk about nuclear energy and the role it plays because, you know, when I talk to these groups and we mention nuclear energy, they are, "No, no, no, we can't do that." But nuclear energy is, what, 55 percent of all of our clean energy right now in America?

Dr. GATTIE. Right, of the clean energy.

Mr. CARTER. Right. So tell me about nuclear energy and tell me, first of all, where you see that and the role it is playing in future.

Dr. GATTIE. So, again, thank you for question about nuclear. This is the untapped resource that we are not focusing on, in my opinion, at the level that we need to focus on. You will see throughout my testimony, I emphasize the national security implications of this. Nuclear is one of those rare, unique energy resources that is not simply an energy commodity. It, if left to market forces alone and the market forces nuclear out of the market, that would be a national security concern because we would be disengaged from the global nuclear fuel cycle, the global nuclear ecosystem. That is not what our original designers of nuclear power policy envisioned. We are to be engaged and embedded and have other countries essentially entangled in our nuclear culture. So it is an energy commodity, but it is more nuanced than just the technology.

Mr. CARTER. Great. Well, I am out of time, but, again, thank you very much. And go, Dawgs.

Dr. GATTIE. Yes, sir. Go, Dawgs. Let's hope they do.

Mr. TONKO. The gentleman yields back.

The Chair now recognizes the gentlelady from California, Representative Barragán, for 5 minutes, please.

Ms. BARRAGÁN. Thank you.

It's critical for communities that are experiencing the deepest effects of climate change to lead conversations on how to mitigate its

impacts, not just for one day on a panel, which we had in November, but every day we are having this conversation. This is important since the first page of our briefing memo says that there is a large agreement among climate policy experts that a price on carbon is needed to reduce greenhouse gas emissions. However, I have received repeated correspondence from environmental justice groups that have real concerns with the carbon tax, absent concrete steps to invest in frontline communities and stop the expansion of fossil fuel infrastructure and extraction that harms communities.

For my constituents, the climate crisis is also a public health crisis. As we move forward, we must ensure all voices are at the table as we weigh climate solutions.

I request unanimous consent to enter into the record a letter to the Congressional Progressive Caucus from 33 environmental justice community civil rights and environmental organizations opposing a carbon tax.

Mr. TONKO. Without objection, so ordered.

[The information appears at the conclusion of the hearing.]

Ms. BARRAGÁN. I also request unanimous consent to enter into the record a letter sent to the House Select Committee on Climate Crisis by over 250 environmental groups urging the committee to reject policies that worsen inequalities and prioritize support for communities harmed by the most—by climate change and pollution.

Mr. TONKO. Without objection, so ordered.

[The information appears at the conclusion of the hearing.]

Mr. SHIMKUS. Chairman, can we—we are not going to object, but we would like to see them, if we may.

Ms. BARRAGÁN. Sure. I will make them available.

Mr. Profeta, there are as many as 177 natural gas power plants planned or under construction. If built, the emissions from these plants will be locked in well beyond 2050. Which policy would make more—which would be more effective at preventing this: a carbon tax or a moratorium or new fossil fuel power plants?

Mr. PROFETA. Thank you for the question, Congresswoman.

I believe the obvious answer to your question is, if you are looking for effectiveness not to have the plant built, to ban the plants would be the more effective way to ensure it is done rather than use market forces. The appeal of the market force approach is that you don't pick or choose the technology. You actually let the market find the lowest cost reduction.

I also would note that the proposal I brought forward on sort of Federal/State partnership allows the State governments to really look at some of the community affects you are most concerned about within their States and design policies that make sure they address the concerns of your constituents.

Ms. BARRAGÁN. Thank you.

Mr. Esty, it was recently reported by the EIA that U.S. oil production reached a record of 12.4 million barrels per day, making us the world's largest oil producer. I am fighting urban oil drilling in my district that contributes to this total. How can the U.S. reconcile being the world's largest oil producer and decarbonize by 2050?

Mr. ESTY. I think your question raises the opportunity to put a price on the harm causing you have identified, and I think that is one of the unifying themes that has come out of the panel today, is that by making people pay for the harm they cause, in particular by putting a carbon charge in place, you begin to steer people towards other options, and I think this is a very good solution for the kind of issues you are talking about, not only from the point of view of carbon impacts, climate change, but, frankly, for the public health issues as well.

Ms. BARRAGÁN. Mr. Kaufman, do you—Dr. Kaufman, do you want to chime in on this?

Dr. KAUFMAN. Well, I would agree with you that investing in frontline communities is massively important and that there are a lot of equity issues that policymakers should consider. I would also encourage you not to lose sight of the first- and second-order impacts of any strategy that you would put into place to achieve net zero emissions by 2050, and that is going to be massive reduction in not just carbon dioxide emissions but local air pollution. So I think there are important issues about how these benefits are distributed throughout the population, but, you know, there are benefits for all there.

Ms. BARRAGÁN. Great. Thank you.

I yield back.

Mr. TONKO. The gentlelady yields back.

The Chair now recognizes Representative Long for 5 minutes, please.

Mr. LONG. Thank you, Mr. Chairman.

And, Dr. Gattie, our hearing today is the latest in a series on how our committee could enact policies that will reduce carbon emissions throughout the economy. We all agree that reducing carbon emissions is an important goal to work towards. And if anyone's ever visited China and Beijing, in particular, and other cities in China where you literally cannot see across the street, we know how important it is to work towards that goal.

But I am wary of the potential economic and national security impacts that broad-sweeping climate legislation will have for everyday Americans. We have seen across the world how well-intentioned governments are implementing policies to reduce carbon emissions that have faced extreme backlash from citizens. It has been mentioned several times here today when these actions affect cost of goods and services which harm economies and make countries less competitive in the global marketplace.

The policies we work towards in this committee must reflect the global nature of the climate change problem. Having aggressive domestic climate solutions will not have an impact on climate change if the rest of the world continues to increase their own carbon emissions. Action this committee takes needs to serve as a blueprint for the rest of the world, showing how our climate policies that don't hinder economic growth and threaten national security are attainable and the right way to combat global problems like climate change.

Dr. Gattie, I am a proponent of nuclear power as a producer of clean and consistent carbon-free emissions, and I'd like to say that I recently visited Fukushima, and I am cochair of the congressional

study group on Japan with my buddy, Diana DeGette, on the other side of the aisle, and they have gone through some times with that, of course, and with trying to get back to nuclear energy, which, you know, with their locale where they are located, it is pretty much mandatory.

And it is disheartening that the rhetoric from some of the Presidential candidates running right now shows a desire to eliminate our most reliable clean energy source. Nuclear power can and should be further utilized in America, but the potential for exporting nuclear technology in developing countries can produce a path forward to significant carbon reductions.

Can you expand on the importance of building durable energy technology relationships and how exporting nuclear technology can help the United States accomplish larger goals of combating climate change?

Dr. GATTIE. Yes, sir. Thank you for your question.

Energy is essentially the language of geopolitics. Energy relationships are what underpin much of our 21st century, just, economic flows. Those relationships are going to occur globally. Right now, countries such as Russia and China are building out those infrastructures. China is using their Belt and Road Initiative. And, of course, Russia is looking to build gas pipelines. They just, I think, connected one. It's the Power of Siberia to China.

Those are anchors for long-term geopolitical relationships. When it comes to nuclear, in particular nuclear, that is an 80-year relationship. Whoever is the country developing the technology in those developing regions will be there for 80 years or longer. They have the opportunity to then impress upon that region their own cultural norms and standards. They don't necessarily share our American values. If they are authoritarian countries, they are not in it for only the long-term relation. They are in it for dominance. They are in it for the influence. They have a plan. Russia and China, in particular, with their nuclear and Russia with its gas, they have a strategy, and it is a long-term strategy, and energy underpins that.

We should be responding to give those countries options, the options that our early policymakers directed nuclear policy for the very intention of the U.S. being that provider of that nuclear power. The national security aspects are the overarching objectives for all the things you just mentioned, Representative Long. Climate change is embedded in that. It just happens to be one of the benefits of nuclear, but still the national security part is the overarching objective.

Mr. LONG. You covered several of the things I was going to point out as which is China's hundred projects that are either planned or proposed or everything. So I am out of time. So I appreciate all of you being here today.

And I yield back.

Mr. TONKO. The gentleman yields back.

The Chair now recognizes the gentlelady from Delaware, Representative Blunt Rochester, for 5 minutes, please.

Ms. BLUNT ROCHESTER. Thank you, Mr. Chairman.

And thank you for your continued leadership in building a 100 percent clean economy. I also would like to thank Mr. Shimkus, our ranking member, and to the witnesses.

One of the things—if anybody is watching this hearing, I hope the big takeaway that they have is something that my colleague, Mr. Carter, talked about, which is the agreement that we have that, number one, climate change is real, that we must address it on a global level, and that the United States must be a leader. If you leave with nothing else, there is agreement on that. And ultimately, we do this for our health. We do this for our security. We do this for our economy, and the goal is to do it in a just way. So be encouraged by that.

Part of the process here is to come up with solutions, and this is a solution, some solutions, and I wanted to just share that, before coming to Congress, I had the opportunity to serve in State government in Delaware. And at the State level, partnerships were pivotal. It was just pivotal. So I am really interested in the State/Federal partnership idea to address the climate crisis. And, particularly with Delaware being a leader in fighting climate change, I am proud to say that Delaware is a member of both the Regional Greenhouse Gas Initiative, also known as RGGI, and the U.S. Climate Alliance, and this year in particular we have seen unprecedented climate action at the State level. I want to make sure that we protect and build on that great work that is being done.

So my question is to you, Mr. Profeta. How can we ensure that a State/Federal partnership builds on the successes of programs like RGGI, rather than duplicating or undermining them?

Mr. PROFETA. Thank you, Congresswoman, for the questions.

I think that is the beauty of the idea, is that there is so much activity on the State level. The States have developed such leadership on the issue. There is no reason to halt that but actually use that momentum and keep it going forward with sort of a Federal/State partnership. So what the Federal role would be, would be to create a 50-State solution to make sure all States have objectives and goals set by the Federal Government so there is no patchwork between them.

And States like Delaware, States like the RGGI States, could continue their program and be—the one key would be to look at what the leadership States have done, or all the States have done, what has been working, and make sure your legislation authorizes that to continue and accelerate.

Ms. BLUNT ROCHESTER. Great. Thank you.

And, thanks to programs like RGGI, emissions are decreasing in the Northeast. But at the same time, they are increasing in other parts of the country, possibly even offsetting other regions' gains. Can you explain why States' emissions are going in such directions and how a State/Federal partnership can counteract that?

Mr. PROFETA. Well, it is kind of like a balloon. You push down one place, it may come up another place. The emissions can leak to other regions of the country. And this is tradition across a lot of our statutes, but what the Federal Government can do is set objectives that kind of create a level playing field and make sure everybody is moving in the right direction but allow the States to design plans that work for their constituencies, their needs and tran-

sitions. So, you know, the Federal Government will create the standards to make sure everybody is going the right direction, but the States will have the discretion to take it there.

Ms. BLUNT ROCHESTER. And then I just want to close by piggybacking on Ms. Barragán's questions that we know communities of color, as well as low-income communities, are disproportionately burdened with pollution. And at the same time, these communities tend to spend more of their income for power and heat their homes, while lacking the resources and information to take advantage of solutions like energy efficiency and solar. Some of the traditional ideas for how to decarbonize fail to account for these inequities, and for that reason a comprehensive climate strategy with economy-wide solutions must ensure that these frontline communities are heard, protected, and prioritized.

In the time that we have, maybe Dr. Kaufman and Mr. Esty, if you can each discuss how we can go about protecting low-income households and other impacted communities and how smart policy design can ensure these protections.

And we only have 30 seconds.

Mr. ESTY. I will start for 10, and then we will let—I think what you have is the opportunity to spend the revenue that comes from a carbon charge in ways that address the inequities, and I think attending to the communities that are disadvantaged is a starting point, but I would also look at the communities most affected by the transition. So I think a smart transition is critical.

Ms. BLUNT ROCHESTER. Mr. Kaufman, 10 seconds.

Dr. KAUFMAN. Well, let me just agree and say I mentioned in my testimony making sure those who can't afford higher prices don't have to pay them. Making sure that coal communities, in particular, who would be adversely affected by the policy would be very smart uses of revenue. I think the frontline communities issue is potentially a separate policy objective but no less important.

Ms. BLUNT ROCHESTER. I know my time has run out, but I think that is also an area where we can find common ground, that we also have to take care of vulnerable communities that also are impacted by what we do here. So thank you so much.

And I yield back.

Mr. TONKO. The gentlelady yields back.

The Chair now recognizes the gentleman from South Carolina, Mr. Duncan, please, for 5 minutes.

Mr. DUNCAN. Thank you.

Thank you, gentlemen, for being here.

I want to begin by commending the Trump administration and the energy sector for the robust domestic energy production we are seeing now. There is no doubt that energy—American energy renaissance has strengthened our leadership on the world stage. The failure to seize the abundance of our resources has international implications. In fact, a couple of weeks ago Fiona Hill testified in front of the House Intelligence Committee that Vladimir Putin saw American fracking as a great threat to Russian interests and that a fracking ban would play into strengthening Putin's hands.

Energy is used as a political weapon by many of our adversaries. We have the opportunity and arguably the moral obligation to export U.S. energy to energy-poor countries around the world to help

them reduce their dependence on corrupt state-owned regimes like Vladimir Putin. We have the ability to increase the quality of life for so many people around the world.

If we truly care about the lives of people around the world and impoverished regions, American energy export can help improve their lives by providing electricity to areas that don't have that so they no longer have to cook over wood or coal or dung or whatever substance they use to heat in their homes, cook over, they have the ability with electricity to keep food fresh for longer periods of time, the air quality is much better, the possibility of air conditioning, the possibility of reading to their children at night. But yet the policies I hear put forth and the ideas put forth today would increase electricity costs for American citizens.

And who is hit worse by those costs? And that is the poor folks in our economy because higher electricity fees would eat up more of their already limited income, but yet you want to tax the energy production. You want to tax the manufacturing in this country and redistribute that wealth to help—I think Mr. Kaufman said—help those so they don't have to pay the electricity costs, the higher costs. That is just redistribution theology, and it doesn't work.

One added benefit, that our export LNG may be cleaner than that that those nations would use otherwise. So climate benefits are connected directly to the energy diplomacy efforts. But what would we do this in this country? We are pushed to sign on to a Paris climate accord. But we're not holding India, China, and Russia accountable for their air quality emissions.

