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BUILDING A 100 PERCENT CLEAN ECONOMY:

OPPORTUNITIES FOR AN EQUITABLE, LOW-CARBON RECOVERY

WEDNESDAY, SEPTEMBER 16, 2020

House of Representatives,

Subcommittee on Environment and Climate Change,

Committee on Energy and Commerce,

Washington, D.C.

The subcommittee met, pursuant to call, at 10:07 a.m., via Webex, Hon. Paul Tonko [chairman of the subcommittee] presiding.

Present: Representatives Tonko, Clarke, Peters, Barragan, Blunt Rochester, DeGette, Schakowsky, Matsui, McNerney, Ruiz, Dingell, Pallone (ex officio), Shimkus, Rodgers, McKinley, Johnson, Long, Flores, Carter, Duncan, and Walden (ex officio).

Staff Present: Jeff Carroll, Staff Director; Jacqueline Cohen, Chief Environment Counsel; Adam Fischer, Junior Professional Staff Member; Waverly Gordon, Deputy Chief Counsel; Perry Hamilton, Deputy Chief Clerk; Rick Kessler, Senior Advisor and Staff Director, Energy and Environment; Brendan Larkin, Policy Coordinator; Elysa Montfort, Press Secretary; Joe Orlando, Policy Analyst; Kaitlyn Peel, Digital Director; Tim Robinson, Chief Counsel; Nikki Roy, Policy Coordinator; Rebecca Tomilchik, Policy Analyst; Mike

Bloomquist, Minority Staff Director; Jerry Couri, Minority Deputy Chief Counsel, Environment & Climate Change; Tiffany Haverly, Minority Communications Director; Peter Kielty, Minority General Counsel; Ryan Long, Minority Deputy Staff Director; Mary Martin, Minority Chief Counsel, Energy & Environment & Climate Change; Brandon Mooney, Minority Deputy Chief Counsel, Energy; Clare Paoletta, Minority Policy Analyst, Health; Brannon Rains, Minority Policy Analyst; Peter Spencer, Minority Senior Professional Staff Member, Environment & Climate Change; and Callie Strock, Minority Press Secretary.

Mr. Tonko. The Subcommittee on Environment and Climate Change will now come to order.

And today the subcommittee is holding a hearing entitled "Building a 100 Percent Clean Economy: Opportunities for an Equitable Low Carbon Recovery."

Due to the COVID-19 public health emergency, today's hearing is being held remotely. All members and witnesses will be participating via video conferencing. As part of our hearing, microphones will be set on mute for purposes of eliminating inadvertent background noise. Members and witnesses, you will need to unmute your microphone each time you choose to speak.

Documents for the record can be sent to Rebecca "Becky" Tomilchik at the email address we provided to staff. All documents will be entered into the record at the conclusion of the hearing, and I now recognize myself for 5 minutes for an opening statement.

When we began the 100 Percent Clean Economy hearing series, we set out to identify the challenges and the opportunities for our Nation to achieve scientifically necessary pollution reduction targets. Over the past year we have heard from experts about how to achieve these goals while strengthening our economy, creating new jobs and industries, modernizing our infrastructure, and addressing historic environmental injustices, all while transitioning every sector to a low-carbon future.

When we began this work, we had a pretty good idea that wildfires, hurricanes, and extreme heat, all exacerbated by our changing climate, were serious threats to Americans' lives and our near- and long-term economic outlook, but we had no way of foreseeing the COVID-19 pandemic. Closures due to COVID-19 have led to manufacturing reductions, supply chain disruptions, and increased installation of clean

energy and energy efficiency technologies. Prior to COVID-19, clean energy sectors were adding jobs at twice the rate of overall U.S. employment. Today over one half a million clean energy workers have lost their jobs.

And, undoubtedly, the pandemic has shed light on systemic inequities. Many of the people that have been most likely to lose their lives to COVID are most likely to be unemployed because of it, more likely to experience harmful pollution in their communities, and most at risk to the dangers caused by climate change.

It has never been more obvious that our collective climate response, future economic prosperity, and commitment to building a more just and equitable society are intertwined. As we continue to consider how these goals should be achieved, given our current circumstances, I believe it is imperative that we start with targeting Federal investments to ensure that an economic recovery and clean energy transition will benefit workers and frontline communities while delivering a healthier and more resilient environment for all Americans.

Throughout the 116th Congress, this subcommittee has heard many ideas to do just that. Programs in the committee's jurisdiction can support the creation of American jobs, especially in labor-intensive sectors like construction and manufacturing. This isn't some unrealistic dream. There are real and existing programs that can be leveraged. We just need to increase the scale of our ambition and the depth of our commitment. This includes investments to modernize the grid, retrofit buildings, manufacture clean vehicles, develop a modern energy workforce, and research innovative technologies.

These efforts can also make us more resilient to unforeseen disruptions like COVID. For example, building domestic, low-carbon manufacturing capacity can shorten supply chains, while creating new jobs in emerging industries. These were ideas included in our comprehensive climate plan last year. And they make just as much

sense today, given their climate and economic benefits.

And it may surprise some people, but in recent years, we have worked on a bipartisan basis on many important components of such a plan to support redevelopment of brownfields, remediation of Superfund sites, and improvements to water systems. These types of programs can be at the heart of our Nation's recovery to put people to work modernizing and climatizing our infrastructure while reducing pollution, especially in frontline communities.

Putting Americans back to work should be a top priority, but that is not the only important metric. We need to ensure that the jobs we are creating are of high quality. We need to create a support system for workforce development and training that isn't just putting people into transitional jobs but into long-term careers. We need to make strategic and sustained investments to develop new industries that will employ Americans for decades to come, and we need to make certain that these investments reach all communities.

While the need for action is as urgent as ever, we can be confident that this approach can have a meaningful impact. Much of the clean energy progress made in the past decade can trace its origins back to the historic investments of the Recovery Act. The cost of solar, wind, LEDs, and lithium-ion batteries have declined at an unthinkable rate, supported by those investments and incentives. Those investments created jobs while having long-term benefits: technology breakthroughs from ARPA-E, deployment of smart meters, and the first carbon capture demonstration projects to name just a few.

We are approaching 200,000 COVID deaths, and meanwhile, millions are unemployed, and we continue to see terrifying images of wildfires from the West and hurricanes from the Gulf. At our first hearing of the 116th Congress, I suggested that we wore at an inflection point. And how our committee responds in this moment will

define our Nation for the next one-half century and beyond. This is truer today than ever before. And I look forward to today's discussion of the tremendous opportunities available to put Americans back to work in the short term while realizing the long-term benefits of a cleaner, more resilient, more competitive, and more just economy.

And, with that, I now recognize Mr. Shimkus, our ranking member of the Subcommittee on Environment and Climate Change for 5 minutes.

Representative, please, your opening statement.

[The prepared statement of Mr. Tonko follows:]

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Mr. Shimkus. Thank you, Mr. Chairman.

For any community to be prosperous and healthy, it takes energy. I think there is no dispute on this committee that promoting economic recovery, growing an economy, building and spreading prosperity, themes of today's hearing, require that energy be both affordable and reliable. The American people overwhelmingly agree. Recent polling found Americans prioritize affordability and reliability over emissions reduction. The same poll found 50 percent of people could not afford an electricity bill increase of $15 or more, including 25 percent who said that they could not afford an increase of any amount.

Higher energy costs also disproportionately hurt the poor more than the rich because low-income families spend a higher percentage of their income on those bills. The burden of higher energy costs is even more acute in communities of color. A study by the American Council for an Energy-Efficient Economy found that, on average, Black, Hispanic, and Native American households spend a much larger portion of their income on energy bills than White, non-Hispanic households.

It is our responsibility as policymakers to closely examine the costs, the effectiveness, and other impacts of the environmental policies that affect energy. Failure to do this, especially when addressing climate change, risks harm to public health and hurts most of those who can afford it the least. Let's not lose sight of that today as we consider a low-carbon recovery that aims to benefit all Americans.

This is a laudable goal, but I think we should look very carefully and cautiously at any measures that rush towards a national energy transition that results in new insecurities and other problems. On August 14th and 15th last month, for the first time since its energy crisis in 2001, California's grid operator had to institute rolling blackouts

for some 2 million people. This was because the state supply of electricity could not meet demand during the later hours of the day. This is when the sun sets and the State's estimated 12 gigawatts of utility-scale solar no longer provides power to the grid. And So the grid operator has to draw upon other power sources if they are available. The immediate cause of this crisis was the unexpected drop-off in wind energy and a loss of power plant, coupled with limited electricity availability for import as the heat wave hit other Western States.

But the chronic cause of the crisis in California is its increasing reliance on wind and solar, driven up by the State's mandate that 60 percent of its electricity must come from renewables by 2030, up from about 36 percent today. This rush to green in California is driving out baseload generation, including clean nuclear energy, and locking in a system that its own authorities warn is more vulnerable to supply disruption and that charges among the highest electricity rates in the Nation.

Tellingly, the Diablo Canyon Nuclear Power Plant, which represents 20 percent of the State's carbon-free energy and a thousand high-paying jobs is scheduled to begin shutting down in 4 years. That State's overcapacity of solar and wind forced regulators to curtail Diablo's output, making it uneconomical, even though nuclear offers equally clean but far more reliable power than wind and solar.

I don't think we want to impose California's green new normal on the rest of the Nation. But what else are we failing to consider as we look at clean economy policies, especially policies that drive toward the mandatory reliance on renewables and electrification?

One witness today, Dr. Michot Foss, from Rice University's Baker Institute, will offer some important considerations that will help us understand more fully where these clean economy policies and depend on renewables and electrification are going. She

will speak to the energy and economic security risks we face concerning the materials that will be needed for building out complex green energy systems. These include the critical minerals and raw materials for batteries and for components for wind and solar as well as other systems and machines that make up our Nation's energy and transportation infrastructure.

A growing dependence on critical minerals in these new energy systems raises serious supply chain, national security, and economic security and environmental issues that have not received the attention they deserve. After 50 years of national energy policies that sought to protect Americans's energy security, it would be a shame to reverse all those gains we have made because we didn't confront the hard questions that proposed energy transitions raise. We can begin asking those questions this morning.

Thank you, Mr. Chairman. I look forward to an informative hearing.

With that, I yield back my time.

[The prepared statement of Mr. Shimkus follows:]

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Staff. You are muted, Mr. Chairman.

Mr. Tonko. I thank you, and the gentleman yields back.

The chair recognizes now Mr. Pallone, the chair of the full committee, for 5 minutes for his opening statement.

Chairman Pallone.

The Chairman. Thank you, Chairman Tonko.

Today's hearing is the latest in the committee's series on building 100 percent clean economy, which becomes even more crucial to the future of our country and our planet by the day. The images and the stories from the wildfires that are engulfing large parts of California, Oregon, and Washington are devastating. The destruction of homes and businesses and the loss of life is heartbreaking. And the fires are producing some of the worst air quality in the world.

And these fires are climate fires, and it was disheartening to watch the President on the ground in California earlier this week where he once again fully denied scientific facts. 2020 is on track to be one of the two hottest years, if not the hottest year, on record.

On the East and Gulf Coasts, it has been a record-breaking Atlantic hurricane season. For the first time in recorded history, 18 tropical storms have formed before October. And now Hurricane Sally is predicted to drop about 30 inches of rain on part of the Gulf Coast.

Unfortunately, this is all a preview of what is in store for the future if we don't take bold, decisive action to combat the climate crisis. And now as the COVID-19 pandemic has changed the economic landscape, the path to 100 percent clean looks difference today than it did last year, but the science based target of transitioning to 100

percent clean economy by no later than 2050, which we adopted last year, is still important. In fact, we really need to move much faster. And achieving that goal remains critical if we are to avoid the most damaging and costly consequences of climate change.