How about this? Instead of stopping pipelines and LNG export terminals on the West Coast, why not support those so that cleaner-burning, affordable, American-produced natural gas can be exported to areas like India or Southeast Asia or possibly China to help them lower their air-quality emission while supporting a robust American energy economy?

A carbon tax, as you have proposed in your testimony, of a more drastic—a ban on fracking that some have proposed would completely reverse the trajectory of American energy renaissance. American companies would be less inclined to innovate. Costs would undoubtedly go up for consumers across the economy.

So, Dr. Gattie, we talked a lot about the role of natural gas and our changing generation mix, but we always don't give credit where it is due. Do you agree that our emissions reductions are made possible by hydraulic fracturing and advances in the technology?

Dr. GATTIE. In the power sector, yes, sir.

Mr. DUNCAN. Can you talk a little bit about nuclear power and how that figures into the energy matrix and lowering our carbon footprint?

Because, Mr. Esty, you are from Connecticut? Is that correct?

Mr. ESTY. [Nonverbal response.]

Mr. DUNCAN. Your Governor just decided not to decommission reactors and keep them online. Why? His own words were, "We can meet our attainment levels. We can meet our lower carbon footprint by keeping nuclear in the mix." There is a byproduct on nuclear power, and that is nuclear waste that needs to go to a long-term stable storage facility. This committee has talked about Yucca

Mountain. I am not going to go there today, but I support that as a long-term storage facility.

Dr. Gattie, can you talk about nuclear power and how it plays into that, into the lowering-carbon-footprint matrix?

Dr. GATTIE. The way I look at nuclear, it is a long-term investment. It is a long game. It is very different than the way a lot of the markets work now, where markets are trending towards short-term, marginal profits, looking at natural gas, which I am a natural gas supporter. It has gotten us to where we are in the power sector.

I agree with your point that I would like to see us exporting that LNG to countries where other countries are building pipelines to connect them with their countries, but the nuclear is the long game. We are looking at long-term carbon hedging here for eventually if there is a carbon processor or anything. This is a long game.

Mr. DUNCAN. I am out of time.

But would you agree that Russia and China and India—Russia and China primarily—are exceeding the United States in nuclear technology and development at this point?

Dr. GATTIE. Russia and China are. I wouldn't necessarily say India is, but they are on—they have strategies that we currently lack.

Mr. DUNCAN. Yes.

Thank you, Mr. Chairman. I yield back. I appreciate it.

Mr. TONKO. The gentleman yields back.

The Chair now recognizes the gentleman from Florida, Mr. Soto, for 5 minutes, please.

Mr. SOTO. Thank you, Mr. Chairman.

You know, we define American excellence and leadership in climate here in Congress, not by the terrible energy policies of China and India. So I for one won't be using them as a benchmark, but the fact that we need to lead. And we are here because we have our 100 Percent Clean Economy Act to get us to net-neutral carbon output by 2050, and it is an all-of-the-above strategy that includes wind and solar but also includes nuclear and potentially carbon capture.

But I want to focus not on just the cost of action, which we will go into in a little bit, but the cost of inaction. Through 2014 to 2018, we spent $13 billion a year annually on disaster relief, including in my home State of Florida. Three of the past 6 years, we set records in disaster relief spending, and that is not even getting into the health costs that are facing so many communities of color like where I represent, and then I am forced to go back to a State where we see headlines in Florida today: "Climate Change Once Flooded Florida—And It Could Again," WLRN.org; "Florida Keys Deliver a Hard Message. As Seas Rise, Some Places Can't Be Saved," New York Times just today.

But, if saving the planet for our children and our grandchildren isn't enough, how about 21st century economic dominance? If we have the clean energy revolution here with our partners in Europe, we will dominate the 21st Century economy.

I just want to ask a basic question to Mr. Kaufman. If we developed advanced clean energy technology, do you think China, India, and Russia would buy it?

Dr. KAUFMAN. If the technology is good, I think they would buy it. I think what my sense is that we have been innovating in energy, you know, for decades, for centuries, and what we have seen is that innovation is important, but it doesn't in itself cause us to use less of anything, right? We use more biomass now than we used to. We use more coal than we used to, even though we are developing these new technologies. So I certainly appreciate the points that we need to develop new technologies. But I think, if we think that will lead to reduced emissions by itself, then I think we are kidding ourselves.

Mr. SOTO. Certainly, which is why we have an all-of-the-above strategy, and thank you for that comment.

You know, this comes down to basic property law. You learn it in Property 101: tragedy of the commons. Those of you who are lawyers in the room know that wonderful story. It started back in England and beforehand where people would pollute the commons. It would get worse and worse. There would be health problems. You would have economic collapse unless you regulate the commons. And now we are dealing with the whole world, because every ton of carbon that is put in the air is polluting and destroying our planet.

And so, you know, I would like to think that we Democrats are the party of free market, much like our colleagues across the aisle, which is why we are here today, to discuss free market solutions.

I would like to get a show of hands. How many of you would support a cap-and-trade regime to help lower carbon emissions? Raise your hand.

Mr. ESTY. Can we ask whether that is our choice?

Mr. SOTO. I am going to go into other things. I am going to go into carbon tax next. So we have one, two, three.

How many of you would support a carbon tax as a regime to lower energy costs? OK. Let's focus on carbon tax because it seems like one that most of you have pushed more than others. It would be great to hear from all three of you who raised your hands. What do you believe the cost of carbon should be set at per ton?

Mr. ESTY.

Mr. ESTY. I would start with $5 per ton and escalate by $5 per ton per year for 20 years for a $100-a-ton end price.

Mr. SOTO. Thank you.

Dr. Kaufman, what is the price of carbon per ton to our planet?

Dr. KAUFMAN. I think if we are in the realm of starting above, you know, the $20, $30 a ton, it is whatever bill that you can pass in Congress.

Mr. SOTO. Mr. Profeta, what do you think it should be?

Mr. PROFETA. I raised my hand for other things. So I think you do whatever you can to get expeditious reductions in greenhouse gases.

I would second Noah's standpoint. What is politically feasible in that range that would make—move the needle?

Mr. SOTO. OK. Thank you.

And, lastly, you know, we are cognizant of the fact there are energy-producing States that would suffer economically as these things happen and that this funding should also be used to help invest into new industries like transitioning to renewable energy

equipment manufacturing, building nuclear power plants in some of these areas that will be producing less coal or oil or gas and even establishing wind where appropriate.

I wanted to ask a basic question to Mr. Esty. Do you think we have the ability to transition those economies over to these more renewable energy and nuclear energy opportunities?

Mr. ESTY. Absolutely. I think there is a clear possibility of reinvesting some of the revenue generated by an economy-wide carbon charge and put that into the communities that need to transition.

Mr. SOTO. Thank you.

I yield back.

Mr. TONKO. The gentleman yields back.

The Chair now recognizes the gentleman from Ohio, Mr. Johnson, Representative Johnson. You have 5 minutes, please.

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

And, Professor Gattie, you know, last Congress this committee discussed the important role that Part 810 plays in U.S. civil nuclear providers' ability to engage with our international allies. During this debate, we heard some concerns that went along the lines of, you know, it is too dangerous for the U.S. to engage in these international markets, therefore Russia, China, and others should take the lead in that engagement while we sit on the sidelines. For crying out loud—and I have heard Secretary Perry even talk about this—we cannot sit on the sidelines on the commercial nuclear arena because, once China and Russia get their foot in the door with developing countries in putting in commercial nuclear programs, they are in there for, like, a hundred years. I mean, it is a big influence that they wield.

So, in your testimony, you discuss how early U.S. nuclear policymakers recognized the strategic importance of America's nuclear enterprise. So here is my question: What steps can Congress and those within the nuclear industry take to stress the importance of America's international engagement today?

Dr. GATTIE. Thank you, Congressman, for that question.

I will propose two general high-altitude—the first one is political, and that is I would encourage the committee to maybe go back and look at the 1956 platforms for both Democrats and Republicans. Both were competing to be the champion for the U.S. Nuclear Enterprise to be the world's premier nuclear base. I would like to see that brought down to the public's purview for the general public to understand that we have managed this for 70 years and can continue.

Now moving forward, on the broader policy side, a suggestion as to how do we develop a strategy long term. To the point you made, Congressman, China and Russia have strategies. They are state-owned enterprises, serve as extensions of the state. One analog here is the way DoD kind of looks at its supply chain and manufacturing supply chain. Every few years, they do an industrial-based review. They look at what we need to do to ensure that our defense base and our manufacturing base for the defense is where it needs to be.

I think a similar approach could be taken for our nuclear sector. It is a critical industry. It is a national security industry. I think we should at least, to get our brains wrapped around what our gut

is telling us about this national security thing, we really need to do an evaluation or assessment similar to that to look at our manufacturing supply chain and our current status for U.S. nuclear enterprise. I think that is something this committee and Congress can engage in and get multiple Federal authorities engaged. It would be the intelligence community, the State Department, the Commerce Department to do a thorough review of where we are, where we are compared with other countries, and what is the strategy for moving forward.

Mr. JOHNSON. Yes, I think it is really important. And I agree with you. We have got to get it into the purview of the American people. It has got to be a conversation on the street. And the reason why is because, in countries like China and Russia, public opinion doesn't mean anything to the decisionmakers in those countries. They don't have the system that we have that demands input from the American people and we lawmakers that have to take into consideration the concerns of our people, the people that sent us here to represent them. It puts us at a disadvantage in terms of tactical moves in that sphere. So I agree with you.

How can we ensure that we are appropriately balancing safety and security within our nuclear export policies while ensuring our domestic industry can successfully compete in these international markets?

Dr. GATTIE. So, again, there, Congressman, I would go back to my earlier point about doing a base-level industrial review of our entire nuclear sector. Where do we stand on the supply chain? Where do we stand on our fuel purchases? Where are the bottlenecks and constraints currently where we can and cannot purchase fuels? Are we constrained at any point in that supply chain? I am not sure that we comprehensively understand exactly where we are. I think that is something that should be driven by some congressional——

Mr. JOHNSON. Do we have the right balance between engagement and security? Do you think that—because, I mean, I don't. Obviously, I don't.

Dr. GATTIE. No, sir. No, sir.

Mr. JOHNSON. OK. All right.

Mr. Chairman, I yield back.

Mr. TONKO. The gentleman yields back.

The Chair now recognizes the gentlelady from Colorado, Representative DeGette, for 5 minutes, please.

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

I have been a member of the Energy and Commerce Committee for many, many years. And I actually sat in on the hearings where my colleagues on the other side of the aisle, despite overwhelming evidence to the contrary, denied that climate change existed. So I am actually really pleased to see that we have moved now into the realm where everybody agrees that climate change exists and that we need to have a solution, but I am, frankly, very concerned by this implication that, since it is an international problem and since China, India, and other countries—Russia—are not complying, that we should somehow just sit around because I don't know of any time in our Nation's history where we actually sat around waiting for China, India, and Russia to do something.

And so that is why I have been developing legislation. I have been trying to find a bipartisan cosponsor of this legislation that would be a market-based solution, that would help U.S. interests, that would get us to the standards of zero percent carbon emissions by 2050, and that would be an all-of-the-above solutions, so long as they met those standards.

So I want to ask some questions about how a bill like that—which would basically decarbonize electricity and then move towards electrification of everything—how that would help us with this international issue and with the U.S. standards in the international community. Rather than sitting back and waiting for them to do something, let's be the leader and let's benefit economically from it.

So, Dr. Kaufman, I want to start with you. If we put a price on carbon pollution, can that drive innovation in technologies that don't emit carbon?

Dr. KAUFMAN. It will, yes.

Ms. DEGETTE. OK. And do you know exactly what technologies can get us to zero emissions, or do you think we are going have to have innovations along the way in the next 30 years?

Dr. KAUFMAN. Well, innovation will enable decarbonization to proceed more cost effectively, faster. It is——

Ms. DEGETTE. Right. But we don't know exactly what that technology is right now, do we?

Mr. Esty, you are shaking your head no.

Mr. ESTY. I agree with you. What we really want to do is incentivize technology breakthroughs across the board.

Ms. DEGETTE. Right.

Mr. ESTY. And so that is where the carbon price allows you to get all of those different players, because we don't know whether it would be wind——

Ms. DEGETTE. Right.

Mr. ESTY [continuing]. Or solar or biofuels or tidal power or wave power or anything perhaps not even known.

Ms. DEGETTE. Right. I mean, you know, my provider, Xcel Energy, they set a zero percent goal by 2050, and they told me, "Frankly, we don't know how we are going get there, but we are going innovate, and we are going to get there."

So I want to ask the two of you, Mr. Esty and Dr. Kaufman, if we do develop those technologies—Mr. Soto asked a little bit about this—is that going to help us be able to then export our technologies around the world and help them also reduce their carbon imprint?

Mr. ESTY. Well, I would argue that the U.S. has always been very good at innovation and that has been the key to our competitiveness over time, and it is quite clear the world is pivoted towards a decarbonized future, and I think we would want to be out front in helping to deliver those solutions not only domestically but internationally.

Ms. DEGETTE. And it would help our economy, right?

Mr. ESTY. Absolutely.

Ms. DEGETTE. Now, Mr. Profeta, I want to ask you quickly. You talk about building a program State by State, and I really agree with that. I think every State has their own history in advancing

clean industry. In Colorado, I talked about Xcel and what they did. And everybody has their own unique starting points.

So, if I understand correctly, your overarching principles are: The pace of progress needs to be proportional to the scale of the problem so that the goals are going to be ambitious; the policy approach needs to be doable, by which you mean bipartisan; and we need to respect the different starting points around the country across different sectors and even within different sectors.

Is that an accurate summary of your views?

Mr. PROFETA. That is really well-boiled-down stated principles, yes.

Ms. DEGETTE. OK. Now, as we create an economy-wide program step by step—which, as you say, can be done in a number of ways—how do we avoid doing that in a patchwork way? How do we have an overall arching solution?

Mr. PROFETA. There are two versions of patchwork. One is you have some who are acting, some who don't. So you have sort of leakage into the nonacting State. A 50-State strategy solves that. The second is you have different regulatory regimes in different States, and you may evolve some differences as the State laboratories work, but you can write your legislation to incentivize States to work together, to have all the authorities they need to merge sectors, merge programs, where it's efficient for them to do so.

Ms. DEGETTE. You mentioned other laws: the Safe Drinking Water Act, Clean Air Act. A lot of laws we have done that way. Is that right?

Mr. PROFETA. Exactly. If you look at the Clean Air Act and what we did on the interstate pollution across the Northeast and Midwest, we wrote model rules in programs that would allow the States to work collectively together.

Ms. DEGETTE. Thank you. Thank you very much to all of you.

Mr. TONKO. The gentlelady yields back.

The Chair now recognizes the gentlelady from the State of Washington, Representative Rodgers for 5 minutes, please.

Mrs. RODGERS. All right. Very good. Thank you, Mr. Chairman.

And today we are considering policies to achieve economy-wide deep decarbonization. Judging from the majority's memo, their proposals seem limited to policies that tax our economy and industrial sectors out of existence and destroy America's global competitiveness and leadership.

In Washington State, people have resoundingly rejected two separate carbon tax initiatives because a tax would put us at a competitive disadvantage. A Federal carbon tax or cap-and-trade would do the same to America on the global level without allowing to us continue to lead in reducing carbon emissions.

Climate change is a global issue, not just an American issue. It requires a global solution centered around innovation, which has made the United States so successful at reducing emissions. As we look to decrease emissions without destroying our economy, it is crucial that we expand our nuclear energy portfolio. American companies like TerraPower in Bellevue, Washington, have led the world in nuclear technology and innovation, but regulatory restrictions have hurt their ability to deploy new reactors both at home and abroad.

Right now, China and Russia are developing and exporting small modular reactors to underdeveloped countries, expanding their global influence. For America to win the future, we cannot afford to sit and allow this to continue.

Professor Gattie, in your testimony, you mention early efforts by American policymakers to use America's nuclear energy enterprise strategically around the world. In your opinion, what caused the move away from these policies, and how has that affected our national security and global competitiveness with China and Russia?

Dr. GATTIE. Thank you for the question.

I think over time there were a few things that contributed to it. I think we got complacent, for one thing. I think we just simply—back in the eighties and nineties, we got complacent in the power sector. I think recently maybe we have gotten a little overconfident in our natural gas market. We are very—lots of confidence right now that we have got an abundant supply of natural gas. Of course, what we know is those are—those have end games to them.

I think there is also a good bit of, we have had market deregulation throughout the country. I think that has contributed to some of the current nuclear fleet being threatened for early closure. There is also just a general fear of waste and proliferation, things that we have always been able to manage here in the U.S. and globally for decades. But maybe one of the underlying reasons, Congresswoman, is that I really believe that we have got a general disconnect—and I am saying this in reflection of students that I teach. There is a general disconnect of where we are globally right now, what the 21st century is actually like, what our competitors are now compared to what they were in the 20th century.

Russia looks ham-fisted, the USSR does, compared with what China is now. They have a long-game strategy. And nuclear is dead center in that, a long-game strategy to develop advanced reactors, close the nuclear fuel cycle, and implant their nuclear culture in other countries.

President Xi Jinping, he makes no bones about it that it is socialism with Chinese characteristics. And if the U.S. does not step up and respond, it is going to give the world the impression that socialism with Chinese characteristics is succeeding where capitalism with American characteristics is failing.

This is something—it is a sad state of affairs when President Eisenhower's "Atoms for Peace" vision is being forwarded by China and Russia and not us. That is—he would roll over in his grave.

Mrs. RODGERS. Thank you.

So let's talk about, how do we make up the ground? So, in terms of policies to reduce emissions, how would we benefit from Federal policies to demonstrate technologies like advanced nuclear? Is it a problem that the Department of Energy does not currently have a demonstration project for a nuclear technology such as been proposed in the Nuclear Energy Leadership Act?

Dr. GATTIE. I think things like NELA, the Nuclear Energy Leadership Act, are good touchstones. I think the overarching concern here is we don't have a strategy for those things to map into. We don't have a long-game purview and vision of what we want our nuclear enterprise to be in the 21st century for 30, 40, and 50 years.

I wish we would stop rejoicing too much in small victories and look at the big picture and setting ourselves up again to be the world's dominant—not a level playing field with China—the dominant nuclear provider in the world.

Mrs. RODGERS. Thank you. Thank you for being here.

And I will yield back.

Mr. TONKO. The gentlelady yields back.

The Chair now recognizes the gentlelady from Stanville, Illinois, Representative Schakowsky, for 5 minutes, please.

Ms. SCHAKOWSKY. We are in the midst of an existential crisis right now. Last month, over 11,000 scientists from across the globe issued a warning of, quote, "untold suffering," unquote—quote/unquote—that will be caused by climate change. The warning stated that, quote, "scientists have a moral obligation to clearly warn humanity of any catastrophe, catastrophic threat, and to tell it like it is. We declare clearly and unequivocally that planet Earth is facing a climate emergency," end of quote.

While the President ignores the emergency, my State of Illinois—you have talked somewhat about States—is leading the way on climate solutions thanks to the work of Governor Pritzker and our House and Senate. During his first week in office, the Governor signed an executive order to join the U.S. Climate Alliance. And since then, the Governor has signed bills that will boost wind energy development in the State and protect communities from coal ash and other pollutants and champion a plan that invests $140 million for renewable energy projects across Illinois.

So, Mr. Profeta, what can—or maybe the question should be, can the Federal Government right now learn from States like Illinois?

Mr. PROFETA. Yes. In fact, we do work with the State of Illinois and some of the projects we worked at Duke University, and I have been very happy to be engaged with the efforts there.

Illinois is a good example. It is part of—Chicago is part of the PNJ region, too, which is the electricity grid region, and so it is looking to both take its own actions and figure out how in the electricity market it can make sure that its emissions are not only—reductions are not only secured in Illinois but across the region, and that is where the Federal Government could help by giving all the States goals and objectives so that they are sort of holding each other to the same standard.

Ms. SCHAKOWSKY. Mr. Esty, your statement describes the importance of innovation including the need for, quote, "innovation in policy design." Some of my colleagues like to say that, quote, "innovation is the key to addressing climate change," but they stop short of calling for policies to actually spur innovation.

So, Mr. Esty and maybe Mr. Profeta as well, or Dr. Kaufman, talking about if you would agree that innovation doesn't just happen on its own and that it requires strong policy signals to set the Federal level.

Mr. ESTY. So I would just say—and I think it has been a consensus today—that you want a portfolio of policies to drive clean energy and to create incentives for the innovation that we all are counting upon.

Mr. PROFETA. Yes, I would like to say, yes, you know, the United States is probably one of the greatest engines of innovation in the

history of the world. And our capitalist system has really driven people. When they can make money innovating, they tend to do it. So, if we can create policies, however we do it, that drive the innovative engine, this Nation, towards those things, we will end up driving the world's transition in the energy system, and that would be across the whole portfolio.

The one thing that is really distinctive, I think, on this panel that I want to make sure and note is every one of the four of us thinks that nuclear power is probably part of the solution set. So it is not something that where I think any of us think that nuclear isn't a significant part of the solution. A good——

Ms. SCHAKOWSKY. Let me confirm that. Is that the case? OK. I know that——

Mr. PROFETA. I mean, the chairman said at the outset there is no silver bullet for climate change. It is really silver buckshot. You just have to, like, spray the incentive across the economy and harvest every solution you can possibly have that doesn't make greenhouse gases.

Ms. SCHAKOWSKY. So I want to get do this question of urgency. I spent a lot of time with constituents, especially young constituents who are walking out of classrooms on Friday, trying to come here and create this sense of urgency. Thousands of experts are warning that climate change could mark actually kind of a dead end for humanity.

I am just trying to get from—well, I guess we are done. I have said my sense of urgency, but I really think that that has to be such a big part of the conversation here, that we have to move and we have to move now and the kids that come to me say, "Don't talk to me about my bright future. I might not have a future if you don't act."

Mr. TONKO. The gentlelady yields back.

The Chair now recognizes the gentlelady from California, Representative Matsui, for 5 minutes, please.

Ms. MATSUI. Thank you, Mr. Chairman. I will thank the panel for being with us today.

Over the past 6 months this committee has been focusing on a number of hearings to examine what it will take to achieve 100 percent net zero emissions by 2050, a necessary goal if we are to safeguard our planet and future generations from the devastating effects of climate change.

A central policy to this goal is the idea of some sort of economy-wide price on carbon. This has already taken place in the EU and parts of Canada and here at home in my home State of California, as well as grouping of nine Northeastern and mid-Atlantic States, signifying clear support for such initiative.

California's cap-and-trade program, which has been in place since 2014, has demonstrated dual benefits of reducing emissions through its mandated caps but also by raising revenue through the quarterly allocation auctions, which can fund additional emissions reduction and climate mitigation efforts.

Mr. Profeta, you mentioned in your testimony this idea of a Federal/State climate partnership in which the Federal Government sets a national level of reductions and States implement unique plans to achieve this.

Additionally, Canada established a Federal carbon pricing mechanism that allows provinces and territories the flexibility to develop their own carbon pricing system. The policy allows provinces whose carbon prices meet the Federal standards to maintain their existing mechanisms.

Mr. Profeta, do you think a U.S. carbon pricing system should be structured in a way that provides States the authority and flexibility to develop their own market-based carbon pricing strategies and allows States that have already established carbon pricing mechanisms, like my home State of California, to maintain their existing programs?

Mr. PROFETA. Yes, I think the concept that we have been discussing developing would allow the States to determine whatever approach they want to meet the carbon goals, including the preexisting programs.

Ms. MATSUI. OK. As I mentioned, California's cap-and-trade policy has delivered the additional benefit of bringing in millions of dollars of revenue that can go towards additional efforts such as investments in cleaner transportation, energy efficiency upgrades, and reducing air toxics and criteria pollutants. The first year of auctions alone generated more than $525 million in revenue for the State, and to date 11.8 billion has been generated and deposited into a fund that is used to reduce greenhouse gas emissions. Indeed, my district of Sacramento has benefited from these dollars through programs like low-carbon transportation projects and the Community Air Protection Program, which prioritizes air quality in frontline communities.

Dr. Kaufman, there seems to be a misconception that carbon prices must be incredibly high to be effective. Based on experience in California and other jurisdictions at home and abroad, how would you respond to that misconception?

Dr. KAUFMAN. Well, I think what you want to do is exactly what the committee is doing, which is set your long-term target—and net zero makes a heck of a lot of sense because at the global level climate change will continue until we get to net zero carbon dioxide emissions—and then you want to work backwards from there and say, what do you want to achieve in the near term to get on that pathway?

And what our research suggests is that, you know, particularly if you, you know, surround a carbon price with a set of complementary policies, a price that is in the $30-, $40-, $50-per-ton range could be incredibly effective at reducing emissions and getting you on that net zero pathway.

Ms. MATSUI. OK. We have made significant strides in deploying renewable energy and increasing efficiency measures. It is clear that our country has a long way to go in transitioning into a clean energy economy.

Dr. Kaufman, given this, do you think it is necessary that a carbon price include a requirement that at least a portion of that money be spent on things like renewable energy, additional emissions reduction efforts, and research and development?

Dr. KAUFMAN. I would say it depends on what your policy objectives are and what the details of the carbon price itself are. I certainly think that investments are going to be needed. You know,

we need—you know, think about the transportation sector, and if we are going to, you know, over the next few decades switch away from gasoline and diesel vehicles, we need to facilitate this shift so drivers are comfortable doing that. So we need to get that money from somewhere.

That said, I think, you know, the carbon pricing revenue is just government revenue, right? So I think policymakers need to come to a consensus on the best way to use that revenue. It is the price signal itself that is going to do the most at reducing emissions.

Ms. MATSUI. Right. Absolutely.

OK. I am already running out of time.

So thank you very much.

Mr. TONKO. The gentlelady yields back.

The Chair now recognizes the gentleman from California, Represent Ruiz, for 5 minutes, please.

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

And thank you to all the witnesses here today to discuss the importance of decarbonization. I want to talk about one of the primary options to reduce carbon emissions that we have been talking today, which is putting a price on carbon and how the revenue produced by such a price will be utilized.

Leading into that, I want to help you understand the situation in my district, California's 36th—Eastern Riverside County in the Coachella Valley, San Jacinto Valley, Southern California area—and present to you the specific challenges faced by my constituents when it comes to carbon pollution. Separating the Coachella Valley from the Los Angeles Basin is a stretch of mountains. The only break in those mountains is the San Gorgonio Pass. The pass is a gateway for millions of cars and truck traveling on Interstate 10, usually from the ports to Arizona. But it also acts at a wind tunnel, bringing regular intense wind into our community. You might have seen the shots of the windmills in the movies there in Palm Springs. This air often includes high levels of pollutants and carbon emissions that weren't produced in my district.

According to an analysis done by Northern Arizona University, the Los Angeles County produces 55 percent of all the emissions from the five surrounding counties, including San Bernardino, Riverside, Orange, and Ventura Counties. In fact, the carbon pollution from the ports alone matches the total residential and commercial output from all of Riverside County. Just think about that. And as you know, carbon pollution is rarely emitted alone. It is often emitted alongside other harmful elements, such as nitrogen oxide and sulfur.

So, for the majority of the year, these pollutants blow east towards my constituents, and these increased levels of greenhouse gases worsen ozone pollution for which the Coachella Valley has been in nonattainment with the Clean Air Act since 1997. And, as an emergency physician, I know all too well what this looks like. It is children with increasing rates of asthma. It is more frequent heat stress among the elderly. It is exacerbated respiratory diseases among those who already struggle with respiratory ailments, and the list goes on and on and on.

It is important to note that, even though my district does not produce the large volumes of carbon pollution, we have taken enor-

mous initiatives when it comes to decarbonization and renewable energy. In fact, my district produces the most renewable energy on Federal land compared to other districts in the entire United States.

The point is that air quality in my district is poor. The majority of air pollution is not created in my district. Yet the people I represent and the people I cared for in the emergency department bear the health burdens. Furthermore, it is the rural, underserved, resource-poor communities in my district and throughout the Nation that are disproportionately most affected.

So how do we address equity in any cost to carbon emissions so that those who don't produce the pollution, don't live in a big city, but are impacted by the pollution caused there get their fair share of revenues to address the public's health? In my home State of California, the State's cap-and-trade program has provided an important source of revenue for communities struggling with air pollution. In 2018, 39 percent of investments from program venues went to disadvantaged communities. So these are the same communities that are more at risk of being exposed and having the public health risks.

So, Dr. Kaufman, can you speak to how revenues from a national carbon pricing program could help improve air quality at the local level, especially in communities where investment is needed most?

Dr. KAUFMAN. Right. Well, thank you for the question.

So, again, the revenue from a carbon pricing program, that is just government revenue, and it can be used to achieve many different important priorities. And I think you are listing one critical priority.

You know, I would point out that, as you correctly noted, it is not the carbon pollution that is causing, you know, the health issues. It is the other pollutants. So we also, you know, should push on the Clean Air Act and other legislation, if needed, to directly address those sources of pollution.