Now, in January, our committee released a draft of the CLEAN Future Act, which outlined tools to put the United States on the path to 100 percent clean economy, and today we will look at how those tools and others can help our economy recover stronger and cleaner than it was before the pandemic.

Over the last 7 months, nearly 200,000 Americans have died and nearly 3.4 million Americans have permanently lost their jobs, and less than half of the 22 million jobs lost since February have been recovered. Even worse, job growth has slowed with each passing month. And this crisis has not hit all Americans equally. Communities of color have been disproportionately affected by the health and economic impacts of the pandemic. These are the same communities that have endured disproportionate exposure to air and water pollution for far too long. As we begin to recover from the current crisis, we have an opportunity and an obligation to build a fair, better future for these communities and for all Americans.

So today we will examine the role of the Federal Government in enabling such a recovery, a recovery that not only jump-starts the economy but one that centers on equitable, inclusive climate action. A recent report from the Commodity Futures Trading Commission offers a startling view of the economic costs of climate inaction. The report found that climate-related extreme weather events will wreak havoc on our financial systems, undermining long-term economic growth. And that dire warning builds on the Federal Government's prior estimates that climate change could cut U.S. gross domestic product by 10 percent by the end of the century.

These figures are alarming. But they simply confirm what we already know, that the climate crisis is real, it is devastating, and it is unfolding before our very eyes. The public health, economic, and climate crisis are all happening simultaneously. And we have no choice but to tackle all of these challenging head-on as we rebuild. We cannot recreate the problems -- or I should say we should not recreate the problems of the past but instead create a future that is cleaner, more equitable, and more inclusive.

An ambitious recovery effort focused on climate action will give us the tools to build back better and stronger and create millions of new, good-paying jobs. And I look forward to hearing from our witnesses about how Federal support can reinvigorate our economy and put us on a path to a cleaner, more equitable future.

I just want to thank Chairman Tonko and also our Ranking Member Shimkus, Greg. This hearing is very important and, obviously, we spent a lot of time on climate change both in the subcommittee and the full committee, and we need to continue to do so as a committee.

So thanks again, Paul.

I yield back.

[The prepared statement of The Chairman follows:]

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The Chairman. I can't hear Paul.

Mr. Tonko. I can teach myself here.

The chair will now recognize Representative Walden, ranking member of the full committee, for 5 minutes for his opening statement.

Greg, before you take the floor here, let me extend my condolences to you and other members of this subcommittee who have witnessed and absorbed some terrific damage in your districts. I am sure the entire subcommittee shares its thoughts and its concerns with you, and let's go forward and make certain we can do the best in response to that damage that has occurred in your area.

Mr. Walden. Well, thank you, Mr. Chairman.

Thank you, Mr. Chairman, and thanks to all of you for your thoughts and prayers, especially for my constituents and those of Kurt Schrader as well who have lost everything. This hit the poorest of the poor. Those with the least were wiped out the most, and so we have got a lot of recovery. It is a long road back. So I appreciate that.

And today's hearing does come as Oregon and much of the West, California and Washington, have suffered from these horrific and devastating wildfires, kind of hitting us all, all at once. In Oregon, more than 40,000 people are displaced, lives have been lost, thousands of homes have been destroyed, and an area the size of Rhode Island has burned. Our hearts go out to those impacted by these catastrophic fires.

Sadly, our Federal forests have lacked proper management for years, resulting in our Federal forests becoming tinderboxes. We got nearly 63 million acres of national forestlands the Forest Service has determined need active management and thinning to get them back in balance with nature. So that is something we, I think, should all be able to agree upon, because when these fires come, the emissions are just extraordinary.

And by the way, upwards of 70 percent of carbon emissions come after the fires are out from decaying material left behind.

Proper forest management reduces fire risks, lowers carbon emissions from fires, and it creates good jobs. It also allows us to utilize our natural resources in a sustainable way to protect and grow our communities and our forests.

Today's hearing is also relevant in the wake of California's most recent rolling blackouts, affecting hundreds of thousands of people in the middle of both a heat wave and a pandemic. There is a lot we can do as a Nation to improve reliability and resilience of our electric grid, and I think that is good bipartisan work.

Mr. Chairman, you referenced it in your statements as well.

We have to prioritize energy security and affordability for consumers, as Mr. Shimkus said, and use experience and science as our guide for our energy policy. We share the goal of a clean economy. Republicans put consumers and innovation first as we balance many complicated issues impacting our economy, our environment, and national security.

Regrettably, California's current energy crisis was predictable, and it was avoidable. California policymakers ignored the scientists and the engineers who maintained the electric grid and, instead, mandated their version of a Green New Deal. California forced the retirement of the most stable baseload nuclear natural gas-fired power generation without reliable backup option in place. California regulators, I believe, failed in the most basic responsibility, and that is ensuring adequate electric generation is available whenever and wherever needed.

So, as a result, hundreds of thousands of Californians were forced to endure rolling outages when they needed their electricity the most, and, in fact, the Bonneville Power Administration -- had the Bonneville Power Administration not been able to ramp

up hydropower regeneration on the Columbia and Snake Rivers, it would have been even worse. If California, the world's fifth largest economy, cannot keep the lights on during a heat wave, that is a serious warning for anyone considering placing these mandates on the rest of the Nation.

I would also like to highlight another major challenge we must confront, and that is the growing reliance on foreign-sourced critical minerals which serve as raw ingredients to manufacture all kinds of electronics, batteries, solar panels, and windmills. These critical minerals are largely controlled by China and mined beyond our borders now and without our high environmental and worker safety standards. This is a supply chain issue I hope the committee will look at and those of our colleagues on other committees.

The U.S. has an extraordinary abundance of these very same mineral resources, both onshore and offshore. We are the world's number one producer of oil and gas and a leading producer of coal. These traditional energy resources have powered our Nation's economy and strengthened our hand diplomatically. Today we are more energy secure than ever in the history of the United States. Millions of people have good jobs in the energy industry, and our businesses and consumers have some of the lowest and most stable energy prices anywhere in the world.

Despite our abundance energy resources, though, we do rely on other countries for dozens of other vital minerals. We are 100 percent net-import reliant on some minerals used in many electronics, batteries, solar panels, and windmills. If the vision is to power the Nation on these technologies alone, we could be in serious trouble if we don't deal with the supply chain issue.

As we have learned from this pandemic, our reliance on foreign, especially Chinese, supply chains is a strategic vulnerability. Given our innovative strength and the progress we have made to become energy secure, it would be unconscionable to sacrifice

these gains for a Green New Deal fantasy that bans hydraulic fracturing and discards decades of progress. So let's learn from the mistakes of the past and not move too quickly without a full understanding of the facts and science.

Is transitioning to 100 percent renewables and electric vehicles a good idea if it means we are going to be 100 percent dependent on China for the minerals to produce them? Do Americans want to transition to 100 percent renewables if it means rolling blackouts? These are the issues that I know the committee takes seriously.

We need to have a serious solutions-oriented discussion about dealing with climate change. We all want affordable, clean, and reliable energy options. The question is, what is the best way to get there?

So, Mr. Chairman, thanks for the hearing. I look forward to the testimony. I will be going back and forth because I am dealing with the emergency in my district in real time.

But I yield back and thank you.

[The prepared statement of Mr. Walden follows:]

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Mr. Tonko. The gentleman yields back.

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

I now will introduce the witnesses for today's hearing. First, we have Dr. Devashree Saha, Ph.D., senior associate with the World Resources Institute; Mr. Lonnie R. Stephenson, international president of the International Brotherhood of Electrical Workers, IBEW; Dr. Denise Fairchild, Ph.D., president and chief executive officer, Emerald Cities Collaborative; and, finally, Dr. Michot Foss, Ph.D., fellow in energy and minerals, Baker Institute for Public Policy at the Center for Energy Studies of Rice University.

I will now recognize Dr. Saha for 5 minutes to provide an opening statement. Welcome again.

STATEMENTS OF DEVASHREE SAHA, PH.D., SENIOR ASSOCIATE, WORLD RESOURCES INSTITUTE; LONNIE R. STEPHENSON, INTERNATIONAL PRESIDENT, INTERNATIONAL BROTHERHOOD OF ELECTRICAL WORKERS (IBEW); DENISE FAIRCHILD, PH.D., PRESIDENT AND CHIEF EXECUTIVE OFFICER, EMERALD CITIES COLLABORATIVE; MICHELLE MICHOT FOSS, PH.D., FELLOW IN ENERGY AND MINERALS, BAKER INSTITUTE FOR PUBLIC POLICY, CENTER FOR ENERGY STUDIES, RICE UNIVERSITY

STATEMENT OF DEVASHREE SAHA, PH.D.

Dr. Saha. Good morning, Chairman Tonko, Ranking Member Shimkus, and other members of the subcommittee. My name is Devashree Saha, and I am a senior associate at World Resources Institute. Thank you for this opportunity.

This year has been like none other, and I am sure all of you here agree with me on that. We are witnessing the impacts of COVID-19, an economic recession with millions of Americans unemployed, a rising racial and social justice movement, and the direct effects of climate change with historic wildfires raging on the West Coast.

With all these intersecting crises, I want to talk about the important role that clean energy and other low-carbon technologies can play in enabling an economic recovery that benefits all Americans, that increases stability in the financial markets, and puts the United States on the path to 100 percent clean economy.

A new analysis by WRI reviewed the latest economic and policy literature, and it clearly concluded that better economic growth and better climate go hand in hand. They are not incompatible. My written testimony has more details, but I want to highlight three key findings from our report.

First, strong climate action and investments in low-carbon infrastructure can be effective in stimulating jobs and economic activity as part of the recovery process and also ensure our long-term competitiveness and growth.

Clean energy is already a major U.S. employer. It supports 3.6 million American workers, and these are jobs this which are well-distributed all over the country and, prior to COVID-19, had been growing at a much faster pace than overall employment. With today's high unemployment level, investments in these technologies can create more jobs than similar level of investment in carbon-intensive sectors of the U.S. economy.

Let me give you one example. $1 million spent on clean energy generates about seven to eight full-time equivalent jobs per year. A similar level of investment in fossil fuel technology generates only two to three jobs. There are other economic benefits. The domestic and global clean tech market is booming. It has been growing significantly in the last decade. The U.S. advanced energy industry generated $238 billion in revenues in 2018. This is only about 14 -- 15 percent off the global total, but the sector's 11 percent growth in 2018 was almost four times the growth of the U.S. economy. In short, America can improve its manufacturing competitiveness by building a domestic market for low-carbon technologies and tapping into foreign markets.

The second key finding is that delaying action on climate will further expose the United States to costly damages from climate impacts, air pollution, and other public health crises, as well as create instability in the financial markets, which is why it is so heartening to see that the financial sector is increasing the ability to recognize the risks associated with climate change and also realize the significant opportunities that emerge from climate action.

As Chairman Pallone said, the Commodities Futures Trading Commission put out a report which warned that climate change poses a major risk to the stability of the U.S.

financial system, and it has recommended that enacting a carbon price is the most important step that the U.S. needs to take now. And it is significant that the report and its findings have been endorsed by some of the largest banks, asset manager and owners, Big Agriculture, including Cargill as well as a major oil company, which brings me to the third and final finding.

The investments needed for the low-carbon transition are significant, but the returns in economic opportunities, improved public health, and avoided climate catastrophes will far exceed the costs. America stands to benefit economically from taking strong climate action, which is why it is well past time for Congress to enact comprehensive climate legislation to accelerate America's transition to a clean, thriving economy.

Thank you.