Mr. RUIZ. So what about the concept of a carbon price dividend that is targeted at frontline communities? How do we ensure that those dividends reach the right populations?

Dr. KAUFMAN. Well, fortunate——

Mr. RUIZ. Suggestions?

Dr. KAUFMAN. I am sorry? What——

Mr. RUIZ. Any suggestions?

Dr. KAUFMAN. Just that the carbon price would provide hundreds of billions of dollars a year, if we are talking about sort of a reasonably priced, you know, program. So you would have a lot of money at your disposal to invest into communities like those, to deal with this issue.

Mr. RUIZ. So we just have to make sure at the back end, once there is the revenue, that the equation focuses on carbon cost equity for the communities that need them the most because they suffer the ailments the most.

Thank you.

Mr. TONKO. You are welcome. The gentleman yields back.

The Chair now recognizes the gentleman from California, Mr. McNerney, for 5 minutes, please.

Mr. MCNERNEY. I thank the chairman and ranking member. I thank the witnesses this morning.

Mr. Esty, before coming to Congress, I spent my career developing wind energy technology, and that gave me an appreciation for how hard it is to get funding and financing and so on for that technology.

Can you elaborate on how policy can create incentives for capital to flow into developing renewable energy technology?

Mr. ESTY. Sure. I think we have talked today about the importance of a price signal attracting both research and development money and also deployment money. And I think we have also mentioned that we want, beyond an economy-wide price signal, the benefit of some more targeted efforts. And in Connecticut, we created a green bank, and that green bank has allowed us to ramp up dramatically the flow of capital into wind energy, solar power, energy efficiency. And I think there is a real opportunity to replicate that at the national level.

Mr. MCNERNEY. OK. That includes storage, right?

Mr. ESTY. Includes storage, includes anything that helps you move towards a decarbonized future. And I think what you get with a green bank is the ability to use limited public money to leverage private capital. And in Connecticut, we are seeing something approaching $7 of private capital now for every dollar of government money.

Mr. MCNERNEY. Thumbs up.

Mr. ESTY. The solar world loves it. The wind world loves it, and the energy efficiency guys benefit as well.

Mr. MCNERNEY. Thank you.

Mr. Gattie, is there a dangerous synergy between climate change and the loss of biological diversity?

Dr. GATTIE. Yes, sir, there is.

Mr. MCNERNEY. Is there any—I mean, I think they both feed on each other and aggravate each other's growing concern.

Dr. GATTIE. Yes, sir. I agree.

Mr. MCNERNEY. Mr. Kaufman, do you agree?

Dr. KAUFMAN. I do.

Mr. MCNERNEY. Is there any policy approach that would help decouple those or would help reduce the biological diversity amplification of this problem?

Dr. KAUFMAN. Well, I think the committee is doing exactly the right thing. What we need to do is sort of halt climate change as quickly as we can. And I think net zero by 2050 is a perfectly reasonable goal because, the more temperatures rise, the more those risks and others will build.

Mr. MCNERNEY. Well, do you believe that reducing carbon emissions alone, Dr. Kaufman, will be sufficient to prevent climate catastrophe?

And the reason I ask that is because there is a significant and undefined latency between the time carbon is emitted into the atmosphere and the time that we are starting to see these effects. So we could be seeing the effects of carbon emitted 10 years ago, we still have 10 years of carbon buildup since then that are going to continue to throttle the climate change.

Dr. KAUFMAN. That is exactly right. So, you know, at this point, it is not about—you know, it is not about making sure climate change doesn't exist. It exists already. It is with us—every tenth of a degree of temperature that it goes up further will make it worse. So it is just a matter of, you know, stabilizing temperatures to minimize those risks.

Mr. MCNERNEY. So, I mean, just reducing carbon emissions alone—how about if we add in taking carbon out of the atmosphere and sequestering it? With carbon emission reduction, is that going to be enough to prevent catastrophe, in your opinion?

Dr. KAUFMAN. Well, I think we need to get to net zero emissions. So carbon dioxide emissions—the sources of emissions as well and, you know, balanced with the sinks, and that is trees, forests, as well as technological options, like direct air capture and storage underground. We need to balance the sources with the sinks, and that is what is going to stabilize temperatures over time.

Mr. MCNERNEY. Do you think we need to move toward climate engineering?

Dr. KAUFMAN. I think it is worth studying.

Mr. MCNERNEY. The science—Dr. Gattie?

Dr. GATTIE. I wouldn't jump out and say yes, absolutely. That is a—that connects a lot of issues across States and continents. So are is some unintended consequences that could come out of that that we would really need to——

Mr. MCNERNEY. Well, there are unintended consequences of adding carbon to the atmosphere for the last hundred years.

Dr. GATTIE. And I agree with us doing everything we can to reduce that. What I wouldn't want to do is anything that may compound that, just unwittingly compound that.

Mr. MCNERNEY. But the science would be—it would be good to develop the science?

Dr. GATTIE. I think we should be looking at it, yes, sir.

Mr. MCNERNEY. Mr. Profeta?

Mr. PROFETA. Yes, we should develop the science. We should be looking at everything we can do to minimize the risk.

Mr. MCNERNEY. Thank you. I yield back.

I am the last guy?

Mr. TONKO. You just may be, I believe, looking around.

I believe the list of Members that chose to question our panel has been completed.

And before we adjourn, I request unanimous consent to enter the following into the record. We have a letter from Our Children's Trust, a letter from the Portland Cement Association, a letter from Michael Gerard of Columbia Law School and John C. Dernbach of Widener University Commonwealth Law School, a letter from the Environmental Defense Fund, and then two letters that earlier were referenced that were entered into the record by Representative Barragán.

So, without objection, so ordered.

[The information appears at the conclusion of the hearing.][1]

[1] The letter from Our Children's Trust has been retained in committee files and also is available at https://docs.house.gov/meetings/IF/IF18/20191205/110295/HHRG-116-IF18-20191205-SD003.pdf.

And, again, we thank our witnesses for sharing all of the information that they have shared here this morning. It is very important and helpful to the goals that we have established as a subcommittee.

I remind Members that, pursuant to committee rules, they have 10 business days by which to submit additional questions for the record to be answered by our witnesses. So I would ask each witness to please respond promptly to any of such questions. And you may, you know, receive them from our colleagues.

So, at this time, the subcommittee is adjourned. Thank you again.

[Whereupon, at 12:40 p.m., the subcommittee was adjourned.]

[Material submitted for inclusion in the record follows:]

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December 4, 2019

The Honorable Paul Tonko
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House of Representatives
Washington, DC 20515

The Honorable John Shimkus
Ranking Member
Energy & Commerce
Subcommittee on the Environment
House of Representatives
Washington, DC 20515

Dear Chairman Tonko and Ranking Member Shimkus:

I am writing to you on behalf of the Portland Cement Association (PCA) in regards to the hearing entitled, "*Building A 100 Percent Clean Economy: Solutions for Economy-wide Deep Decarbonization.*" Sustainability and environmental stewardship are top priorities for America's cement manufacturers.

PCA, founded in 1916, is the premier policy, research, education, and market intelligence organization serving America's cement manufacturers. PCA members represent 92 percent of the United States' cement production capacity and have distribution facilities in every state in the continental U.S. Cement and concrete product manufacturing, directly and indirectly, employs approximately 610,000 people in our country, and our collective industries contribute over $125 billion to our economy. The Association promotes safety, sustainability, and innovation in all aspects of construction, fosters continuous improvement in cement manufacturing and distribution, and promotes economic growth and sound infrastructure investment.

Portland cement is not a brand name, but the generic term for the type of cement used in virtually all concrete. Concrete forms when portland cement is mixed water, and aggregate (sand and rock), and allowed to harden. Cement holds the concrete together and has a role similar to flour in a cake mix. Concrete is the most-utilized material after water in the world; the U.S. uses about 260 million cubic yards of concrete each year. It is used to build highways, bridges, runways, water & sewage pipes, high-rise buildings, dams, homes, floors, sidewalks, and driveways.

Cement, the essential material to make concrete, is manufactured through an energy-intensive process. The heart of the process is the cement kiln, a large rotating industrial furnace in which limestone (the critical raw ingredient) and other materials are heated to 3,500 degrees Fahrenheit. At this temperature, the materials become molten and then recombine into small stones called clinker, which is then conveyed to mills to be crushed into the final cement powder. During the heating phase, the molecular structure of the calcium carbonate ($CaCO_3$) found in the limestone breaks apart to form calcium oxide (CaO) and carbon dioxide (CO_2), which is released as process emissions. These emissions are a chemical "fact of life" in cement manufacturing, which constitutes 60% of industry CO_2 emissions. Currently, there is no commercially viable technology to prevent or reduce the released CO_2 resulting from the chemical process.

Cement manufacturers have invested significantly to reduce CO2 and other emissions by implementing R&D driven technology improvements, increasing energy efficiency, and reducing reliance on fossil fuels through the use of lower carbon-intensive alternative fuels. The cement industry lowered energy consumption 37 percent since 1972 through equipment and process improvements. Between 2010 and 2016, the cement industry decreased its greenhouse gas (GHG) emissions by six percent while increasing production by 26 percent through efficiency improvements in the manufacturing process. For 2017, twenty-six (28%) of cement plants won awards from the Department of Energy's ENERGY STAR program for their efficiency efforts.

Looking forward, manufacturers face unique and fundamental challenges associated with further decarbonizing the cement industry. While energy efficiency and alternative fuels will continue to be critical components of the industry's decarbonation strategy, 60% of the industry's CO2 emissions result from the chemical process of manufacturing cement. Currently, there is no commercially available, affordable, and scalable technology available to the cement industry for the capture, use, and storage (CCUS) of these manufacturing process emissions. Indeed, at the current pace of research and development, commercially available CCUS technology is several years away. For us to meet the deadlines cited by scientists for global action, technological development will have to be accelerated, with particular focus on industrial sectors like the cement industry. This will require targeted federal funding and financial incentives to move the technology from the demonstration and pilot stage to commercial-scale use, as well as a significant investment in infrastructure to reliably transport and store CO2. Considering the chemistry required to make cement, reducing emissions will require significant research into storage and utilization, such as how to cost-effectively mineralize carbon. Legislation should consider research and development funding as part of any regime that limits carbon emissions.

Manufacturers also face the growing risk of a patchwork of state-level policies. California and other states are moving forward to limit GHGs within their borders in the absence of federal action. Their experiences offer lessons for policymakers, but as Congress moves forward with a federal policy, it should ensure that there is a single regime for limiting GHGs. If cement manufacturers were faced with conflicting technical requirements and duplicitous taxes or carbon credit systems, it would severely reduce their competitiveness. Congress faced this dilemma when it considered how to modernize the Toxic Substances Control Act (TSCA) in 2016. Congress understood the risk for manufacturers then and included mechanisms that preempted state power, particularly for California. Congress should take similar steps for GHG legislation as it would be supported by precedent.

Further, any such legislation should be careful to protect the competitiveness of American manufacturers against foreign producers that may not face similar GHG emission limits. With a global market for commodities like cement, the cost of production is an essential part of competitiveness. Any limits on GHGs will raise these costs, such as for fuel, materials, environmental controls, training, planning, and permitting, for manufacturers. Foreign competitors without these costs would have a competitive edge, and would increase production as demand for their cheaper product increases at the harm of American businesses. This carbon leakage would defeat the purpose of the bill. Therefore, any GHG legislation should include a border adjustment mechanism or other leveling provision to ensure that US manufacturers in

energy-intensive, trade-exposed industries maintain a level playing field with cheaper foreign imports not subject to similar standards. A border mechanism would protect American economic growth and facilitate a reduction in global GHG emissions.

In short, the cement manufacturers support Congressional action that seeks to limit GHG emissions. PCA supports market-based policies and initiatives that enable the industry's continued reduction of its carbon footprint in a responsible and sustainable manner. We encourage careful questioning of the witnesses at this hearing to evaluate how a market-based regime could be crafted while preserving the competitiveness of American manufacturers. We also stress that the legislation creating any such regime must include significant measures that invest and guide federal research into CCUS and other technologies that are imperative to the success of comprehensive climate change legislation.

PCA appreciates the opportunity to share our member's efforts to improve efficiency and reduce emissions. We look forward to working with the subcommittee on future legislation and agency oversight to ensure cement manufacturers have the support required from the federal government to enable the industry's continued reduction of its carbon footprint in a responsible and sustainable manner.

Sincerely,

Sean O'Neill
Senior Vice-President, Government Affairs
Portland Cement Association

COLUMBIA LAW SCHOOL

Michael B. Gerrard
Andrew Sabin Professor of Professional Practice
Director, Sabin Center for Climate Change Law
Chair, Faculty of the Earth Institute

December 4, 2019

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

The Honorable John Shimkus
Ranking Member, Committee on Energy and Commerce,
Subcommittee on Environment and Climate Change
U.S. House of Representatives
2322 Rayburn Office Building
Washington, DC 20515

Re: Key Recommendations of *Legal Pathways to Deep Decarbonization in the United States*

Dear Chairman Tonko and Ranking Member Shimkus:

We write in advance of your December 5, 2019 hearing on "Building a 100 Percent Clean Economy: Solutions for Economy-Wide Deep Decarbonization," which will consider economy-wide approaches to addressing climate change in the U.S, with a specific focus on carbon pricing and the role of states in implementing climate policies. Of potential interest to you is the book that we recently co-edited, *Legal Pathways to Deep Decarbonization in the United States*, which contains contributing chapters from leading scholars across the country, and which includes more than 1,500 specific legal recommendations for reducing U.S. greenhouse gas emissions at least 80% by no later than 2050.

In this letter, we identify recommendations that cut across each of the pillars of decarbonization, and describe some of those that seem the most important to us in terms of achieving deep decarbonization. We are also enclosing a more thorough summary of the book's recommendations for your consideration. Finally, the letter summarizes our thoughts about the role of states in a national effort to reduce greenhouse gas emissions.

KEY RECOMMENDATIONS FROM LEGAL PATHWAYS

Cross-cutting recommendations

- The federal government should set a price on carbon and other greenhouse gases.
- The federal government should accelerate and intensify research and development for zero-greenhouse-gas emitting technology and carbon removal technology.
- The federal government, in a future administration, should reinstate and strengthen climate change regulations that have been weakened under the Trump Administration.

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- In all actions taken to reduce greenhouse gas emissions, the federal government, state and local governments, and the private sector, should:
  - Foster a just transition for those individuals and communities dependent on the carbon economy.
  - Maximize environmental, economic, and social co-benefits.

Energy efficiency and conservation

- The federal government should adopt strict fuel economy standards for light duty and heavy duty vehicles.
- The federal government should adopt more and stronger federal and state appliance efficiency standards.
- State and local governments should adopt stringent energy efficiency standards for new buildings.
- State and local governments should adopt requirements or incentives for building retrofits for resilience, electrification, and efficiency.

Decarbonization of electricity sector

- The federal government should adopt expedited approval procedures for leasing for offshore wind and not unduly delay the NEPA process.
- States should preempt local control for siting of utility-scale renewables.
- The federal government should reform the process for approval of interstate transmission lines to facilitate long-distance transmission of electricity from renewable sources.
- The federal government should eliminate fossil fuel subsidies.
- Local governments should ease building and zoning requirements for distributed renewables.

Switching of end-use fuels to electricity

- Federal, state and local governments, as well as the private sector, should engage in a massive infrastructure program to construct and operate electric vehicle charging stations.
- The federal government should redirect biofuels use from motor vehicles to more specialized uses such as in planes, and should strengthen existing requirements to make biofuels production more sustainable.
- State and local governments should encourage or require that existing buildings be heated and cooled by electricity rather than by oil or natural gas.

Carbon capture and negative emissions

- The federal government should progressively reform agricultural subsidies and incentives to encourage climate-friendly agriculture.
- Congress should amend the "organic legislation" for each federal public land system to mandate consideration and implementation of climate mitigation, adaptation, and resilience in management plans.
- States should impose restrictions on carbon dioxide emissions to drive carbon capture and sequestration, including carbon dioxide emissions from the industrial sector.
- States should modify their renewable portfolio standard laws to require not just the purchase of renewable energy but also energy produced by coal-fired and natural gas combined cycle plants that are equipped to capture carbon dioxide.

Significant reduction in emissions of non-carbon dioxide pollutants

- The federal government and states should strengthen controls over leakage and venting of methane throughout the life cycle.
- The federal government should impose stronger controls over emissions from diesel emissions from all sources, including black carbon emissions.
- To reduce black carbon and other emissions, EPA should prioritize regulations that accelerate fleet turnover and otherwise take older and dirtier engines and vehicles off the road.
- The federal government should quickly ratify the Kigali Amendment either through existing authority under the Clean Air Act or through formal advice and consent of the U.S. Senate.
- State and local governments should update and amend their green purchasing program requirements to eliminate purchases of HFC-containing equipment where other low-global-warming-potential and more energy efficient alternatives are available on the market.
- The federal government as well as state governments should strengthen regulations and incentives so as to significantly reduce nitrous oxide emissions in agriculture.

ROLE OF STATES IN DEEP DECARBONIZATION

As noted earlier, *Legal Pathways* makes recommendations for not only the federal government, but also state governments, local governments, and the private sector. Our analysis of these many recommendations leads us to conclude that each level of governance has unique abilities to reduce greenhouse gas emissions that cannot easily be replicated by other levels. This conclusion, of course, applies to states. States have an important role in:

- Permitting and regulation of utility-scale electricity generation (both fossil fuels and renewables).
- Siting of electric transmission lines.
- Siting and approval of intrastate electricity and natural gas distribution lines.
- Pricing of electricity and natural gas to consumers.
- Standards for emissions of hydrofluorocarbons (HFCs) because courts have limited the federal role.
- Regulation of oil, gas, and coal extraction on private or state-owned land.
- Subsurface property rights (relevant to CO2 sequestration)
- Forestry on private land and state forests.
- Insurance regulation.
- Solid waste regulation.

The federal government should support and encourage efforts by states to reduce greenhouse gas emissions or, at a minimum, not interfere with states that are trying to reduce these emissions. States can and have made an important contribution to reducing these emissions. They have been—and continue to be—important sources of learning for the most cost-effective ways of reducing greenhouse gas emissions. And they have proven adept at finding ways of reducing greenhouse gas emissions in ways that produce other benefits. They have often lowered energy costs for the poor. They have contributed to employment and economic growth. These tools encourage technological innovations that can lead to even greater greenhouse gas reductions in the future, as well as further economic and employment growth. Use of these tools

also reduces emissions of other air pollutants that impair human health, including sulfur dioxide, mercury, and particulates. These additional benefits have often been strong drivers for adoption of greenhouse gas reductions at the state level.

We hope that this high-level summary of the key recommendations of *Legal Pathways to Deep Decarbonization* and our overview of the role of states' efforts are useful to you in your important work creating policies to achieve decarbonization in this country. Please let us know if we can be of further assistance to you or your fellow Subcommittee members, or if you or your staffs would like full copies of the book. A short summary version of the book is available for free download as a PDF from this site.

Sincerely,

Michael Gerrard
Andrew Sabin Professor of Professional Practice
Director, Sabin Center for Climate Change Law

John C. Dernbach
Commonwealth Professor of Environmental Law and Sustainability
Director, Environmental Law and Sustainability Center
Widener University Commonwealth Law School

cc: The Honorable Frank Pallone, Chairman, U.S. House Committee on Energy and Commerce
The Honorable Greg Walden, Ranking Member, U.S. House Committee on Energy and Commerce

December 5, 2019

Chairman Paul Tonko
United States House of Representatives
Committee on Energy and Commerce
Subcommittee on the Environment and Climate Change
Washington DC 20515

Ranking Member John Shimkus
United States House of Representatives
Committee on Energy and Commerce
Subcommittee on the Environment and Climate Change
Washington DC 20515

Dear Chairman Tonko and Ranking Member Shimkus,

Please accept this letter as part of the record for the hearing on "Building a 100 Percent Clean Economy: Solutions for Economy-Wide Deep Decarbonization."

Thank you for the opportunity to submit written testimony on the critical need for economy-wide policy solutions to ensure dramatic reductions in climate pollution and put the United States on the path to a 100% clean economy by mid-century.

The Goal: A 100% Clean Economy

The impacts of climate change are already being felt in communities across the United States. If we fail to act to reduce climate pollution, the costs—to the American economy, to public health, and to the environment—will be enormous. The latest science tells us that to avoid the worst impacts of climate change, the United States must reach net zero emissions across the economy—emitting no more climate pollution than we can remove—no later than 2050. That is what we mean by a 100% clean economy.

The transformative changes needed to achieve this goal will require equally ambitious policy solutions that can drive dramatic emissions reductions across all of the major emitting sectors of the economy, including electricity, industry, buildings, transportation, and land use. While the U.S. electricity sector is making progress towards beginning this transition, other sectors are currently lagging behind. Emissions from transportation, buildings, and industry each rose in 2018. Absent new policies, total energy-related carbon dioxide emissions are projected to remain flat into the future and even to start rising by mid-century—even as the science tells us they must fall rapidly.[1]

[1] 2018 emissions data from Rhodium Group, Final U.S. Emissions Estimates for 2018, May 2019, https://rhg.com/research/final-us-emissions-estimates-for-2018/; projections from U.S. Energy Information Administration, Annual Energy Outlook 2019, January 2019, Table 18, https://www.eia.gov/outlooks/aeo/.

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To address the climate crisis, we must accelerate decarbonization in the electricity sector and reverse rising emissions in other sectors by shifting from carbon-intensive fuels and activities to those that produce low, zero, or even negative emissions. And we must do that at an unprecedented pace and scale.

Achieving the Goal: A Portfolio Approach

Comprehensive federal climate legislation can meet this challenge by mobilizing investment and action throughout the American economy—and holding us accountable to the goal. Achieving a 100% clean economy will require a portfolio of policies designed to address key barriers, challenges, and objectives including:

- spurring technology innovation;
- delivering just and equitable outcomes for all Americans;
- addressing barriers to clean energy and energy efficiency in specific sectors;
- supporting farmers and forest landowners in reducing emissions and increasing resilience to climate change;
- cutting emissions of other greenhouse gases, such as methane; and
- strengthening the nation's infrastructure.

The centerpiece of the portfolio should be an economy-wide approach that taps the fastest and cheapest reductions available, while creating incentives for the research, development, and deployment of the next generation of low-carbon technologies. Designed well, such a core mechanism can serve as a magnet that aligns efforts to cut pollution across the entire economy, making complementary policies cheaper and easier to achieve and moving us more rapidly towards the 100% clean goal.

This letter lays out reasons why an economy-wide approach is vital to achieving a 100% clean economy by 2050, and outlines several options for the design of such a policy.

The Centerpiece of the Portfolio: An Economy-Wide Core Mechanism

The centerpiece of comprehensive federal climate legislation should be a core policy mechanism that ensures dramatic reductions in climate pollution across the U.S. economy in order to meet the 100% clean goal. This mechanism should cover as much of the economy as practicable, recognizing that some sources are too diffuse, too hard to measure, or too small to be covered. An economy-wide mechanism can:

> **Maximize emissions reductions**: Broad emissions coverage is critical because emissions come from many sectors of the economy and a policy that exempts one or more of these sectors, especially sectors that contribute significant emissions, undercuts the effectiveness in achieving overall reduction goals.
>
> **Ensure consistent signals to drive reductions across sectors**: Excluding major emissions sources can create perverse incentives for some sources of emissions to shift from covered to uncovered sectors, undermining overall environmental performance. Covering the vast majority of missions ensures that each sector is facing the same incentives to reduce emissions and no sectors or industries are disproportionately burdened.
>
> **Tap the lowest-cost reductions:** Broad emissions coverage is also critical to achieve emissions reductions cost-effectively. Since costs for mitigation vary within and between

sectors, broader coverage ensures that businesses retain the flexibility to pursue the cheapest reductions first and that no opportunities are left on the table—a critical precondition for minimizing the overall costs of climate legislation.

Drive clean investment and innovation: Aligning incentives for reductions across the economy will help spur the development of essential innovative technologies across various parts of the economy, while orienting investments in all sectors towards deployment of a broad portfolio of low-carbon technologies. Well-designed policy can play a critical role in ensuring that promising next-generation technologies become cheap enough to deploy at scale—and their effect will be most powerful if the policy covers all of the major emitting sectors where new technologies are needed.

Improve public health and quality of life for all communities: The core mechanism should be designed to improve public health and quality of life for all communities and distribute costs and benefits in a way that promotes equity. Economically disadvantaged communities and communities of color have been exposed to disproportionate levels of toxic pollution and also stand to be the first and worst hit by — and the least prepared for — the costs and impacts of climate change. Climate policies should address environmental justice, provide transparency, promote affordability, and give a voice to and commit to benefitting American workers, disadvantaged communities, and those most directly affected by climate change and the transition to a cleaner economy.

Three options for a core policy mechanism are:

1. *An enforceable nationwide pollution limit:* Congress sets a legally enforceable limit on total climate pollution from fuel combustion and industry – amounting to about 85% of U.S. greenhouse gas emissions. That limit gets tighter over time, reaching net zero emissions by 2050 at the latest. The policy should provide individual sources with flexibility over how to meet the nationwide limit, along with economic incentives to spur deep reductions as soon as possible and at the least cost.

2. *A carbon fee with climate backstops:* Congress enacts a fee on all climate pollution from fuel combustion and industry, again comprising roughly 85% of U.S. greenhouse gas emissions. To ensure that we meet the 100% clean goal, a declining pollution pathway consistent with net zero emissions by 2050 should be established, along with regular assessments of performance. If emissions are above the pathway, the fee automatically increases, providing a climate backstop. If the fee still does not produce the needed results, EPA would be directed to issue regulations to meet the goal.

3. *A statutory goal of a 100% clean economy by 2050 with direction to federal agencies to act:* Congress establishes a national goal of net zero emissions by 2050 and directs EPA, with support from other federal agencies, to meet it. This could be achieved either through direct federal rules or through state action with federal guidelines, oversight, and backstop provisions.

Ensuring Emissions Reductions: The True Measure of Success

The ultimate measure of success for any climate policy is reducing climate pollution. To that end, the core mechanism must provide clear accountability for and enforceability of emissions reductions. In this way, it can serve as a safety net to ensure that overall emissions decline on a time scale in line with what the science tells us is necessary.

A policy that establishes a legally enforceable limit on the total quantity of allowable climate pollution (option 1 above) can guarantee results. In the context of a carbon fee (option 2), however, some form of "climate backstops" are essential to ensure reductions consistent with achieving net-zero emissions by 2050.[2]

A carbon fee sets a price per unit of pollution, which provides an incentive for businesses and households to reduce emissions. But a pure tax lacks an explicit connection to performance, as measured by emissions, and therefore provides no assurance that the required reductions will actually be achieved. We know that emissions will fall as a result of a carbon fee, but even the most robust economic modeling cannot provide certainty about how big the decline will be. Fundamental factors like energy or economic market dynamics can change over time, affecting the performance of a tax. Because greenhouse gases accumulate in the atmosphere over time, even being slightly off the desired path over several decades can produce significant consequences for cumulative emissions, and thus climate damages. A pure tax also cannot ensure that the U.S. meets its commitments under the Paris Agreement.

To address this inherent uncertainty, any carbon fee policy should include climate backstops, also known as "environmental integrity mechanisms" (EIMs). Climate backstops link a carbon fee to specified pollution reduction goals and provide mechanisms to help the program stay on course for meeting those goals. Such measures have been included in several recent federal carbon fee proposals, including the MARKET CHOICE Act and the Energy Innovation and Carbon Dividend Act (both introduced in the 115th Congress and updated and reintroduced in the 116th Congress) and the Stemming Warming and Augmenting Pay (SWAP) Act and the Climate Action Rebate Act (both introduced in the 116th Congress).[3]

Most notably, one type of climate backstop (included in all the bills above) is a mechanism that increases the fee automatically if the tax has not been sufficient to drive emissions down to the specified emissions reduction goals outlined in the legislation. Such an approach allows the carbon fee to adjust quickly, transparently, and predictably, helping to keep the program on track to ensure the necessary emissions reductions are achieved. Additional climate backstops, including direction to EPA to issue regulations to meet the emissions goals, should be included in the event that automatic fee increases still do not produce the needed results. In addition, excess revenues (which will be higher than projected if emissions goals are not met) could be used to drive additional abatement.

Market-Based Policies: A Cost-Effective Solution

Cost-effective emissions reductions allow for greater ambition on a faster timeline

Given the urgency of the climate challenge, Congress should put in place policies that can help us transition as swiftly and as dramatically as possible, while ensuring affordability for all Americans. Leveraging cost-effective solutions will be vital to achieving the 100% clean goal, since they can drive greater emissions reductions on a faster timeline—while simultaneously reducing the overall cost to American businesses, industries, and consumers.