[The prepared statement of Dr. Saha follows:]

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Mr. Tonko. Thank you, Dr. Saha.

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

STATEMENT OF LONNIE R. STEPHENSON

Mr. Stephenson. Thank you, Chairman Tonko, Ranking Member Shimkus, and members of the House Energy and Commerce Subcommittee on the Environment and Climate Change. Thank you for inviting in me to participate in this morning's hearing.

My name is Lonnie Stephenson. I have the honor of serving as the International President of the International Brotherhood of Electrical Workers. The IBEW is the largest energy union in the world. We represent more than 775,000 members in the United States, U.S. territories, and Canada who work in a variety of energy-related fields, including utilities, construction, telecommunication, broadcasting, manufacturing, and transportation.

IBEW members are working on the front lines of the climate change. We are proud to be building and maintaining the zero- and no-carbon power generation sources from large-scale solar installations in the deserts of California to offshore wind farms off the coast of Rhode Island.

Our inside wiremen regularly retrofit older buildings with modern energy efficiency techniques that significantly reduce energy usage and lowers energy prices for consumers. In recent weeks, the IBEW outside linemen from all around the country have been deployed in response to the power outages caused by the severe weather events, such as Hurricane Laura, Tropical Storm Isaias, the Midwest derecho windstorm, and now the wildfires that are threatening the communities along the West Coast.

The COVID-19 pandemic has taken a terrible toll on America's workers and labor unions. The Bureau of Labor stats reported earlier this month that 13.6 million Americans are currently out of work, more than double since February. This includes tens of thousands of IBEW members who have lost work due to the temporary shutdowns or are victims of the sharp decline in the economic activity. Further troubling are the 2.1 million Americans who have permanently lost their jobs since this spring.

At the same time, the climate crisis is real and urgent and poses a threat to our Nation's long-term prosperity. The Federal Government needs to develop a plan to mitigate the impacts of climate change and responsibility -- and responsibly reduce emissions to avoid the worst impacts of global warming.

For these reasons the IBEW supports Congress developing a stimulus plan that would create over a million family-supported, union-friendly jobs to rebuild our Nation's infrastructure, lower greenhouse gas emissions, and mitigate the impacts of climate change. In my written testimony, I address three areas of importance of the IBEW members in a low-carbon economy: labor standards, baseload generation, and manufacturing.

For our members, all the workers -- all the workers, it is critical that Congress -- labor standards to make sure that -- to a future low-carbon stimulus legislation. Labor standards, such as prevailing wages, project labor agreements, and requiring employers to respect workers' rights to join a union, are some of the best policy tools available to ensure that our green economy will create family-supported jobs and provide equity for all workers.

Supporting baseload generation, including coal, gas, and nuclear generation is key to maintaining the security and reliability of our Nation's electric grid. Robust Federal

investments in carbon capture and advanced nuclear technology will be critical to lower emissions and ensuring the reliability and preserving jobs.

The IBEW views the low-carbon economy as America's best opportunity to reinvigorate our manufacturing sector. A large percentage of green jobs in the low-carbon economy will come from manufacturing, whether here or overseas. Congress must take advantage of this opportunity and support the domestic manufacturing and American workers who will build the green products and the future before this sector is dominated by China or other foreign competitors.

Finally, I want to recognize and share the exciting partnership that the IBEW has started recently with the AFL-CIO and the Energy Futures Initiative, which was started by former Energy Secretary Ernest Moniz. Our initiative of labor-energy partnership will be developing State, regional, and national analysis that will focus on the intersection of job quality, equity, and climate change.

Thank you again for the opportunity to testify today, and I look forward to taking your questions.

[The prepared statement of Mr. Stephenson follows:]

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Mr. Tonko. Well, thank you, Mr. Stephenson. Thank you for your leadership with the IBEW.

With that, we will now move to Dr. Fairchild.

Doctor, you are recognized for 5 minutes, please.

STATEMENT OF DENISE FAIRCHILD, PH.D.

Dr. Fairchild. Thank you, Chairman Tonko, and the distinguished members of this committee. I appreciate the opportunity to talk to you today about how to build 100 percent clean economy with both low-carbon and an equitable focus. My name is Denise Fairchild. I am the president and CEO of Emerald Cities Collaborative, and we are a national nonprofit organization with a triple bottom-line mission: to green our cities, build our communities, and strengthen our democracy through equity and inclusion.

Since I am on the clock and I am not sure how you guys get this down to 5 minutes, I would like to start with my bottom line. We have a triple pandemic that we are dealing with. This is a pandemic of our environment and climate, our economy, and justice.

So, if we are going to make a difference, we have to have large-scale investments to, one, not just modernize our grid but decentralize it, decentralize our energy, food, and water infrastructure, to eliminate energy waste, to mitigate and also adapt to extreme weather, and to put the economy back into the hands of our communities, local, urban, and rural communities.

We need to scale a climate economy that ensures a just transition, high road jobs and business opportunities in order for our current workers and our future workers to

move from the fossil fuel sector into the new clean economy.

We need to break systemic barriers to jobs and business opportunities that are faced by low-income communities, Black, indigenous and people of color. We need a flexible energy block-grant program that will fund and develop local energy, clean energy infrastructure. We need at least 1 percent of an investment to ensure that the capacity of low-income workers, frontline workers can compete in this new economy, as well as our businesses. And then we need to develop investment capital to fund a community-driven and -owned energy food and water sector.

So who are we? Emerald Cities was founded 10 years ago when we had the last economic crisis. And it was really a coalition. We are a coalition of community business, labor, and sustainability organizations to build a high road economy that worked at the intersection of environment, economy, and equity. I am a witness to the possibilities of a justice-centered economy. We have retrofitted billions of dollars of public buildings to save energy, waste, money, and carbon emissions. We have created greener and healthier homes for low-income communities of color. We put Black and Brown youth into union apprenticeship programs. We created family wage jobs and minority contracting opportunities in rebuilding the infrastructure and the food sector.

We remain committed to a carbon-free economy, rebuilding our middle class, and connecting disadvantaged communities to this new economy. But there is a lot more to be done and to do this time around. We learned a lot in 10 years, and we are in a different place today than we were 10 years ago. In the energy sector, we know that ARRA, the ARRA climate recovery got us to the starting blocks, but these investments funded only short-term jobs, not years. They did not get us off fossil fuels. They did not mitigate our energy vulnerabilities to blackouts and brownouts, and it did not democratize our energy sector to benefit everyone.

Our food sector is failing us. Not only is it energy intensive but COVID exposed the deficiencies of our current centralized food system. Our food supply chain fell apart. Farmers were dumping milk, destroying food products they couldn't get to market. At the same time, people, the market, waited hours in line at food banks. Our water infrastructure is drowning us from floods, hurricanes, rising rivers, seas, and our new normal.

Inequity, we know that low-income communities of color are last to get clean infrastructure investments and are underrepresented in the clean economy. We will reproduce income inequalities, wealth inequalities if we do not get rid of the structural impediments to high-wage careers and business opportunities for low-income Black, indigenous, and communities of color.

We have seen this work take place. It is happening all around the country. What we need, however, is a real commitment, a political will to not bounce back but to bounce forward, to be a 100 percent renewable and generative economy, to invest first in communities most impacted by climate, to create shorter supply chains that narrow the gap between producers and consumers, to use the best in our technologies to decentralize and create a distributive infrastructure that increase redundancy and minimizes the disruptions that we are facing and to democratize our economy to the high road with labor and community standards.

Thank you very much for this opportunity. I look forward to the discussion.

[The prepared statement of Dr. Fairchild follows:]

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

Mr. Tonko. Ms. Fairchild, you did that in 5 minutes. So thank you.

Dr. Fairchild. I had about 10 minutes more though.

Mr. Tonko. Okay. Thank you.

And we now move to Dr. Michot Foss.

You are recognized, Doctor, for 5 minutes, please.

Staff. I think she is muted, Chairman.

Mr. Tonko. You will have to unmute yourself, Doctor.

Dr. Michot Foss. Got it. Technology accomplished.

Mr. Tonko. Thank you. Thank you. Welcome.

STATEMENT OF MICHELLE MICHOT FOSS, PH.D.

Dr. Michot Foss. Good morning. I am happy to help out with this hearing today. I am Dr. Michelle Michot Foss. I am a fellow in energy and minerals at Rice University's Baker Institute for Public Policy at the Center for Energy Studies.

We can all agree that, whatever we do, especially when using scarce public resources, tax dollars, and natural resource endowments, we would like outcomes to be a net improvement. I am here to speak on the importance of nonfuel minerals for energy.

Minerals and materials criticality includes the distribution of natural resources, minerals resources, their geology, relative abundance, proximity to markets, among other things. The quality of minerals matters. Not all quality works for specific applications. A significant hurdle today and going forward is access for development in countries and locations where minerals resources are extracted.

A few facts and figures to add to what already has come up. Between 1984 and

2018, total tonnage output of nonfuel minerals increased more than two and a half times, exceeding what we have grown in energy. We know the demand will increase for alternative energy applications, and that material requirements will be higher. This is a logical function of lower energy densities.

In 2018, the U.S. constituted 12 percent of global nonfuel minerals production. We at the Baker Institute are currently tracking 41 minerals, including basic metals like copper, minerals essential for catalysts and magnets like the rare earths, minerals for catalytic converters and hydrogen fuel cells like the platinum group, minerals that could be used for advanced batteries and solar PV like niobium, indium, and others. We are among the top 10 producing countries for only a few. We are a large consumer, and so our demand exceeds what our domestic supply chains can serve.

And, finally, advanced materials for high-performance electric power grids and equipment will expand our list of minerals. There is a lot going on in that space that we need to attend to.

With respect to critical mineral security, in my view, we should consider the following. One is price risk. In recent years, the prices of traded energy and nonfuel minerals have converged. There are good reasons for this. Both of these are linked to GDP. Higher mineral prices means higher cost energy and vice versa. The next one to worry about is supply chains: mines to wheels or mines to plugs and beyond, including end of life. Internal -- international shipments of lithium battery products already rival those of traditional fuels in global extent. Nearly 80 percent of battery manufacturing is located in China. All of the raw materials for that battery manufacturing are sourced well beyond China, as already mentioned. This largely explains why lithium batteries are cheap, by the way. It is the Chinese capacity.

Supply chains for end of life, decommissioning, recycling, and disposal have their

own ESG risks and uncertainties. Recycling could reduce raw material demand. Globally, we currently recycle less than lithium -- less than 5 percent of lithium battery product.

Environmental security, roughly 80 percent of the lithium-based battery capacity in China is supported by nearly 3,000 coal-fired power plants, the backbone of China's electric power grid. This means an output of CO2 emissions that rivals everything that we produce in our domestic oil and gas system, which we are in the process of lowering.

Sulfur hexafluoride, I don't know if the committee has dealt with this. SF6 is an insulator for electric power switch gear and electronics. It has a more powerful GHD than carbon dioxide or methane. It does not decay in the atmosphere, and it will increase with electrification.

Geopolitical risks, we have had long experience with oil import dependency. Our domestic petroleum and natural gas abundance has provided relief. Our import dependence for raw materials and alternative energy components, such as wind turbans and motors, solar PV and batteries, is very high. This presents a distinct security tradeoff in making a rapid shift away from our legacy energy fuels. Import dependence also affects our trade balance and represents a leakage of economic wealth from our country.

With respect to mining and minerals processing, attention to ESG risks is growing. We believe that these can be done well. We think governance matters. And this is a subject that I hope we come back to. Mr. Walden basically referred to this in terms of our regulatory oversight.

We submitted a brief with Missouri Science and Technology for the G20 meetings. We have five recommendations in those that I will share with you quickly. One is that we should include nonfuel minerals in G20 discussions. The second is that G20

members should fund research to develop a uniform mineral criticality index, that they should promote transparency of critical minerals, that members should engage relevant multilateral agencies to foster technical technological collaborations, and that we should commit to share best practices on mining and minerals processing.

And we would like to mention the energy resource governance initiative that we have here in the U.S. and that we are sharing with other countries as an example.

Thank you.

[The prepared statement of Dr. Michot Foss follows:]

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Mr. Tonko. Thank you, Dr. Michot Foss.

And thank you again to all of our witnesses. Thank you for sharing such great perspective and information with us. We will now move to member questions, and I will start by recognizing myself for 5 minutes.

I will start by saying I don't think anyone believes the transition to a 100-percent clean economy will be easy. If it were, we wouldn't have had all of these hearings and sought expert testimony over the past 18 months.

So I appreciate Dr. Michot Foss' testimony, and I will mention that I recently introduced a bipartisan bill to support our D&D to recycle and reuse critical materials from energy storage systems. I am happy to discuss that effort with any of my Republican colleagues because I truly believe it is critical that, when we identify a potential challenge, we must try to work together to overcome it.

But this morning I want to focus on the opportunities. Let's see if we can identify some programs ripe for Federal investment which could support well-paying jobs, transition us to a cleaner economy, and indeed lead to more equitable outcomes for all Americans.

So, Dr. Saha, are there opportunities for emissions reductions in domestic manufacturing if we support deployment of zero-emission school buses?

Dr. Saha. Thank you.

Yes, I think in any forthcoming economic recovery stimulus packages or infrastructure bill, focusing on a few key areas can lead to not only emission reductions potential but also economic benefits in terms of, you know, creating jobs, long-term economic resilience. And earlier this year, WRI had identified five key areas. And one of them actually includes investing in public transit and transportation infrastructure,

then also investing in manufacturing electric school and transit buses. They cannot only reduce operating and maintenance costs, reduce CO2 emissions, and avoid emissions of harmful local pollution, the negative health impacts, these can also create jobs, especially manufacturing jobs, and they can position the U.S. as a leader in the growing zero-emission vehicle market. So definitely the answer is yes.

Mr. Tonko. Thank you.

And, Mr. Stephenson, if Federal investments included strong labor standards, could IBEW members find job opportunities building and maintaining the network of charging stations that would be needed to support those given buses?

Mr. Stephenson. Well, yes, there is no doubt there is going to have to be a huge infrastructure investment to install charging stations really across the country, not only for the buses but for other vehicles as well. And so it should provide many job opportunities, I think, hopefully for our members to install all those charging not only for along the highways but also in the homes and in the businesses and the schoolyards, wherever they have those buses. Obviously, we have to have charging stations for them to recharge.

Mr. Tonko. Thank you.

And, Dr. Fairchild, in the communities in which you work, could -- would deploying new clean buses and reducing tailpipe emissions from heavy duty vehicles check all the boxes we are discussing today?

Dr. Fairchild. Oh, absolutely. As you know, there are frontline communities, communities of color live close to all carbon emission land uses. And it would be substantial, particularly mobile sources of air pollution if we were able to mitigate that and -- but I also think that it is important if that we make those investments, those investments must be large enough so that not only can we get our union brothers and

sisters back to work, but it has got to be enough so that they open up their opportunities for and create access for lower income communities of color to also be a part of those economic opportunities.

Mr. Tonko. Great. So this isn't some unrealistic dream we are chasing. There really are Federal investments that could be made to support these three goals.

Let's try to cover a couple more examples. Dr. Saha, your testimony mentions how grid investment, such as building high-voltage transmission lines, can create jobs and other economic benefits. Is this also important infrastructure for decarbonizing our electricity sector?

Dr. Saha. Yes. Absolutely, yes, especially when we keep in mind the context, right? We have a growing need to advance energy efficiency. We have to integrate increasing amounts of renewable energy onto the grid, and we have to keep basic new demands for electricity including from electrification of the transportation and building sectors. So definitely modernizing the electric grid infrastructure is not only an important investment opportunity but also critical for decarbonizing the power sector.

I just want to quote one stat here that transmission investment ranging between $12 billion and $16 billion annually to 2030 could stimulate about $30 billion to $40 billion in annual economic activity and create 150,000 to 200,000 full-time jobs each year.

Mr. Tonko. Thank you.

And, Mr. Stephenson, my time has run out, but if you could just maybe perhaps with us in written form back to the committee how your members would benefit from a build-out of our Nation's transmission infrastructure, I think that would be important. You might even share it with my colleagues this morning. But my time is up.

And we will now to move to recognize Mr. Shimkus, our subcommittee ranking member for 5 minutes to ask questions.

Representative.

Mr. Shimkus. Thank you, Mr. Chairman, and it is a great hearing.

So, Lonnie, I want to go to you first, and, you know, I appreciate your work, especially in our push to finalize Yucca Mountain and really get the Federal Government to actually comply with the law. So my thanks to that effort. And you know the high-quality and well-paid workforce, that would continue then go to Nevada to help finish that project.

Now I understand that there is roughly 14,000 IBEW members work at about 40 nuclear power plants around the country, and I have a, you know, a photo of the disposition of these nuclear power plants around the country. Some have closed. Some of them are planning to close. Some of them have been rolled back because of State activity. Your workers are in these plants. What are the benefits of the nuclear power across our country?

Mr. Stephenson. Well, thank you, Representative Shimkus. It is always good to see another Illinoisan.

Mr. Shimkus. And we got Dresden. In your testimony, you mentioned Dresden --

Mr. Stephenson. Yes.

Mr. Shimkus. -- on the closure list now, too.

Mr. Stephenson. Yes, both Dresden and Byron, two very productive power plants in Illinois. It is crucial that we keep them open.

I think nuclear power is a huge piece of the puzzle, if you will. As we have talked, as we do the transition to the renewables, we still have to have strong reliable baseload and, of course, you know, nuclear zero emissions, when it comes to cleaning the emissions, and So with the current nuclear facilities that are there and the new

technology, the new next generation of nuclear would be a great opportunity to make sure that we have reliable clean baseload to keep power running when the wind is not blowing, the sun is not shining. So we think there is a huge opportunity for the nuclear industry and should be into the future.

Mr. Shimkus. Yes. So I would hope in our discussions we would work with the majority to try to make sure we somehow incentivize nuclear baseload because of zero-carbon emissions and the baseload, as everyone who has followed the grid, is critical. Really the whole deployment if we are going to transition, we need some solid, big numbers of electrons flowing on the grid while we move up and down the rest of the supply-and-demand chain through renewables.

Let me go to Dr. Michot Foss.

And I just, before I want to ask my questions, I want to make sure people look at page 5 and 6 of her testimony because she has, like, the dominant producer of battery chemistries and I am not going to go through it all but 28 of the 39 minerals that are needed in battery technology, the dominant producer is China. So I could read this list, and 28 of the 39 will be this is coming from China. So this is the energy security portion of this discussion that we have to have. So I wanted to make sure people take a look at that in my short time.

Remember I want to talk -- ask Dr. Michot Foss. When we talk about carbon-free emissions in these systems, are we really talking about quote-unquote, clean energy? I am always having trouble with words, and how we use it. Zero carbon, clean, there is a lot hidden in the way we parse out these things. In other words, when you consider the whole supply chain from the mine to the plug, how do these technologies stack up in terms of clean energy?

Dr. Michot Foss. I don't know the definition of clean either. So I will admit to

that. I think everybody has got their own.

But if what we are looking at is reducing measurable quantities of certain things, gases from, you know, emissions or even other things that we are concerned about, I think it is -- you are -- again, Mr. Walden's comment about governance, it is easier to do this when you have got good policies, good oversight, protections for workers, and protections for the environment.

And I think the interesting thing, watching these debates in the United States, is the extent to which we know how difficult it would be to revitalize the mining industry, minerals processing in the United States or much less manufacturing for that matter, for everybody who would like to use manufacturing as a way of creating jobs and wealth around all of this. But yet we are the best positioned country to do that, us and other countries that also have difficulty dealing with public opposition to extractive businesses.

Mr. Shimkus. Let me stop. My time is almost expired, but let me end with this in that there have been some people, a Senator friend of mine, who says the next energy revolution would not come from a mine. And I would beg to argue in that all of these precious minerals in that are coming from a mine. So mining is still going to be part of this debate, and energy security is important.

So, with that, Mr. Chairman, I ran over my time. I appreciate it.

And I yield back.

Mr. Tonko. I thank you. The gentleman yields back.

The chair now recognizes Chairman Pallone of the full committee.

Chairman, you have 5 minutes to ask questions.

The Chairman. Thank you, Chairman Tonko.

I wanted to ask Dr. Saha a question and then -- and then go to a second question with Mr. Stephenson. So try to get both of them in.

But, Dr. Saha, the transition to a low-carbon economy is more important today than ever before, and I mentioned in my opening remarks that we are facing three overlapping crises, -- a pandemic, an economic collapse, and a climate emergency -- and it is critical that we provide relief to communities battered by the COVID-19 pandemic and the destructive impacts of climate change.

So I wanted to start by asking you about the role of the Federal Government in transitioning to what you describe as the new climate economy, especially given the crisis that we face. The pandemic has fundamentally altered our economy. But would you agree that reaching a net-zero emissions by 2050 is still as important as ever or maybe even earlier, as some have suggested, and, if so, in the absence of Federal leadership, will this transition happen fast enough and at sufficient scale to both meet our climate goals and provide the economic benefits you describe in your testimony?

I know we could spend an hour or two on it. But if you could just take a couple of minutes, I would appreciate it.

Dr. Saha. So, again, let me give you a little bit of context. Between 2005 and 2018, U.S. carbon emissions reduced by 12 percent, 12 percent. Okay? And that is admirable. But we have to keep in mind that much of this decline came from fuel switching from coal to gas in the power sector. So this is what happened between 2005 and 2018.

And now think about where we need to go. By 2050, we have to reduce net emissions to zero if we want to be on track for 1.5 degree centigrade of warming. So this means that, from 2018 to 2030, U.S. emissions will have to decrease more than twice as fast as they did during 2005 and 2018. So that means that we cannot simply leave things to market forces or on the shoulders of subnational governments and businesses. The effort to address climate change will require leadership from the Federal

Government. Period.

The Chairman. All right. Thanks so much.

Mr. Stephenson, the energy sector, like so many others, has been hit hard by the economic crisis, and I would like to hear your perspective on the role of Federal Government in revitalizing these sectors. Do you believe we can quickly recover the clean energy and energy efficiency jobs that have been lost, jobs that are vital to transitioning to a low-carbon economy? We have talked about that in previous hearings, you know, these jobs that we lost in clean energy and energy efficiency. So can we do that quickly, get them back, or are we going to need some significant Federal support and investment to accomplish that?

Mr. Stephenson. Well, I think there is going to have to be some Federal support to accomplish that. As you know, as some of these jobs, our members have worked in coal generation, for example. Those are very good-paying jobs with good salaries and benefits. And as those jobs -- you know, we start the transition, continue the transition into the renewables, those type of jobs are hard to replace because, you know, you might have 200 people working at a coal generation plant. Then if you replace that with solar and wind, while there is a lot of job opportunities in the construction of all those, there are very few jobs really to maintain those.

And so but we really need, you know, the just transition is a word you use. You know, you hear it all the time. How do we have a just transition, you know, from workers that are currently in those jobs or they have got, you know, jobs in the future that is going to pay them, you know, similar wages and benefits.

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[11:04 a.m.]