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[2] Read more about EDF's work on climate backstops here: http://blogs.edf.org/markets/2016/11/03/ensuring-environmental-outcomes-from-a-carbon-tax/ and http://blogs.edf.org/climate411/2018/12/18/a-growing-call-for-environmental-integrity/

[3] See: MARKET CHOICE Act (H.R.6463, 115th Congress; H.R.4520, 116th Congress); Energy Innovation and Carbon Dividend Act (H.R.7173, 115th Congress; H.R.763, 116th Congress); Stemming Warming and Augmenting Pay (SWAP) Act (H.R.4058, 116th Congress); Climate Action Rebate Act (H.R.4051/S.2284, 116th Congress).

Evidence shows that flexible market-based policies that set enforceable, declining limits on pollution and let businesses find the best ways can achieve emissions reductions at far lower cost than alternative policies. For instance, studies suggest that carbon pricing policies can be up to 14 times cheaper than sector-specific standards at achieving the same amount of reductions.[4] Each of the three options for core policy mechanisms described above can be implemented in a way that provides flexibility and creates incentives to reduce emissions as cost-effectively as possible.

Revenues raised can fund critical environmental and equity priorities

A carbon price of $50 per ton, rising at 5% annually (above inflation) could raise roughly $2.5 trillion over a decade; a cap-and-trade program with auctioned allowances could yield a similar amount. This revenue could be used to meet a range of objectives, including protecting low-income families from changes in energy costs[5] and vulnerable communities from the impacts of climate change; funding job and worker transition programs; investing in clean energy innovation and technologies that will be critical to achieving net-zero emissions by 2050; and ensuring cleaner air and investment in communities that have historically borne a disproportionate burden of pollution.

Modeling shows that revenues from a carbon price can be distributed in ways that improve economic welfare for the lowest income households.[6] When deciding how to invest revenues from a carbon price, policymakers should give a voice to and commit to benefiting American workers, historically disadvantaged communities, and communities and workforces most directly affected by climate change and the transition to a 100% clean economy.

Market-based policies have proven to be extremely effective in practice

Cost savings and revenues raised from well-designed market-based policies can also be channeled into additional reductions, creating opportunities to increase ambition and improve environmental outcomes over time. In California, for example, billions of dollars in revenues from the state's cap-and-trade program have been reinvested in programs and policies that achieve further emissions reductions beyond the cap, including rebates for electric vehicles and solar installations, investment in low-carbon transportation, and emissions reductions from natural and working lands.[7] Similarly, revenues from the Regional Greenhouse Gas Initiative (RGGI), the cap-and-trade program covering emissions from electric power generation in nine northeastern states, have been reinvested in energy efficiency, renewable energy, and electricity bill assistance for consumers. RGGI investments from 2017 alone are expected to drive additional lifetime carbon reductions of 8.3 million short tons and deliver $1.4 billion in energy savings to consumers.[8] The demonstrated benefits and low cost of emissions reductions under RGGI contributed to participating states' decision in 2017 to increase the ambition of the program by further lowering the cap between 2020 and 2030 by 30%.[9]

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[4] These results are sensitive to the modeling of pre-existing tax distortions. See Pizer et al. (2006). Modeling Economy-Wide vs Sectoral Climate Policies Using Combined Aggregate-Sectoral Models. *The Energy Journal* 27(3), 135–68. https://www.jstor.org/stable/23296994?seq=1. See also, Karplus et al. (2013, March 1). Should a Vehicle Fuel Economy Standard Be Combined with an Economy-Wide Greenhouse Gas Emissions Constraint? Implications for Energy and Climate Policy in the United States. *Energy Economics* 36, 322–33.

[5] For example, see https://www.cbpp.org/research/climate-change/the-design-and-implementation-of-policies-to-protect-low-income-households.

[6] Resources for the Future. (2019, September). Carbon Pricing Calculator. *RFF*. https://www.rff.org/cpc/.

[7] California Climate Investments, "2019 Annual Report: Cap-and-Trade Auction Proceeds," March 2019, caclimateinvestments.ca.gov.

[8] The Regional Greenhouse Gas Initiative, "The Investment of RGGI Proceeds in 2017," October 2019, https://www.rggi.org/sites/default/files/Uploads/Proceeds/RGGI_Proceeds_Report_2017.pdf.

[9] Regional Greenhouse Gas Initiative, "Summary of RGGI Model Rule Update," December 19, 2017, https://www.rggi.org/sites/default/files/Uploads/Program-Review/12-19-2017/Summary_Model_Rule_Updates.pdf.

Market-based policies for reducing pollution have proven to be extremely effective in practice:

- ✓ With California's cap-and-trade policy in place, emissions fell below the state's 2020 target of reducing emissions to 1990 levels four years early and emissions continue to decline.[10] Meanwhile the state's GDP has grown at a faster rate than the rest of the country.[11]
- ✓ RGGI states have seen carbon dioxide emissions fall 47% since the program began (90% faster than the rest of the country) while electricity prices have fallen 5.7% and GDP has grown 47% (31% faster than the rest of the country).[12]
- ✓ The sulfur dioxide (SO2) trading program created by the 1990 Clean Air Act Amendments (also known as the Acid Rain Program) is another key example of a market-based pollution pricing program that was extremely successful at achieving its environmental aims – and the health and other benefits of the program greatly exceeded the costs.[13] Moreover, these costs were lower than originally forecast and are estimated to be at least 15% and up to 90% less than they would have been under a more prescriptive standard.[14]

Together, these examples provide real-world evidence that market-based policies can drive ambitious climate pollution reductions quickly, while allowing for economic prosperity – underscoring that they are a critical part of the solution set needed to reduce climate pollution at the pace and scale required to avert the worst impacts of climate change.

I thank the Committee for the opportunity to submit this letter on the critical need for economy-wide solutions to ensure dramatic reductions in climate pollution from across the U.S. economy. I look forward to working with members of the Committee on the development of comprehensive national climate legislation that achieves the goal of a 100% clean economy.

Sincerely,

Nathaniel Keohane, Ph.D.
Senior Vice President, Climate
Environmental Defense Fund

cc:
Chairman Frank Pallone, Jr
Ranking Member Greg Walden

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[10] Environmental Defense Fund, "Cutting Carbon and Growing the Economy: A Decade of Cap-and-Trade Success in California" (Environmental Defense Fund, n.d.), https://www.edf.org/sites/default/files/cutting-carbon-growing-economy.pdf. See also, http://blogs.edf.org/climate411/2019/08/27/california-and-quebecs-august-auction-clears-after-emissions-below-2020-target-for-second-year-running/.
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Rep. Mark Pocan
Co-Chair of The Congressional Progressive Caucus
1421 Longworth HOB
Washington, DC 20515

June 21, 2018

Re: Removing Carbon Tax from the People's Budget

Dear Members of the Progressive Caucus,

The undersigned environmental justice, community, civil rights and environmental organizations are writing on behalf of our millions of progressive members and supporters to urge you to remove the price on Corporate Carbon Pollution (carbon tax) from The People's Budget FY 2019.

Today, communities of color, lower-income neighborhoods and Native Americans are disproportionately impacted by nearby frontline air pollution emitters. A carbon tax gives the state and polluters imprimatur for these companies to merely pay a small tax to continue spewing airborne pollutants that significantly damage the health of these disadvantaged communities while continuing to contribute to the ever-present climate emergency. We expect the Progressive Caucus to find better, more equitable solutions that reduces emissions, while also increasing equity and justice.

While we applaud your effort to generate robust revenues to combat the urgency of climate change, the inclusion of a carbon tax would make it much more difficult-and for some groups representing environmental justice communities, impossible – to endorse or promote the People's Budget proposal that includes the inequitable, discriminatory, ineffective and ultimately regressive carbon tax proposal that gives a green light for the biggest climate scofflaws to pay to pollute and maintain a harmful status quo.

It is naïve to presume that polluters only lack a sufficient market indicator or pricing signal to discourage their climate killing emissions. Carbon pricing and other market mechanisms such as cap and trade, emissions trading and others rely on market forces that have already delivered a substantial and disparate toxic burden faced by socially and economically disadvantaged communities. A carbon tax provides a government license to pollute — and to increase pollution as long as taxes are paid. That is why carbon pricing schemes have been ineffective at reducing pollution and safeguarding our communities. We would encourage you to review the landmark report entitled: *Carbon Pricing: A Critical Perspective for Community Resistance*

released last year by the Indigenous Environmental Network and Climate Justice Alliance (http://www.ienearth.org/wp-content/uploads/2017/11/Carbon-Pricing-Final-Print-Final-HiRez.pdf)

Carbon taxes would be highly regressive, irrespective of the proposed unworkable rebate schemes. Lower-income families dedicate a larger proportion of their income on energy, so a carbon tax hits economically struggling family the hardest. These households are already forced to make difficult financial choices between food and rent, and medicines and education.

The Progressive Caucus should be skeptical of relying on a carbon tax that has been endorsed by many large oil and gas companies, the World Bank, a Who's Who of Republican thought leaders and, most recently, the College Republicans. Some support carbon taxes as a revenue raiser to pay for corporate tax cuts; the companies endorse carbon taxes because they know that it will have no real impact on their production, profits or pollution.

The adoption of false, industry-friendly market approaches, like carbon taxes and carbon cap-and-trade programs, are not true climate solutions, only illusions of solutions. The most effective way to fight climate change is through commonsense regulation that requires polluters to reduce their carbon emissions, while increasing incentives for the expansion of clean, renewable energy sources like wind and solar. This approach restored America's waterways with the Clean Air Act and dramatically reduced airborne contaminants with the Clean Air Act.

Raising revenue from pollution will not reduce emissions, it will merely make the government dependent on the polluters' tax revenues to fulfill other budgetary needs. And industry will simply continue business as usual, exposing socially and economically disadvantaged communities to more toxic pollutants while passing on costs to struggling families.

Carbon tax revenue could never adequately compensate America for the destruction that extraction and pollution has on frontline communities hit first and worst by climate change. The regressive Trump tax cut and misguided Republican budgetary priorities provide ample revenue opportunities to replace a carbon tax. Moreover, an immediate cessation of the $20 billion in annual subsidies could be re-invested in frontline communities and renewable energy infrastructure.

We urge you to remove carbon tax from the People's Budget and replace it with progressive income, corporate or financial revenue raisers and ask that the Progressive Caucus continue to advocate for policies and proposals that actually curb and vastly reduce emissions, and those that prioritize more equitable, effective and just transition from fossil fuels.

Sincerely,

Food & Water Watch
Climate Justice Alliance
Indigenous Environmental Network
National Nurses United
Our Revolution
People Demanding Action
Progressive Democrats of America

Bronx Climate Justice North
Church Women United in New York State
Citizens For A Clean Pompton Lakes
Citizens United for Renewable Energy (CURE),
Council on Intelligent Energy & Conservation Policy
Daughters of Wisdom
Don't Gas the Pinelands!
Elmirans & Friends Against Fracking
Environmental Justice Task Force of the WNY Peace Center
Gas Free Seneca
iEat Green
Justice Action Mobilization Network/ Faith in Solar
Lower Raritan Watershed Partnership
Maryland Environmental Health Network
Newark Science and Sustainability
NJ State Industrial Union Council
North American Climate, Conservation and Environment (NACCE)
Nuclear Age Peace Foundation
Our Revolution New Mexico and Frack Free Four Corners
Patuxent Riverkeeper
People for a Healthy Environment
Sisters of St. Dominic of Blauvelt, New York
The Climate Mobilization NYC
WATERSPIRIT
Weather Medic Inc

Speaker Nancy Pelosi
Speaker of the United States House of Representatives
1236 Longworth H.O.B.
Washington, DC 20515

Representative Kathy Castor
Chair, House Select Committee on the Climate Crisis
2052 Rayburn House Office Building
Washington, D.C. 20515

November 22, 2019

Dear Speaker Nancy Pelosi and Select Committee Chair Kathy Castor,

On behalf of millions of members and supporters, we are calling on the Select Committee on the Climate Crisis to endorse the bold actions that science requires and that justice demands in order to limit global temperature rise to below 1.5°C above pre-industrial levels — actions that a majority of the United States public supports. Unfortunately the Select Committee's Request for Information fails to solicit information on two of the most critical components of the climate fight: (1) addressing structural inequities that perpetuate injustice and the disproportionate impacts to frontline communities, and (2) ending fossil fuel production - the major driver of climate change.

By framing its request for input myopically, the Select Committee has created a self-fulfilling prophecy whereby the solutions it is likely to recommend only partially address the climate crisis. We can only note our disappointment regarding the Committee's failure this past year to truly reach out to those most harmed by the toxic legacy of our fossil-fuel based economy. In contrast, industry and powerful interests were given a disproportionate voice in the hearings and events held by the Committee. After decades of inaction and defeatist rhetoric about what is possible, our planet can no longer afford incremental or isolated policy tweaks that appear safe to Members of Congress, most of whom will not live to see the consequences of the disastrous choices that they have made. The climate emergency the world now faces requires the courage to champion transformative action in response: a Green New Deal to build a more just and sustainable world.

The need for a Green New Deal is more pronounced than ever, as marginalized communities are impacted by intersecting crises of climate change, increasing income/wealth inequality, and rising white nationalism and neo-fascism. One of the greatest legislative accomplishments of the Democratic Party, the New Deal, excluded and was especially harmful to African American, Indigenous and LatinX people. An inclusive and equitable Green New Deal that centers frontline communities and puts us on the path to a regenerative economy is our last chance to address the climate crisis and dismantle myriad inequities that have gone unmitigated for too long.

The climate crisis is a symptom of a system that exploits and extracts from our natural resources and our people, particularly frontline, vulnerable and Indigenous communities

disproportionately burdened by the fossil fuel economy. These same communities are creating visionary solutions to fight climate change by building a more equitable world, and Members of Congress must translate these visions and actions into transformative policy.

The undersigned groups are eager to work with House leaders to achieve the necessary policies outlined below. We are also prepared to hold legislators accountable if they fail to support bold action. With millions of lives at stake, we need leaders in Congress with the courage to move beyond the decades-old political status quo that protects corporate interests over the health and well-being of our communities. We need leaders who will champion transformative actions to mobilize our government into the decade of a Green New Deal.

In order to meet the challenge of the climate crisis, it is imperative that the Select Committee put forward — and the House adopt — the following five recommendations:

1. **A commitment to environmental justice that prioritizes support for communities historically harmed first and most.** We must not only invest in prosperity for communities on the frontlines of poverty, environmental racism and pollution, but also follow the leadership of these communities already developing innovative solutions to build sustainable and healthy local energy, food and service systems. The transition to a sustainable economy presents an opportunity to invest in people by creating a federal jobs guarantee with collective bargaining rights and family-sustaining wages. We must take a holistic approach to healthy communities that addresses the disproportionate burden of pollution and environmental degradation, as well as other threats, such as mass incarceration and militarization. We need policies rooted in justice that protect the right to housing and healthcare. And to foster a healthy democracy we must reverse the erosion of voting rights, including ending partisan gerrymandering.