The Chairman. I believe you testified about jobs in people that are actually working on renewables, you know, windmills and solar and all of that. Don't you think we are going to need some kind of Federal help to bring those back as well because --

Mr. Stephenson. Absolutely. For example, there is not a solar panel that is manufactured in the United States. Why can't we bring back the manufacturing and manufacture those solar panels?

Wind generation, same thing, we are not manufacturing here in the States. Why can't we bring that back and give that a boost to our economy by encouraging and bringing the opportunity to build those, you know, the renewables and do it here, do it here in the States and provide good quality jobs in those markets to provide those services.

The Chairman. All right. Thank you so much.

Thank you, Chairman Tonko.

Mr. Tonko. The gentleman yields back.

And the chair now recognizes Representative Walden, full committee ranking member, for 5 minutes to ask questions.

Representative Walden.

Mr. Walden. Hey, thank you very much, Mr. Chairman, and thanks again to our witnesses today.

I have a quick yes or no question for all of our witnesses. In the Northwest, obviously, we rely on a lot of hydropower and their efforts to take out that hydropower,

especially the Snake River Dams.

And I just wondered, yes or no, do you or the organizations you represent support removal of the Snake River Dams and the hydropower it provides?

I don't know who wants to answer.

Mr. Stephenson. I will give you a quick answer. We need to have hydro again as a clean energy source and it need to be a part of the equation.

Mr. Walden. All right.

Ms. Fairchild?

Dr. Fairchild. [Inaudible] taken a position on that.

Mr. Walden. Has not? There is a lot of background noise, I am sorry. Has not taken a position?

Dr. Fairchild. So we are a collaborative [inaudible] a position on that.

Mr. Walden. Okay. All right.

Ms. Saha?

Dr. Saha. Given that climate change is an existing shared threat, I think we need to allow the use of all possible tools, including hydropower, to emission tests as soon as possible.

Mr. Walden. Yeah, yes.

Ms. Foss?

Dr. Michot Foss. I would say that you would only take them out if you have a viable alternative.

Mr. Walden. Yeah, thank you.

Did I get to everybody? Did I leave anybody out?

Yeah, I just would say for my friends in the South, BPA provided as much generation in California as they could within their transmission capabilities. Between

the 14th and 19th of August, they sold 65,000 megawatt hours of hydropower and increased their peak hydropower levels by 50 percent and its load by 25 percent in the days leading up to those power grid issues.

So, you know, what I endure out in my part of the world is a threat to the hydro system and a constant effort to try and reduce it and remove these dams. And, obviously, we have fish mitigation issues and all, enormous billion dollar investments in trying to deal with some of that.

But, on the other hand, we do have clean zero emission hydropower that is constantly under threat of renewable. And then we watch as the nuclear facilities are getting shut down around the country, and I would tell you I am a big advocate -- and I know that both chairman are -- for enhancing the electric grid, but it is darn near impossible to site expansion of electric grid, especially in the West. 55 percent of my district is Federal land. They have been trying to build the Boardman to Hemingway Line for quite awhile from Idaho into my district. It is very controversial. And they are doing everything they can to avoid having it touch Federal ground because it is so difficult to get it permitted and approved. And so, of course, that raises you-know-what with private land owners who see their land then under a threat.

So expanding the grid to be able to manage the renewable energy and the grid itself is really problematic. Needs to happen, don't get me wrong. And my district is home to thousands of megawatts of wind power. And I don't know the current number on solar. But we have huge expansions going on in solar.

We actually have great opportunity to expand geothermal, too. But a lot of that, again, is on Federal land. These are very controversial issues politically when you try to do anything on the Federal ground, but in the West, so much of our States is Federal, and it is something I think we have to address.

One other question to Dr. Michot Foss. Let's start with some facts. Here in the U.S. we are blessed with a rich diversity of these energy sources. If you look at total energy consumption in 2019, 80 percent came from fossil, 8 percent from nuclear, 11 percent from renewables, and the share of energy that comes from renewables is projected to grow in the years ahead. But if we just look at electricity generation, only 7 percent came from wind and less than 2 percent from solar.

So there are, obviously, efforts to ban the other fossil fuels along the way. But if we were to rapidly phase out use of fossil energy, how do we replace that 80 percent of our energy mix? Could you speak to that?

Dr. Michot Foss. Not easily. It will take time, and I think that is the crux of the political conversation is the amount of time that it will take, especially if you want to repatriate manufacturing, repatriate jobs, build supply chains and do it at home as opposed to spending our dollars to acquire imported equipment and materials. You know, those are the issues, right. Worldwide, in fact, renewable energy is still only about 2 or 3 percent.

So rapid growth rates, everybody notices that, but still a very small proportion. It is hard to do. It takes a lot of infrastructure.

Mr. Walden. I appreciate that. Because I do think that is the challenge. We all want to use the latest innovative technology with the least emissions, but getting from here to there is, I think, where the debate is, how quickly can you do it and not risk rolling blackouts or other issues.

My time has expired. Mr. Chairman, thanks for your thoughts on my district and your continued leadership on these issues.

And I yield back.

Mr. Tonko. You are most welcome. The gentleman yields back.

The Chair now recognizes the gentleman from California, Representative Peters, for 5 minutes, please.

Mr. Peters. Thank you, Mr. Chairman.

I would like to discuss a strategy that I haven't heard much about recently, but it is a fundamental component of any effective climate change mitigation policy, and that is the price on carbon. If we are going to save this plant, we need to change the behavior of every decision-maker throughout the economy, from the largest corporations to each of us individuals.

And one of the best ways to incentivize this collective solution is to put a price on carbon either through a cap in trade like California has or through a carbon tax. Those of us who represented the United States at the UN Climate Conference COP25 in Madrid last year heard this over and over again from economists and heads of state alike, markets need clear pricing levels to transition to a low-carbon economy.

Why? Because a price on carbon would incentivize producers and consumers of carbon intensive goods without any further government action to make better choices and to use less fossil fuel and to substitute lower carbon alternatives.

We have talked at length in Congress about an ambitious multi-trillion dollar infrastructure initiative to fix our bridges and roads, expand broadband, upgrade the electrical grid, and more. Historically we funded those programs by raising the Federal gasoline tax. Now, we could raise that tax again, but at this point an upstream carbon tax makes much more sense.

We are still providing funding through an energy levy, but we also continue incentivizing conservation and innovation in a technology neutral way that will reduce the generation of greenhouse gases.

The double benefit of using a carbon tax for infrastructure is that it will fund

Federal infrastructure investments and without any further government action will also induce carbon-saving infrastructure investments in the private sector, building resilient communities, providing financial support for energy efficiency retrofits, building electrical charging infrastructure, among many other priorities.

According to Senior Fellow Dallas Burtraw of Resources for the Future, quote, "Industry has many opportunities to reduce emissions, but firms can rarely act alone. Policies like carbon pricing and performance standards are essential to coordinate this effort. Deep mid-century decarbonization goals require private sector and government partnership."

Now, some worry that a carbon tax is regressive, and you could say the same thing about the gasoline tax, which we have used for years; but most proposals in Congress for a carbon tax contemplate the refund of a large portion of the revenues to disadvantaged communities that don't have ready alternatives and can't afford increased energy prices.

For instance, the Energy Innovation and Dividend Act, which I cosponsor, proposes a tax that protects low-income communities. But even in this divisive Congress, there are five bipartisan bills that put a price on carbon, and any one of them would be a game changer.

With respect to disadvantaged communities, let's not discount the cost of not acting. People in low-income communities today are disproportionately exposed to air pollution that is linked to asthma, cancer, and other health issues. A price on carbon that slows the rate of climate change does the most good for the communities that are most harmed by climate change today.

Now, a carbon tax is a necessary but not a sufficient solution. There are many issues that will require direct regulation. For instance, it is hard to imagine any scenario where economic incentives alone would prevent fugitive methane emissions or industrial

agricultural emissions. So many of these ideas are laid out in the excellent work of the Select Committee on Climate Change.

So with that, I would like to address my question to Dr. Saha from WRI. And I wanted to say that, I meant to start out by saying people haven't been talking about this. But here is a quote from your testimony today, which is "A carbon price is needed to embed climate change costs into economic decision-making while providing clear incentives for the development and deployment of low-carbon technologies and shifts in operations to reduce carbon emissions.

An economy-wide carbon price should be one of the central elements of a national climate policy and paired with complementary policies can be designed to help achieve net-zero emissions by mid-century."

And that is on page 13. I certainly commend everyone to read that. But, Dr. Saha, can you talk about why it is important, in addition to these Federal investments we are talking about, to engage and incentivize the private sector in doing the right thing on climate?

Dr. Saha. Yes, absolutely. WRI's position is that an economy-wide carbon price, whether it takes the form of cap in trade or carbon tax, has to be one of the most important tools in our toolbox and it can be designed in such a way that it can get the U.S. economy to achieve net-zero emissions by mid-century, and at the same time, it can also build a prosperous economy that offers good jobs, minimizes impacts on families, and helps address environmental justice issues.

And WRI also takes the position that while carbon pricing is necessary, it is not going to be a sufficient approach to achieve multiple climate goals and --

Mr. Peters. My time has expired. I agree with that. I just want to put that on the table because we can't just focus on Federal investments, which are important, and

Federal regulation on which we can agree. We have to incentivize the private sector to be part of this or it won't work.

Dr. Saha. Absolutely.

Mr. Peters. I yield back.

Mr. Tonko. Thank you, Representative Peters. The gentleman yields back.

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

Mrs. Rodgers. Thank you, Mr. Chairman.

I appreciate the majority's focus today on equitable opportunities as a part of today's hearing title. What we have seen in the past from Democrats -- Congresses, as well as the administration, has been more of, I think, an insistence on massive government subsidies and top-down mandates that, unfortunately, pick winners and losers.

When we think about policies to advance clean energy solutions to lower emissions, it should be technology neutral and allow private sector innovation to occur, free from the government mandates and without having to compete on unequal grounds.

I look forward to working with my colleagues on this committee, Republicans and Democrats, to really identify the solutions that are going to lower emissions but do it free from the government mandates and really make it more equitable.

As we consider policies to promote renewable energy technologies compared to other energy solutions, it is critical that we examine their entire life cycle and the impact their manufacturing components and materials have on the environment.

Dr. Michot Foss mentions in her testimony that nearly 80 percent of lithium battery manufacturing capability for electric vehicles is in China, whose grid is overwhelming powered by coal-fired plants. A similar percentage of global supply for

solar panels also originates in China.

Dr. Michot Foss, how should we consider the impact of the manufacturing process on these renewable technologies and the impact that they are having on the environment when we are evaluating their efficacy for reducing emissions globally, especially coming from high emission countries like China, and how do we mitigate these issues?

Dr. Michot Foss. I would have to say that one of my biggest concerns is that if you try to accelerate by any means, either market incentives or direct policy interventions, subsidies, whatever, the process of speeding up the integration of certain technologies that we don't produce ourselves, the components of which we don't produce ourselves, all we are doing effectively is shifting our emissions abroad.

Now, we have been doing this for a really long time. All of the more developed countries have been doing this for a very long time. And so the net improvements that everybody hopes to gain in terms of whatever it is that we are after, reducing greenhouse gas emissions or achieving more equitable access to energy, universal access to energy, whatever the targets are, all become diminished if that is what we end up doing.

This is a really difficult conversation with China. I think everybody has got to be honest about that. We are all hopeful, those of us who have studied the country for years, been there, that they will continue to make improvements in their own energy system. I mean, they are doing certain things. But they also have a very strong stand of self-determination and very little willingness, it seems, to engage in ways that I think others would like them to. So I think that has to be part of the conversation. It is part of the reality check on all of this.

I would point to an example over the past few days, Angela Merkel in Germany got her reality check on this because the Germans would like to be very assertive and stronger in terms of what they are doing, and they would like to be able to meet their

policy goals and policy targets.

But it is meaningless if what they are doing is effectively having to rely on China for a lot of their inputs, and the Chinese are not willing to make the same types of commitments. I mean, that is where we are, I think, in the discussions.

Mrs. Rodgers. Yes, I appreciate that.

We are also seeing issues arise at the end of these technology life cycles. According to some estimates, there will be 600,000 [inaudible] of lithium batteries removed from EB by 2025, 78 million tons of solar panel waste by 2050. As we continue to compete with China in critical materials and manufacturing clean energy technology, recycling can help us reduce waste and increase our ability to compete.

Dr. Michot Foss, some have said that recovering these raw materials from these devices remains impractical, especially since [inaudible].

Do you agree with that view? And how clear is it whether a profitable history will be borne at times to get clean energy from adding [inaudible] to an already growing pile of waste?

Dr. Michot Foss. Well, do you want me to answer? Talk is over. Let me just say quickly there are a lot of ideas. There is good work that is being done on recapturing recycling. I gave you all the figure that we know or that we think we know, which is 5 percent with recovery of lithium batteries.

I mean, it is really hard to track this stuff, very, very difficult. Lack of data, lack of information, lack of transparency, there are huge issues in tracking waste in general, but e-waste in particular.

And then, frankly, when it comes to things like -- and I am sure the other panelists, Dr. Saha, for instance, would be aware of this. That when it comes to recapturing and recycling or properly disposing of waste associated with renewable energy components,

there is really an unwillingness to talk about that and engage on it, probably for a whole variety of reasons.

But it is something that we have to own up to and we have to figure out. It is going to be part of the problem-solving in order to be able to move forward the right way.

So it can be done. People have to be realistic about the timing and the cost and whether it is practical or not --

Mr. Tonko. Okay. The gentlelady yields back.

Mrs. Rodgers. Thank you. I yield back.

Mr. Tonko. Okay. The gentlelady yields back. Thank you so much.

And now the Chair recognizes for 5 minutes the gentlelady from California. Representative Barragan, you are up for 5 minutes, please.

Ms. Barragan. Great. Thank you, Chair Tonko, for holding this important hearing.

Our country cannot afford inaction on the climate crisis, which is no longer a far off threat in the future but is affecting us today. We can see with the unprecedented wildfires in my State of California and throughout the West Coast, which are endangering the health and safety of millions of people.

We also have unprecedented opportunity to act by making a transformational green stimulus investment that delivers an economic recovery, puts people back to work, and serves as a down payment on building a more sustainable future that we can pass on to the next generation.

Dr. Fairchild, I would like to start with you and talk a little bit about equity and clean energy jobs. I want to first start by thanking you for your past work in Los Angeles on community development and job training for underserved communities, like those that I represent.

My district is the fourth poorest district in California. It is critical we center equity in any green stimulus investments we make so that the communities most in need of jobs can benefit.

Can you discuss model programs or policies at the local and State level that we can adopt alongside green investments to make sure communities of color aren't left behind? And those are policies we can adopt on a Federal level.

Dr. Fairchild. Thank you very much, Congresswoman, and LA is my home, so I am going to do as much as I can to help your district.

We have a number of innovative programs. And, first, the thing that we have to recognize is that communities of color are underrepresented in the construction industry, we are underrepresented in the environmental sector, we are underrepresented in the energy sector, we are underrepresented in the water sector. And so that is a problem we have to address, but we have to address it at a number of different levels.

The first is to create awareness among the next generation about the opportunities in the clean energy future. They understand a clean energy future and a clean economy is about their generation and their future opportunities, but they don't know the current pathways that are available to them.

So ASIS, the ASIS program that we have in seven high schools in South and Southeast Los Angeles is actually training young people about, and giving them industry certified skill certificates in huge cells, in technology solid works and figuring out how to actually excite them about this career that is also a mission for them. So we really have to start from the middle school and to the high school level.

We also need to work, and we have been working closely with many of our unit partners, with the Youth Build programs. Particularly in Los Angeles, we have got about a hundred black and brown youth in the ironwork apprenticeship program and building a

solar farm in Lancaster.

And then we are also working with small minority women and veteran owned contractors. We must invest in these contractors or in less than 5 years they will be out of business if we don't teach them about the new technologies that go with the clean energy.

There is new software. There is new equipment and new materials, new building codes, and they are still dealing with legacy issues in terms of access to capital, as well as bonding and insurance.

So this initiative really requires that level of investment.

Ms. Barragan. Great. Thank you so much, Dr. Fairchild.

Dr. Stephenson and Dr. Saha, over 490,000 clean energy workers remain jobless since the pandemic hit, including over 84,000 workers in California. Can you describe the most effective policies and investments we can enact today to bring these jobs back?

Mr. Stephenson. Thank you.

Obviously, we have got to get the funding and get these things back up and running again. It is unfortunate, you know, that the pandemic has slowed down a lot of opportunities for our members to continue to work in the renewable energies. However, you know, there is still a lot of work going out there.

We are still doing a lot of solar. We are still doing a lot of wind. But, you know, I just think that the drive to move into the renewables is going to move us in that direction I think naturally.

Ms. Barragan. Okay.

Dr. Saha. And I would just add that there are few areas which can actually -- their investment can be helpful. So, for instance, targeted expansion of energy efficiency and energy assistance programming can provide several benefits that

can put people to work immediately in quality jobs. It can contribute in the future and also find relief to struggling households by eliminating energy costs.

Similarly, investing in public transit and transportation infrastructure can create jobs, and economic growth investment in energy technologies, especially by extending the tax credits for these technologies, can be really helpful.

So there are a few areas that I think Congress should be focusing attention on.

Ms. Barragan. Great.

Mr. Stephenson, IBEW represents -- oh, I apologize. I believe I am over my time.

So with that, Mr. Chairman, I -- I had, of course, a lot more questions, a very important hearing. Thank you for holding it. And with that, I yield back.

Mr. Tonko. Well, thank you for participating. The gentlelady yields back.

The Chair now recognizes the gentleman from West Virginia. Representative McKinley, you are recognized for 5 minutes, please.

Mr. McKinley. Thank you, Mr. Chairman.

Well, it was only a matter of time. The democratic leadership simply can't let a crisis go to waste. Now, what do I mean by that? Let's go back. I am aware of any industrialized nation, any other in the world, that has hijacked this healthcare crisis as an excuse to fundamentally transform their energy mix. But that is exactly what is happening here.

Now, even China, we talk about China, and its focus on renewables. That is true. But at the same time, they are investing -- they are putting, if you look at this headline, they are talking about putting an investment in coal-fired power plants that is equal to or better than the renewables. They are going to be producing enough coal-fired prevalency equivalent of all of the Eastern European Union. So there is where we are.

Now, if we are trying to represent we are sensitive to people losing their jobs,

where was that compassion over the years as the coal industry, all across America -- in 26 States, we mine coal. What happened to them when they lost a very similar number of jobs with it?

What about towns like Hazard, Kentucky; Gillette, Wyoming; or Welch, West Virginia? Welch, West Virginia, is an example. It only has 1,700 people. There are no other job opportunities in Welch, West Virginia, and they are sitting there with a poverty rate of 27 percent. There are only 1,700 people living in the town. It has got a 35 percent minority population.

But, yet, if we fulfill this mission of going to a hundred percent renewables, what happens to Welch, West Virginia, or Hazard, Kentucky, or Gillette, Wyoming? I think we have a moral obligation to protect them.

But let me switch my question now to Dr. Foss because I have been listening to this diatribe from the other side on this for now for close to 10 years.

Dr. Foss, can you assure the American public that if our country does indeed achieve a hundred percent renewables, once we reach that hundred percent, that we will have no more wildfires, no more hurricanes, no more droughts, and the oceans won't rise? Can you say yes or no?

Dr. Michot Foss. I don't think anybody could make that claim.

Mr. McKinley. Well, that is what they are doing. They are saying that we have got to do this so we can achieve, we won't have wildfires in the West. Those wildfires are horrible. But don't try to tell me as an engineer that this is the first time we have had wildfires.

Go back through your record and look at some in the past. They are horrible right now, I understand that. But the idea is being perpetrated to the American public that if we go to a hundred percent renewables, we will stop the wildfires, we will stop the

hurricanes, we won't have that hurricane season on the East Coast anymore, we won't have droughts.

Thank you for your answer on that.

Let me go to a second question then. So I think you touched close to it. I want to understand, because by 2035 we are going to be -- the democratic leadership is trying to go to 2035, there will be 100 percent carbon-free emissions at power plants. So my question is, that means we are going to rely on renewables, which is -- eventually that is fine. We want to be at renewables eventually, but we need this bridge of using out fossil fuels to bridge to that.

So my question is, by 2035, will we have enough domestically produced -- domestically, and that is the operative word -- domestically produced critical minerals to produce 100 percent of our power generation with renewable resources in just the next 10 years, 15 years? Do you think that we can do that?

Dr. Michot Foss. The issue, of course, is not just the raw material supply, but also the manufacturing capacity.

Mr. McKinley. Can you amplify more on that, if you could, please? I have got a minute. I want people to understand that I know the goal is aspirational. But when they put it in a statute by 2035, are we going to be able to achieve that?

And the fact is, what effect is that going to have on droughts, wildfires? And there is none, as I can understand.

Dr. Michot Foss. You are asking a tough one. I mean, you know, the problem is this. There is a lot of uncertainty, and I think people want to do things that they feel provide us humans with some control, and I think that is understandable. I think the political debate is what makes the most sense given the --

Mr. McKinley. Or what gets them the most votes when they gin up their bases,

and that is what this is all about, ginning up your liberal base to attack fossil fuels.

Dr. Michot Foss. I am not privy to the strategies of --

Mr. McKinley. All right. Mr. Chairman, I have ran out of time on this. I yield back the balance of my time.

Mr. Tonko. Okay. Thank you for your questions.

And now the Chair will recognize the gentlelady from Delaware, the great State of Delaware as she would say. We recognize Representative Blunt Rochester, please, for 5 minutes.

Ms. Blunt Rochester. Thank you, Mr. Chairman, for calling this important hearing, and thank you to all of the witnesses for your testimony here today.

As has been said, our Nation is facing a plethora of crises right now, the COVID-19 pandemic, all-time high unemployment numbers, and climate change. On top of that, the systemic racism that is deeply woven into the fabric of our society exacerbates these crises for people of color.

Watching the wildfires in the West that my colleagues shared with us earlier and knowing that we are simultaneously bracing for the worst hurricane season in decades, the urgency to address climate change couldn't be any clearer. We don't know if we will avoid a wildfire, as was just said, but we can mitigate them. There are some things that are uncertain, but what is certain, we can and we must act, which is why I am proud of Delaware's Attorney General, Kathy Jennings.

Earlier this month she filed a suit on behalf of our State against the fossil fuel industry for its role in exacerbating climate change and the damage it has caused to Delaware's environment. We must act swiftly and boldly.

Right now we have an unprecedented opportunity to build our economy back in a cleaner, healthier, stronger, and more equitable way. And we need jobs that are not

only helping us to fight climate change but also create family-sustaining wages and are accessible to all Americans.

Dr. Fairchild, in your testimony, you described the need for equity first strategies to address ongoing climate crisis, and I agree.

Can you elaborate on why it is so important for the Federal Government to prioritize investment in environmental justice communities?

Dr. Fairchild. Thank you, Congresswoman, for the question.

Well, first of all, communities of color are, as you all know, the first and most impacted by climate change, and they are most impacted by the effects of COVID, are most effected by the challenges of inequities in justice.