2. **Respect for Indigenous peoples, lands and sovereignty.** We must honor the treaties protecting Indigenous lands, waters, and sovereignty by the immediate halt of all construction, leasing and permitting for resource extraction, processing and infrastructure projects affecting or on Indigenous lands. We must uphold the United Nations Declaration on the Rights of Indigenous Peoples, which recognizes that Indigenous Peoples have the right to give or withhold "free, prior and informed consent." And we must recognize the Rights of Nature into law to protect our ecosystems and align human law with natural law.

3. **A just transition to phase out the production and use of fossil fuels and switch to 100% renewable energy.** Whether through catastrophic climate change or a planned phase-out, the fossil fuel era is coming to an end. If we wait to act, workers and communities will be left in the cold — but we have an opportunity to implement a just transition that creates good, family sustaining jobs with strong worker and union protections. We must build a cutting-edge, accessible and affordable transportation system. The committee's work must follow the path of states such as California, Hawaii, Maine, New Mexico, New York and Wisconsin that have already committed to 100 percent clean/renewable energy. We must

end subsidies and giveaways for oil, gas and coal extraction, halt new fossil fuel production, hold fossil fuel companies and utilities accountable for the damage their actions have caused for communities across the country, and begin a managed phase-out of fossil fuel production that puts workers and frontline communities first while prioritizing investments in a clean energy and sustainable future. To succeed, we must reject policies that worsen inequities, such as carbon trading schemes, carbon offsets, and unproven technologies associated with geoengineering, all of which can concentrate dirty projects in marginalized communities and encourage land grabs. We must also reject expensive false solutions that extend our reliance on dirty energy, including biomass, nuclear, and carbon capture and storage that enables continued fossil fuel extraction or is so costly that it takes resources away from cheaper, proven solutions.

4. **Investment in regenerative agriculture/agroecology to build a healthy and just food system.** To fight climate change, we must rapidly reduce greenhouse gas emissions from industrial agriculture, and instead replenish soils and sequester carbon through regenerative and organic farming. We need anti-trust policies to combat consolidation in the food and farming sector, and fair prices for farmers to reverse the rapid loss of farms. Instead of subsidizing agribusiness, we must invest in diversified, resilient local and regional food economies anchored by family farmers, ranchers and fishers that ensure healthy, sustainable food for all. We must also provide increased protections and restitution for Black and Indigenous farmers who have been systematically discriminated against for generations. We must also update federal labor laws to include agriculture and food service workers and ensure fair, family-sustaining wages. We cannot afford to be distracted by false solutions that perpetuate our current industrial monoculture-based food system.

5. **An ambitious emissions reduction timeline in accordance with science.** According to the IPCC's most recent science, we must reduce global emissions by roughly 45 percent by 2030 to have a strong chance at a habitable world in 2050. Legislation enacted and actions taken under the 116th and 117th Congress will be critical to whether the United States succeeds in reducing its share of greenhouse gas emissions in the next decade. We urge the committee to recommend measurable and enforceable emission reduction goals for 2030 and additional key interim targets on the way to zero U.S. emissions well before 2050 in line with the 1.5ºC trajectory laid out in the IPCC's report and in line with our historic responsibility as the world's largest emitter.

We have an opportunity to build a better, more equitable and just world. But first we must stop living in fear and rise to the challenge of the climate crisis with courage. Rejecting fear is exactly what people across the country are doing when they join climate strikes, attend forums, make phone calls and take other actions to demand Congress pass legislation to make a Green New Deal the law of the land. We hope you will heed these calls.

Sincerely,

1. Advocates for Springfield
2. Agricultural Justice Project
3. Alabama Interfaith Power & Light
4. Alliance for Energy Democracy
5. Alliance to Protect Our People & the Places We Live
6. Animals Are Sentient Beings
7. Anthropocene Alliance
8. Arise for Social Justice
9. Arvadans for Progressive Action
10. Athens County Future Action Network
11. Back Country Excursions
12. Baltimore Peace Action
13. Bay Area-System Change not Climate Change
14. Berks Gas Truth
15. Better Path Coalition
16. Beyond Extreme Energy (BXE)
17. Big Reuse
18. Breathe Easy Susquehanna County
19. Buckeye Environmental Network
20. Bucks Environmental Action
21. Bus for Progress
22. California For Progress
23. California young Democrats Environmental Caucus
24. Campaign for Renewable Energy
25. Canton Residents for a Sustainable, Equitable Future
26. Cape Downwinders
27. Care for Creation Church of Orleans
28. Center for Biological Diversity
29. Center for Coalfield Justice
30. Center for Environmentally Recycled Building Alternatives
31. Center for Rural Enterprise & Environmental Justice
32. Center for Story-based Strategy
33. Central California Asthma Collaborative
34. Chatham Research Group
35. Church Women United in New York State
36. Citizen Science Community Resources, Inc.
37. Citizens Action Coalition of Indiana
38. Citizens Coalition for a Safe Community
39. Citizens For Water
40. Citizens Regeneration Lobby
41. Citizens United for Renewable Energy (CURE)
42. Citizens' Environmental Coalition
43. Climate Action Group, Unitarian Society of Northampton & Florence
44. Climate Action Mondays
45. Climate Action Movement, University of Michigan
46. Climate Action Wisconsin
47. Climate Change Awareness & Action
48. Climate Defense Project
49. Climate Generation
50. Climate Hawks Vote
51. Climate Justice Alliance
52. Climate Justice Committee of CNY Solidarity Coalition
53. Climate March
54. Climate Solutions Digest
55. Coalition Against Nukes
56. CODEPINK
57. Columbia Gorge Climate Action Network
58. Columbus Community Bill of Rights
59. Common Sense Design
60. Communities for Safe and Sustainable Energy
61. Community Alliance for Global Justice
62. Compressor Free Franklin
63. Conservation Congress
64. Courage Campaign
65. CREDO Action
66. Damascus Citizens for Sustainability
67. Deep Agroecology

68. Divest Los Angeles
69. Don't Gas the Pinelands
70. Dr. Bronner's
71. Dryden Resource Awareness Coalition
72. DTM Strategies
73. Earth Ethics
74. Eat for the Earth
75. Eco-Eating
76. EGG350.org
77. Environmentalists Against War
78. Eugene / Springfield NAACP
79. Eugene Interfaith Earthkeepers
80. Fair World Project
81. Faith Communities Environmental Network
82. Faith Communities Environmental Network of Cape Cod
83. Families Advocating for Chemical & Toxics Safety
84. Family Farm Defenders
85. Farmworker Association of Florida
86. Flood Victims of Richwood
87. Florida Student Power Network
88. Food & Water Action
89. Food Revolution Network
90. Fossil Free Penn
91. Fossil Free Tompkins
92. Fossil Free Tulane
93. Fox Valley Citizens for Peace & Justice
94. Frack-Free Frostburg
95. Franciscan Action Network
96. Franklin County Continuing Political Revolution Climate Crisis Task Force
97. FreshWater Accountability Project
98. Friends of Merrymeeting Bay
99. Friends of the Earth U.S.
100. Gas Free Seneca
101. Golden Ponds Farm
102. Grassroots Institute
103. Greater Prince William Climate Action Network
104. Green Education and Legal Fund
105. Green Party Of Nassau County
106. Green Sanctuary, Unitarian Church of Barnstable
107. Green Team, First Congregational Church of West Tisbury
108. GreenLatinos
109. Guilford Peace Alliance
110. Hands Across the Sand
111. Health, Environment, Agriculture, Labor Food Alliance
112. Healthy Gulf
113. Hope Glen Farm
114. Hunger Action Los Angeles
115. Indigenous Environmental Network
116. International Marine Mammal Project of Earth island Institute
117. Iowa Citizens for Community Improvement
118. Jackpine Savage Guide Service
119. John J. McCarthy Observatory
120. John Muir Project
121. Justice Commission, Presentation Sisters of Aberdeen
122. Kitsap Environmental Coalition
123. Lisa Hoag Designs
124. Livelihoods Knowledge Exchange Network (LiKEN)
125. Long Beach 350
126. Manhattan Project for a Nuclear-Free World
127. Marshalls Automotive
128. Mid-Missouri Peaceworks
129. Milwaukee Riverkeeper
130. Mission Blue
131. MOM's Organic Market
132. Mormon Environmental Stewardship Alliance (MESA)
133. National Family Farm Coalition
134. Nature Coast Conservation
135. New Jersey Skylands Sunrise Hub
136. New Jersey Tenants Organization
137. New York Communities for Change (NYCC)

138. New York Progressive Action Network
139. New York Progressive Action Network of the Southern Finger Lakes
140. North American Climate, Conservation, and Environment
141. Northeast Organic Farming Association of New York
142. Northeast Organic Farming Association of Vermont
143. Northern Illinois Jobs with Justice
144. Northern Michigan Environmental Action Council
145. Nuclear Information and Resource Service
146. NYC H2O
147. Ocean Conservation Research
148. Oil Change U.S.
149. Organic Consumers Association
150. Osterville United Methodist Church
151. Our Revolution Southern Oregon
152. Our Santa Fe River
153. Partnership for Policy Integrity
154. Peace Action New York State
155. Peace Boat US
156. Pelican Media
157. Pennsylvania Interfaith Power & Light
158. Pennsylvania Youth Climate Strikes
159. People Concerned about Chemical Safety
160. People Demanding Action
161. Peoples Climate Movement New York
162. Physicians for Social Responsibility Arizona
163. Physicians for Social Responsibility Pennsylvania
164. Post-Landfill Action Network
165. Preserve Bent Mountain
166. Preserve Giles County
167. Preserve Montgomery County
168. Preserve Salem
169. Preserve Wild Santee
170. Progressive Democrats of America, Tucson Chapter
171. Project Coyote
172. Promoting Health & Sustainable Energy
173. Protect All Children's Environment
174. Protect Our Water, Heritage, & Rights Coalition
175. Protect Penn Township
176. RE Sources for Sustainable Communities
177. Refuel Our Future
178. Regeneration International
179. Revolution Los Angeles
180. Richmond Interfaith Climate Justice
181. River Guardian Foundation
182. RootsAction
183. Roseland Against Compressor Station (RACS)
184. Safe Energy Analyst
185. Saint Davids Episcopal Church
186. SanDiego350
187. Sanford-Oquaga Area Concerned Citizens
188. Santa Cruz Climate Action Network
189. Santa Fe River Bill of Rights
190. Save Our Illinois Land
191. Save the Pine Bush
192. Save Wolves Now Network
193. Securing Economic and Energy Democracy of Southwest New Mexico
194. Seeding Sovereignty
195. Seneca Lake Guardian, a Waterkeeper Alliance Affiliate
196. Seven Circles Foundation
197. Sisters of St. Francis of Philadelphia
198. SoCal 350 Climate Action
199. Solar Solution
200. SolidarityINFOService
201. South Asian Fund for Education, Scholarship and Training (SAFRST)
202. Spottswoode Winery
203. St Bridget
204. Sunflower Alliance
205. Sunrise Movement

206. Surfrider Foundation
207. Sustainable Economies Law Center
208. Sustainable Medina County
209. System Change not Climate Change Los Angeles
210. Teleport Consulting
211. Temple of Understanding
212. The Climate Mobilization, Hoboken Chapter
213. The Homestead at Denison
214. The People's Justice Council
215. The River Project
216. The Shalom Center
217. The Wei LLC
218. The Whaleman Foundation
219. Time Laboratory
220. Toxic Free North Carolina
221. Toxics Action Center
222. Transition Sebastopol
223. Unitarian Universalist Association
224. Urban Climate Nexus
225. Utah Physicians for a Healthy Environment
226. Vote-Climate
227. WATCH (Water and Air Team Charlevoix)
228. Waterkeeper Alliance
229. WESPAC Foundation
230. West Berkeley Alliance for Clean Air & Safe Jobs
231. Western Maryland Green New Deal
232. Western Watersheds Project
233. White Rabbit Grove RDNA
234. Wild Nature Institute
235. WildWest Institute
236. Winyah Rivers Alliance
237. Wisconsin Network for Peace, Justice & Sustainability
238. Xun Biosphere Project
239. 198 Methods
240. 350Brooklyn
241. 350 Butte County
242. 350 Cape Cod
243. 350 Chicago
244. 350 Colorado
245. 350 Columbia
246. 350 Conejo
247. 350 Corvallis
248. 350 Dallas
249. 350 Eugene
250. 350 Fairfax
251. 350 Kishwaukee
252. 350 Mass Metro North Node
253. 350 Mass-Berkshires
254. 350 Montgomery County
255. 350 New Hampshire Littleton
256. 350NYC
257. 350 Philadelphia
258. 350 Sandpoint
259. 350 Seattle
260. 350 Triangle
261. 350 Wichita
262. 350 Wilmington
263. 350 Yakima Climate Action

Yale Center for Environmental Law & Policy

Written Response to Questions for the Record from The Honorable John Shimkus

Submitted by
Daniel C. Esty
Hillhouse Professor of Environmental Law & Policy and
Director, Yale Center for Environmental Law & Policy
Yale Law School and Yale School of Forestry & Environmental Studies

Regarding testimony before the
Subcommittee on Environment & Climate Change
Committee on Energy & Commerce
U.S. House of Representatives
1st Session, 116th Congress
December 5, 2019

1. What are your views on a "border carbon adjustment" or a tax on imports to protect U.S. manufacturers from being economically disadvantaged by the burdens of climate policies?

RESPONSE:

Any effort to price carbon emissions should be accompanied by a structure of "border carbon adjustment" so that U.S. manufacturers are not disadvantaged in either our domestic marketplace or global markets by any carbon charge that they have to pay.

In today's world of liberalized trade, the competition for market share is global, and the stringency of carbon regulations in each nation, state, or province becomes an important determinant of the competitiveness of the enterprises located within that territory. Worries about potential marketplace disadvantages take on added significance in the context of political sensitivities about "unfair" trade practices, especially with regard to China, which has emerged as a global trading powerhouse and a trade partner that has systematically failed to meet basic obligations to reciprocity.[1]

A structure of border carbon adjustment should be seen as an important component of any carbon pricing framework— to ensure American firms are not penalized by our nation's climate change policy. The mechanics of such an adjustment are described in my response to 1a.

I believe that we must — and can — ensure that environmental progress does not come at the expense of American competitiveness.

a. How would border adjustments work in practice given that countless thousands of consumer products that may be impacted by energy prices?