So if we are going to -- an equity first strategy basically says we support the most vulnerable, release the best first, then everybody benefits because that investment is going to have a multiplier effect. And I think there is a number of particular things that I have been hearing today that is missing the boat.

But number one, we have to have energy security defined in a different way. When we have a blackout or a brownout, what happens to folks that are in home healthcare situations, in critical facilities, people that are in public housing? We had a huge hurricane in New York City.

Folks lost -- the last folks to get back on the energy grid were the public housing residents. I am talking about folks that are on the 10th, 15th, and 20th floors that couldn't even get up and down.

So we have to figure out how we invest first in critical facilities, how we invest in energy strategies for affordable multifamily housing, which is the most difficult building stock to retrofit. We have got to create community level jobs for our contractors to retrofit buildings and residential and small commercial buildings that will be left out into

energy ghettos if, in fact, we don't go in there and retrofit these folks to contribute to a clean energy future and then create green and happy homes.

And I have seen a bipartisan bill on both sides of the House that really talks about retrofitting our schools where our vulnerable communities are.

So these are sort of equity first type of strategies that I would like to be considered.

Ms. Blunt Rochester. Thank you, Dr. Fairchild, and thank you also for your efforts [inaudible] about expanding and diversifying the building and contracting work force.

And on that, Dr. Saha, I chaired the House Bipartisan Future Work Caucus, which we just started, and I launched earlier this year. And with many industries evolving or disappearing as a result of the pandemic, it is more important than ever to create high-paying jobs with varying minimum educational requirements.

How can the clean energy industry combat educational disparities?

Dr. Saha. Yeah. So right now I think as we are sort of moving towards a low-carbon transition, we have to make sure that the jobs that are going to be created in the new climate economy are well-paying jobs, they provide access to people from all communities, and they come, you know, with benefits, and they are accessible to pretty much everyone.

So in terms of that, I think it is really incumbent on the clean energy, you know, the private sector working in partnership with policymakers and, you know, universities and education institutions to understand what are the skills that are going to be needed in this new industry, what are the gaps that need to be addressed, and work towards making sure that these challenges are being addressed.

Otherwise, I think we will perpetrate many of the inequalities and inequities that

the currency has seen, and we cannot replicate those again.

Ms. Blunt Rochester. Thank you, Doctor.

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

Mr. Tonko. The gentlelady yields back.

The Chair now recognizes the gentleman from Ohio. Representative Johnson, you are recognized for 5 minutes, please.

Mr. Johnson. Well, thank you, Mr. Chairman and Ranking Member Shimkus, for holding this hearing today and to our panelists for offering their valuable perspectives.

You know, noted economist Thomas Sowell once said, "There are no solutions, only tradeoffs." So I am afraid that as the majority continues to hold hearing after hearing on their goal of replacing fossil fuels with a green economy.

My friends on the other side of the aisle do not want to admit the advantages America will have to forego in order to realize their green goals. As members of this subcommittee, it is our duty to dive deeper on these sweeping policy proposals that would fundamentally restructure America's energy economy. I would argue that it would fundamentally weaken America's energy economy.

Americans deserve to know the full scope of economic, environmental, and geopolitical costs of some of these much discussed proposals, like massively scaling up wind and solar or tremendously increasing the use of batteries. If this subcommittee won't look into it, who will?

For example, the testimony today reveals that these sweeping proposals to rapidly shift to green energy would likely result in American dependence on long, fragile supply chains moving through lands controlled by our adversaries. But I have to ask you, is this what we really want for America?

We should welcome innovation in helping America produce cleaner and more

abundant energy, as we always have; but a policy change as fundamental as restructuring our energy economy and potentially seeding our energy independence must be discussed with clear eyes and a true appreciation for the costs and risks in doing so.

So, Dr. Michot Foss, we have witnessed a shell revolution in the United States, which I have seen firsthand in eastern and southeastern Ohio. And it has made America the global energy leader, strengthening our geopolitical hand, as well as spurring our economy.

Domestic demand will continue to rise for critical minerals and crucial rare metals for use in electrical components. But, unfortunately, America is dangerously dependent on these materials being mined and processed abroad.

What do we need to do, Dr. Michot Foss, what do we need to do to get America on a firm footing with these materials like we have seen with natural gas production?

Dr. Michot Foss. Well, I think, first of all, what the committee could do is consider that our natural resource endowments are not unsubstantial.

The question is, are we willing to access our own resources and bring them into the market? We are still never going to be able to supply everything that everybody would want to use for any of the applications that we have been talking about today.

So we still will need trade access for those. But I think what we could do is we could look at our own backyard and see what we are willing to do and how we would be willing to do it, with what kind of guidance and what our expectations are in terms of performance of the industry.

No business is perfect. I mean, none of the things that we have talked about today are going to be completely free of problems and challenges and other things.

But in your point about our domestic oil and gas businesses, I think anybody who has studied those over time has seen what the industry can do to improve technologies,

to reduce its own emissions, to be more efficient.

The mining industry and minerals processes could do the same. We would have expectations about how they perform. They need to be able to gain access to the resources for development and build the logistics in order to deliver them.

And I can tell you that in talking with any of the industries that we visit with, whether it is automakers who are trying to step up their commitments to electric vehicles, or people who are trying to plan wind and solar projects, distributor generation, think about new grid expansions and improvements, or whatever, all of those folks would like to have more domestic content in their businesses. And some of them are making major obligations to that.

So that is something you all have to think about because I think before you spend money trying to promote the application, you need to think about the inputs and how the inputs are going to be provided.

Mr. Johnson. Okay. Well, thank you very much.

I did have a second question. I will submit it for the record, Mr. Chairman. But I will yield my time now.

Mr. Tonko. You are most welcome to do that. So thank you so much. The gentleman yields back.

The Chair now recognizes the gentlelady from Illinois who serves as Chair of the Subcommittee on Consumer Protection and Commerce, Representative Schakowsky. You are recognized, Representative, for 5 minutes, please.

Ms. Schakowsky. Thank you so much, Mr. Chairman and Ranking Member, for this important hearing.

You know, we started 2020 watching the horrifying wildfires in Australia that took millions and millions of acres, and now as we speak, of course, we are seeing that

happening on the West Coast and the devastation. So let me also just give my condolences and my concern to my colleagues and, of course, their constituents that are facing so many challenges and even death right now.

And I really appreciate the effort that everyone is making right now, particularly our firefighters going into harm's way, and also the weather occurrences that are happening in the East and the multiple, you know, challenges that we have there.

And so I wanted to talk about something that is happening in Illinois. The Federal Government is investing in a program in Chicago that we call Brownfields to Brightfields, and this program converts old industrial facilities into solar brightfields, and it also creates good paying jobs and the benefits to the community around the city.

So there are so many ways that our local communities can provide good jobs, but I wanted to talk right now to President Stephenson. You know what, the subheading of this hearing today is "Opportunities for an Equitable, Low-Carbon Recovery." And I don't know that everyone would necessarily suspect that a big part of that could be talking about unions, and I wanted to explore that a little bit with you.

As a dues-paying, currently, union member myself -- I have continued to pay my do you see even as I am here in Congress -- it seems to me that this is a really important factor, that -- in fact, I was a big supporter -- I am a big supporter of the PRO Act, the Protecting the Right to Organize, if we want to rebuild a middle class even as we make our country more green.

So I wanted to ask you, how does union, in your view, really fit into this discussion about how we build a more equitable and job secure future?

Mr. Stephenson. Well, thank you, Representative Schakowsky, and, again as a fellow Illinoisan, it is great to see you.

You know, we think it is very important as we move forward with the renewable

energies and the new technologies that are going to come out of that, that those are good paying, good quality jobs, union jobs, that can provide -- that those workers can adequately work and provide for their families.

And we in the, you know, building trades and in the construction trades, we all have recognized -- and we talked about the communities that have been underrepresented or been the ones that have been directly affected by climate change, and we have all across the building trades really increased our efforts to attract and get more women and people of color into our programs because we know that -- and we have training programs all across the United States.

In every State we have got training programs that is already there and privately paid for between us and our contractors.

And so we have the opportunity to, as these new technologies and jobs come out is get -- have the training available to train new workers to come in with the specific skills they need to be able to, you know, go out and maybe it is a wind tech.

Somebody that is taking care of those wind turbines, or, you know, in the solar. There is maintenance jobs that also, like you said, hopefully we can get back to where we are manufacturing some of those products as well, and that would provide great opportunities for jobs in areas where they really need them.

Ms. Schakowsky. So bringing jobs home and also good union jobs.

Dr. Fairchild, you heard what our president of the union has said. How important is it to make sure that there is reaching out to the communities that really need the help?

Dr. Fairchild. It is essential. I think we need to rebuild the middle class if we rebuild our labor unions. But we do have to really find a better way to get people of color into unions, especially the IBEW.

And, by the way, amazing relationships with IBEW and they are opening up their apprenticeship programs, but these are hard tests for young people to pass.

So we have to have intensive boot camps to figure out how to pass these tests, and HVAC and electrical trades and other trades.

So there is a lot of work to be done, but that is the work that we need to do.

Ms. Schakowsky. Thank you.

And I yield back.

Mr. Tonko. The gentlelady yields back.

The Chair now recognizes the gentleman from Texas, I believe is next, Mr. Flores. Or do we have Representative Long with us?

Mr. Long. Yeah.

Mr. Tonko. We do?

Mr. Long. Yes, sir.

Mr. Tonko. Okay. Mr. Long, I am sorry we lost you there for a minute. You are recognized for 5 minutes, please.

Mr. Long. Thank you, Mr. Chairman.

And, Dr. Foss, from your testimony it is clear that critical materials play a significant role in a transition to clean energy, and the U.S. is becoming more dependent on these minerals by the day.

Even though America has trillions of dollars in mineral reserves, we are 100 percent relying on importing more than a dozen key minerals. Most of these minerals come from China and other countries around the world that don't share our values and don't play by our rules.

This is especially clear with respect to environmental standards where these countries are far less concerned about environmental impact of their processes to extract

these critical minerals.

I see from your testimony that you are working with Missouri Science and Technology in Rolla, Missouri, and crafted recommendations for the upcoming G20 hearing related to these topics. Can you explain the current conditions of our domestic mining industry?

Dr. Michot Foss. Well, our domestic mining industry has faded just as a lot of our domestic industries have, manufacturing. And that is a consequence of both commodity markets and pressures from commodity markets, lower cost sources abroad, and partly due to governance in those exporting countries, producing in exporting countries.

And also because we, in protecting people, in protecting the environment, it made our costs higher, and that is something that is a tradeoff. We made it easier for competitors to supply raw materials who don't have the same obligations over their industries that we do.

Mr. Long. Okay. Well, we have critical materials right here at home, especially on Federal lands so the reason, why can't we produce American.

Dr. Michot Foss. It takes a really long time to permit a new mining facility. It can take a really long time to open one that has already been in operation and is being recommissioned.

I think the point came up earlier, dealing with Federal lands is very difficult. Not much of what I think people would pursue would be on private lands, so we don't have, you know, a more flexible arrangement there. It is not that scrutiny is a bad thing.

Scrutiny is a good thing. If processes could be streamlined, if there was more certainty around the permitting process for new facilities, if there were ways of being able to build better consensus among different groups about access and how mining operations would be conducted in different locations, along with all of the supporting

infrastructure, then I think we would be in better shape.

I often feel that what we really need to do is just revisit -- if we are serious about this, we need to just revisit the entire scope of how regulation is as it pertains to the mining in the United States to see where improvements can be made in order to be able to generate more of a [inaudible]

Mr. Long. I think we are serious about it, and I would say to import 12 minerals, you know, it is not a good thing.

So the third domestic environmental permitting process hurt our international competitiveness in this area.