RESPONSE:

As you note, many thousands of consumer products are affected by energy prices. It is not practical – or necessary – to measure the carbon footprint of each product in order to adjust tariffs accordingly. Instead, the U.S. Department of Commerce's International Trade Administration should establish an "effective greenhouse gas price" by country that would provide the baseline for determining whether products entering the United States were, in effect, "subsidized" by the fact that they were produced in a jurisdiction that did not have a roughly comparable price in place on greenhouse gas emissions. A "countervailing duty" would then be charged to offset the implicit subsidy on imports, and exports would be eligible for rebates to offset the unfair advantage those in jurisdictions without appropriate carbon pricing might otherwise benefit from. These policy elements would help ensure the ongoing global competitiveness of American producers. It would also help to prevent "carbon leakage" as economic activities shift to jurisdictions where greenhouse gas emissions are not priced.

b. What analyses have you performed on border adjustments?

RESPONSE:

I have not done any in depth analyses of border tax adjustments in the climate change context. But a number of other scholars have done such work. I would draw the Committee's attention, in particular, to the following analyses:

- Aaron Cosbey, "Developing Guidance for Implementing Border Carbon Adjustments: Lessons, Cautions, and Research Needs from the Literature" (2019).
- Michael Mehling et al., "Designing Border Carbon Adjustments for Enhanced Climate Action" (2019).
- Brian Flannery et al., "Framework Proposal for a US Upstream Greenhouse Gas Tax with WTO-Compliant Border Adjustments" (2018).
- Adele Morris, "Making Border Carbon Adjustments Work in Law and Practice" (2016).
- Joost Pauwelyn, "Carbon Leakage Measures and Border Tax Adjustments under WTO law" (2013).
- Jennifer Hillman, "Changing Climate for Carbon Taxes: Who's Afraid of the WTO?" (2013).

2. The Energy Futures Initiative noted in an August 2019 report that: "While the concept of border adjustments is often cited as an element of a carbon pricing policy, the mechanics of

how it would be implemented and the integration of carbon border adjustments into trade policy have not been studied in any depth."

a. What analyses have you performed on border adjustments?

RESPONSE:

As noted above, I have not done such analyses.

b. What is necessary to analyze the mechanics of how a border adjustment could be implemented within the framework of current trade policy?

RESPONSE:

Please see my answer to question 1a. above.

3. The European Union is actively working to develop a border adjustment–or carbon-based tax on imports. Recently, an article in Reuters reported that China is lashing out at this effort as trade protectionism. The story says "Any border tax would likely raise the price of Chinese goods in the European market, and Beijing believes it would violate a core principle of the Paris agreement on climate change." Related to this, Article 3 of the UN Framework Convention on Climate Change, which is the umbrella treaty under which the Paris Agreement was developed, prohibits countries from trade discrimination for climate purposes.

a. How are such climate tariffs compatible with WTO rules and the UN Framework Convention itself?

RESPONSE:

Policymakers can design a "border carbon adjustment" compatible with WTO rules, either by ensuring consistency with General Agreement on Tariffs and Trade (GATT) Articles II and III – as suggested by Flannery et al. – or by relying on Article XX, which balances trade and environmental goals by providing general exceptions to the usual principles of non-discrimination.

While the GATT jurisprudence has not been definitely settled, I believe a well-designed border carbon adjustment structure would be deemed permissible under Articles II and III. And it appears quite clear that such a policy would be consistent with the GATT exceptions enumerated in Article XX. This Article permits measures that are "necessary to protect human, animal or plant life or health" or "relating to the conservation of exhaustible natural resources..." as long as they do not constitute "arbitrary or unjustifiable discrimination" or "a disguised restriction on international trade."

Van Asselt and Mehling provide a helpful overview of important considerations for each approach in their book chapter titled, "Border Carbon Adjustments in a Post-Paris World: Same Old, Same Old, but Different?" in my forthcoming edited volume (with Sue Biniaz), *Cool Heads in a Warming World: How Trade Policy Can Help Fight Climate Change*."

I would be pleased to provide a copy of this draft book chapter upon request. In addition, Hillman, whose report is included in my response to question 2b, provides useful insights regarding the permissibility of border carbon adjustments under Titles II, III, and XX.

Finally, a "border carbon adjustment" is not incompatible with the UN Framework Convention on Climate Change (UNFCCC). The principles on international trade enumerated in Article 3.5, prohibit "arbitrary or unjustifiable discrimination" and "disguised restriction on international trade." I would note, moreover, that these provisions are not legally binding, nor do they create any new law or policy. Instead, the language conforms to Article XX. Further, a contested trade measure designed to mitigate climate change would not have implications under the Paris Agreement, but rather the World Trade Organization (WTO).

b. What are your proposals for ensuring that climate and trade issues do not merge into a single, mega issue?

RESPONSE:

I have long argued – going back to my 1994 book, GREENING THE GATT – that trade rules need to take account of environmental standards to ensure that they promote fair outcomes, economic prosperity, and social welfare gains. Likewise, environmental standards should be structured so as to minimize friction with trade principles and the economic benefits of international exchange. Ensuring the international trade and climate regimes are not working against each other does not imply they are a "single, mega issue." Instead, such careful coordination is simply a matter of good policy.

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[1] Peter Navarro, "How China Unfairly Bests the U.S.," LA Times (21 June 2011).

Noah Kaufman, Ph.D., Research Scholar
Center on Global Energy Policy, Columbia University

Subcommittee on Environment and Climate Change
Hearing on
"Building a 100 Percent Clean Economy:
Solutions for Economy-Wide Deep Decarbonization"
December 5, 2019

Noah Kaufman, Ph.D.
Research Scholar
Center on Global Energy Policy, Columbia University

The Honorable John Shimkus (R-IL)

1. What are your views on a "border carbon adjustment" or a tax on imports to protect U.S. manufacturers from being economically disadvantaged by the burdens of climate policies?

   RESPONSE: A comprehensive climate policy strategy should not harm the competitiveness of U.S. businesses or encourage emissions "leakage" (i.e. emissions sources relocating abroad). A well-designed border carbon adjustment (BCA) is one way to accomplish these goals.

   a. How would border adjustments work in practice given that countless thousands of consumer products that may be impacted by energy prices?

      RESPONSE: By limiting the universe of products subject to the BCA. A proposal could say that only products that exceed a certain carbon-intensity are included in the BCA program. This could ensure protection for vulnerable industries while retaining administrative feasibility.

   b. What analyses have you performed on border adjustments?

      RESPONSE: None. But there is an extensive literature on BCAs. One example of a study that describes the mechanisms of how a BCA could be implemented in some depth is the following:

      Flannery, Brian, Jennifer A. Hillman, Jan W. Mares, and Matthew Porterfield. 2018. "Framework Proposal for a US Upstream Greenhouse Gas Tax with WTO-Compliant Border Adjustments," Georgetown University Law Center.

2. The Energy Futures Initiative noted in an August 2019 report that: "While the concept of border adjustments is often cited as an element of a carbon pricing policy, the mechanics of how it would be implemented and the integration of carbon border adjustments into trade policy have not been studied in any depth."

a. What analyses have you performed on border adjustments?

RESPONSE: Please see answer to 1b.

b. What is necessary to analyze the mechanics of how a border adjustment could be implemented within the framework of current trade policy?

RESPONSE: To analyze the mechanics of BCAs, the primary needs are data on imports and exports of carbon-intensive products and the countries from/to which the products are imported/exported. It is also important to explore the range of potential responses of trading partners, including their adoption of additional policy measures (see also response 3b).

3. The European Union is actively working to develop a border adjustment—or carbon-based tax on imports. Recently, an article in Reuters reported that China is lashing out at this effort as trade protectionism. The story says "Any border tax would likely raise the price of Chinese goods in the European market, and Beijing believes it would violate a core principle of the Paris agreement on climate change." Related to this, Article 3 of the UN Framework Convention on Climate Change, which is the umbrella treaty under which the Paris Agreement was developed, prohibits countries from trade discrimination for climate purposes.

a. How are such climate tariffs compatible with WTO rules and the UN Framework Convention itself?

RESPONSE: This falls outside my area of expertise, but legal scholars have studied this question in some depth. The following study is one example:

Trachtman, Joel P., WTO Law Constraints on Border Tax Adjustment and Tax Credit Mechanisms to Reduce the Competitive Effects of Carbon Taxes (January 25, 2016). Resources for the Future Discussion Paper 16-03. Available at SSRN: https://ssrn.com/abstract=2738752

Trachtman concludes: "It is possible to design an import border tax adjustment that would pose a reduced risk of violating World Trade Organization (WTO) law, and, in the event a violation is found, an increased likelihood of satisfying the requirements for an exception." (Page 1).

b. What are your proposals for ensuring that climate and trade issues do not merge into a single, mega issue?

RESPONSE: The best way to alleviate concerns about adverse trade-related impacts of United States climate policy is to retain a leadership role in the international climate change framework and negotiations. This would reduce the likelihood of unexpected responses from major trading partners. It could also

reduce the need for BCAs among certain trading partners with similar climate policies.

4. Does the modeling you reference in your testimony assume effective border adjustments?

   RESPONSE: Yes. Our recent modeling has included BCAs because every carbon pricing policy proposed to the U.S. Congress in recent years has included a BCA. Specifically, we adjust macroeconomic parameters in the model to avoid significant changes in the imports or exports of carbon-intensive products.

   a. To the extent modeling has been run without assumed border adjustments, what has it shown?

      RESPONSE: In the modeling reference in my testimony, we did not include any scenarios without BCAs.

   b. What are your plans to use or run an "open economy" version of the model you have used?

      RESPONSE: I am not sure what you mean by "an 'open economy' version of the model." I would be eager to discuss this issue further with you or your staff. In general, I consider the United States a mostly open economy, with or without a BCA in place. We are likely to model climate policy scenarios without BCAs if we see legislative proposal emerge with alternative approaches to protecting the competitiveness of US industries.

   c. Would climate policy deliberations benefit from modeling that seeks to project potential competitive impacts of carbon taxes or other climate policies?

      RESPONSE: Several research initiatives have studied the potential economic impacts of carbon pricing policies, including the following recent studies:

      Diamond, John and George Zodrow. 2018. "The effects of carbon tax policies on the US economy and the welfare of households." *Prepared by the Baker Institute for Public Policy at Rice University for Columbia SIPA Center on Global Energy Policy.* http://energypolicy. columbia.edu/our-work/topics/climatechange-environment/carbon-tax-researchinitiative/carbon-tax-initiative-research

      Nick Macaluso, Sugandha Tuladhar, Jared Woollacott, James R. McFarland, Jared Creason and Jefferson Cole. "The Impact of Carbon Taxation and Revenue Recycling on U.S. Industries" *Climate Change Economics.* Vol. 09, No. 01, 1840005 (2018). https://doi.org/10.1142/S2010007818400055

      Given the continuously changing landscape, climate policy deliberations would

benefit from additional modeling of this type in the future, both for carbon pricing policies and for other climate policies.

FRANK PALLONE, JR., NEW JERSEY
CHAIRMAN

GREG WALDEN, OREGON
RANKING MEMBER

ONE HUNDRED SIXTEENTH CONGRESS

Congress of the United States

House of Representatives

COMMITTEE ON ENERGY AND COMMERCE

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January 15, 2020

Tim Profeta
Director, Nicholas Institute for Environmental Policy Solutions
2117 Campus Drive
P.O. Box 90335
Durham, NC 27708

Dear Mr. Profeta:

Thank you for appearing before the Subcommittee on Environment and Climate Change on December 5, 2019, at the hearing entitled, "Building a 100 Percent Clean Economy: Solutions for Economy-Wide Deep Decarbonization." We appreciate the time and effort you gave as a witness before the Subcommittee.

Pursuant to Rule 3 of the Committee on Energy and Commerce, members are permitted to submit additional questions to the witnesses for their responses, which will be included in the hearing record. Attached are questions directed to you from a Member of the Committee. In preparing your answers to these questions, please address your responses to the Member who has submitted the question using the Word document provided with this letter.

To facilitate the publication of the hearing record, please submit your response to this question by no later than the close of business on Wednesday, January 29, 2020. As previously noted, your responses to the questions in this letter will be included in the hearing record. Your written responses should be transmitted by email in the Word document provided to Adam Fischer, Policy Analyst with the Committee staff, at adam.fischer@mail.house.gov. You do not need to send a paper copy of your response to the Committee. Using the Word document provided for submitting your responses will also help maintain the proper format for incorporating your answers into the hearing record.

Thank you for your prompt attention to this request. If you need additional information or have other questions, please have your staff contact Mr. Fischer at (202) 225-2927.

Sincerely,

Frank Pallone Jr.

Frank Pallone, Jr.
Chairman

Attachment

cc: The Honorable Greg Walden
Ranking Member
Committee on Energy and Commerce

The Honorable Paul D. Tonko
Chairman
Subcommittee on Environment and Climate Change

The Honorable John Shimkus
Ranking Member
Subcommittee on Environment and Climate Change

[Mr. Profeta did not answer submitted questions for the record by the time of publication.]

Subcommittee on Environment and Climate Change
Hearing on
"Building a 100 Percent Clean Economy:
Solutions for Economy-Wide Deep Decarbonization"
December 5, 2019

Mr. Tim Profeta
Director
Nicholas Institute for Environmental Policy Solutions

The Honorable John Shimkus (R-IL)

1. What are your views on a "border carbon adjustment" or a tax on imports to protect U.S. manufacturers from being economically disadvantaged by the burdens of climate policies?

    a. How would border adjustments work in practice given that countless thousands of consumer products that may be impacted by energy prices?

    b. What analyses have you performed on border adjustments?

2. The Energy Futures Initiative noted in an August 2019 report that: "While the concept of border adjustments is often cited as an element of a carbon pricing policy, the mechanics of how it would be implemented and the integration of carbon border adjustments into trade policy have not been studied in any depth."

    a. What analyses have you performed on border adjustments?

    b. What is necessary to analyze the mechanics of how a border adjustment could be implemented within the framework of current trade policy?

3. The European Union is actively working to develop a border adjustment—or carbon-based tax on imports. Recently, an article in Reuters reported that China is lashing out at this effort as trade protectionism. The story says "Any border tax would likely raise the price of Chinese goods in the European market, and Beijing believes it would violate a core principle of the Paris agreement on climate change." Related to this, Article 3 of the UN Framework Convention on Climate Change, which is the umbrella treaty under which the Paris Agreement was developed, prohibits countries from trade discrimination for climate purposes.

    a. How are such climate tariffs compatible with WTO rules and the UN Framework Convention itself?

    b. What are your proposals for ensuring that climate and trade issues do not merge into a single, mega issue?

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