Dr. Michot Foss. I think that certainly what it has done is it has made our industry clean and safe. It has contributed to that. I think people have learned how to adapt.

Just like every other business, the mining industry has acquired new practices. There is a lot more that can be done to make mining safe and to make it clean. I mentioned that earlier, we have got emerging ideas and emerging practices that we ought to be the leader in because we are the best place with our rules, our laws, and our transparency to be able to implement some of the things that people talk about, greener mining, climate friendly mining, you know, things that actually do a better job of protecting mineworkers.

We are deploying new technologies to reduce the human interface. I mean, this is happening in all basic industries. One way to make mining safer is to have fewer mineworkers. I mean, this is a reality in the business in terms of being able to move things forward. Better thinking, better management over permitting, licensing, compliance, and other things I think would help.

Mr. Long. You hit on permitting there at the end, and that was going to be my

next question, but I will submit it for the record since I am out of time, as far as the permitting process and fixing that to be more competitive in our global markets.

And thank you for being here today.

Mr. Chairman, I yield back.

Mr. Tonko. The gentleman yields back.

Next we recognize the gentlelady from California, Representative Matsui, you are recognized for 5 minutes, please.

Ms. Matsui. Okay. Thank you, Mr. Chairman, for holding this really very important hearing. I think it is really critical that we recognize that this is not a one-off deal. Climate change is happening, certainly in California, Oregon, and Washington State, but also throughout the country, whether it is fires or whether it is tremendous hurricanes. This is impacting the entire country, so this hearing is really quite important.

You know, I believe we need to chart a path forward that addresses not only immediacy and gravity of the climate crisis but recognize that costs to inaction are not borne equally by all Americans. Moving toward a clean energy will create new and lasting economic opportunities for helping really to alleviate some of the disproportionate impacts harming frontline communities.

Now, over the last several weeks, more than 700 wildfires have been burning throughout California. If you look at a map of California and the West Coast, you see these little icons of just fires going on all over.

This is including the second and third largest in our State's history. The fires this year are even more disruptive than last, and we have just seen just the beginning of the season. So this is not the height of the destruction right now.

The 2018 and 2019 fires cost more than $40 billion, and as the fire season goes longer and more severe, I am really concerned that the costs in terms of human life and

economic damage will only grow.

So, as I said before, this is not just California and the West Coast. It is coming all throughout the country. So this is a national problem, and it has huge economic downsides.

So, Dr. Saha, can you describe what your research shows regarding the economic impacts of climate inaction in terms of the U.S. GDP?

Dr. Saha. Thank you.

I think that is a very important question because oftentimes when we debate about the merits of climate policy, we don't take into account the costs that are already being borne on the U.S. economy. And as I said in my oral testimony, the longer we delay taking action, the longer the United States is going to be vulnerable to increasing damages from climate catastrophe and air pollution and other impacts.

And I think there is literature that says, emerging studies that have actually looked at how much climate inaction is going to shave off, you know, from U.S. GDP in case it fails to take action. And the impact on U.S. GDP is actually going to be quite significant.

So, in that sense, I think it is really urgent that we understand the gravity of the situation and look at all technologies that can get us to a path of reducing emissions by 2050.

Ms. Matsui. Okay. Thank you.

And, you know, I am talking about wildfires and the fact that we have such significant air pollution that we can barely breathe, day is night, and it is just totally incredible; but we also have the aspects of flooding. In my district, Sacramento is the second most flooded town and urban are [inaudible] in this country, second to New Orleans.

And climate change exacerbates the risk of extreme weather and flooding events

which makes it more common even throughout the Midwest. Modernizing our water infrastructure has significant public safety implications and presents an opportunity to minimize our carbon footprint.

Dr. Fairchild, what steps should we be taking to ensure our water infrastructure is climate resistant, resilient, and clean?

Dr. Fairchild. Thank you for the question, Congresswoman.

Well, I think there are two things I would like to bring into focus. One is how do we mitigate and slow carbon emissions; and then, secondly, how do we adapt to the fact that the climate change is here and the fires are here and how do we build an infrastructure to do both.

On the one hand, our mitigation strategy in green infrastructure looks at watersheds, doing water management infrastructure, which is not the centralized water systems, but really how do we capture water.

On school sites, for example, a lot of initiatives are helping to dig up our playgrounds and making permeable pavements, and we can do this to our streets to capture the water to prevent flooding so it goes into the aquifer.

So there are a number of things, new technologies in coastal restoration and sort of ecological approaches to mitigation.

I guess the more important part is the adaptation, besides the green infrastructure, which is a job generator, by the way, from landscaping to putting up free canopies to address urban heat islands, that we really need to figure out how to adapt to rising heat waves and temperatures in our communities by making our communities cooler.

So I think that the water, energy, climate nexus is clear, and we need to recognize that these are water infrastructures, a huge energy consumer, but we also need to build

an infrastructure to adapt to the floods that are taking place.

Ms. Matsui. Well, thank you very much for all of your work.

And I see I have run out of time, so I yield back. Thank you.

Mr. Tonko. The gentlelady yields back.

The Chair now recognizes the gentleman from Texas. Representatives Flores, you are recognized for 5 minutes.

Mr. Flores. Thank you, Mr. Chairman. I appreciate you holding the hearing today.

Dr. Michot Foss, I have a couple of questions for you, but let me start with this. The goal of this hearing is to determine how we can build a hundred percent clean economy with opportunities for a low-carbon recovery.

But let me say this, that there are no equitable opportunities for recovery for hardworking Americans if the power is out at work or if the lights out at home or school for our Nation's kids.

And California is an example of how to do this incorrectly. The California Green New Deal ignores the science of electricity physics, and it ignores market forces when setting power policy.

Today their flawed policies are causing blackouts and brownouts, and last year they caused massive fires.

California's Governor Newsom recently said that the failure to prevent blackouts was unacceptable, and he called for an investigation.

Well, he won't have to look far because their problems are caused by their failed policies. The Wall Street Journal summed up this viewpoint in an editorial recently saying that California's blackouts were a warning to the rest of America about the risk of Green New Deal policies.

In contrast, Texas is a great example about how to do it right. While oil and gas are both very important to Texas, our State is also a leader of renewable energy. In fact, renewable energy throughout Texas has helped to place our State ahead of all others in contributing to renewable energy production.

According to an article that appeared in Green Tech Media in January, Texas accounted for more than a quarter of all corporate renewable energy deals signed in 2019 around the world. This phenomenal growth is driven by the successful market-based model adapted in Texas in the 1990s when Texas began to deregulate the power industry.

The contrast between California and Texas clearly shows that policy solutions for a low-carbon economy should be based on real world strategies focused on conservation, innovation, adaptation, and market dynamics.

It is also important to realize that policymakers need to pay close attention to the importance of baseload power generation. In this context we should heed the comments of Mr. Stephenson, the President of the IBEW, where he talks about his organization's support for preserving key baseload energy services, including natural gas, coal, and nuclear power.

And as stated in his written testimony, the IBEW sees existing and advanced nuclear power as the cornerstone of low-carbon future. His testimony also states that as the United States moves toward increasing reliance on renewable energy, such as solar and wind, the need for nuclear energy's reliability, the country's only carbon-free source that can ensure around-the-clock generation, even during inclement weather, has become greater.

Today's hearing, which explores the attributes of renewable energy, is a topic in which I have taken a keen personal interest. With regard to the moving toward

carbon-neutral future, I have done more than talk about it. My residence is the largest producer of residential solar power in Brazos County, Texas, and during the hottest part of day, I will be feeding power back into our local grid.

Overall, on an annual basis, I generate 40 percent of my own power. And since 2014, by careful energy usage management and converting to 100 percent LED lighting, we have reduced our gross electricity percentage by another 37 percent.

RPTR WARREN

EDTR SECKMAN

[12:05 p.m.]

Mr. Flores. The point that I want to make is that finding a lasting solution to any of our economic, environmental, and energy solutions requires us to use nothing less than all of the tools in our toolbox, and our solutions again need to focus on conservation, innovation, adaptation to market dynamics.

So, again, Dr. Michot Foss, thank you for being here today and thank you for your blunt warnings regarding the severe economic security and environmental risk of relying on China to achieve our clean energy goals

We as policymakers should also heed your comments regarding the fallacy of expanding pollution sources in China in order to meet our environmental objectives. In my opening statements, I discussed the contrast between the successes of Texas energy policy, which has reduced energy emissions, and that of California, which has experienced a number of shortcomings resulting in rolling blackouts and other issues.

Can you speak to the difference in the way these two States approach incentivizing low-carbon energy production and reducing emissions while maintaining economic growth?

Dr. Michot Foss. The most important difference is that we have an energy-only market, meaning electricity comes into the wholesale market on a full competitive basis. We have price caps that send price signals into the market that people respond to. Also renewable energy that has been developed, including probably yours at your household, Mr. Flores, have benefited from Federal tax supports. So there is that but one thing that we have done that -- that is very difficult to do around the country is to build high-voltage

transmission to carry renewable energy sources into the market. That was not easy. In fact, there is a lot to learn from that experience.

Mr. Flores. Okay. And my next question is this, and we may have to get to you answer it supplementally for me. We need to think about this beyond our borders and think globally. With respect to that, U.S. liquefied natural gas, or LNG, can ensure that global energy demand is met in a manner that minimizes greenhouse gas emissions while maximizing reliability and cost efficiency. So, based on your expertise, what are your thoughts on increasing LNG use and exports as a way to meet global energy, security, and environmental goals?

Dr. Michot Foss. Mr. Chairman, should I answer?

Mr. Tonko. Please do.

Dr. Michot Foss. Okay.

Mr. Tonko. If you could do it quickly though.

Mr. Flores. Thank you, Mr. Chairman.

Dr. Michot Foss. To the extent that, as was already pointed out by other panelists, natural gas has a lower carbon content fuel, then what we would be helping to do through our LNG exports is reducing carbon emissions in other locations around the world the same way that we achieved carbon emission reductions here. It is low-hanging fruit. It is something to think about.

Mr. Flores. Thank you very much.

I yield back.

Mr. Chairman, you are muted.

Mr. Tonko. Sorry about that.

The gentleman yielded back.

The chair now recognizes the gentleman from California, Representative

McNerney. You are recognized for 5 minutes, please.

Mr. McNerney. Well, thank you, Chairman. I thank the ranking members, and I thank the witnesses. Interesting hearing this morning.

So watching the members' questions, I observed that we are -- both sides are talking past each other, and that is unfortunate. The climate is clearly changing. It may not be impacting Ohio just yet, but it will. It is imperative to reduce carbon emissions, but energy security is also important, and everyone recognizes that. The challenge is to reduce emissions while improving energy reliability. I believe that that is possible.

And that is why I recently introduced H.R. 7975, the GREEN Workforce Act, which focuses on helping Americans train for and transition to careers in clean energy fields, providing them with the skills needed to develop and operate clean energy systems of the future.

Mr. Stephenson, thank you for your testimony. By all accounts, we will need millions of new jobs in order to fully recover from the economic impacts of the pandemic. But while the energy sector saw incredible job growth over the past decade, the distribution of that growth has not been equitable and diverse. What can be done ensure that the historically underrepresented groups are not overlooked as the clean energy jobs are created?

Mr. Stephenson. Yes, thank you for that question.

As I kind of alluded to earlier, within IBEW, ourselves, we have developed what we call IBEW Strong and that is designed particularly to make sure that we are reaching out to communities that haven't been part of the -- particularly on our construction side -- of the IBEW, that we are embracing and bringing different communities, people that maybe didn't think they have a place in the IBEW. It is part of the training and education of our

local unions, of our apprenticeship programs. We just partnered with our National Electrical Contractors Association, NECA, and they are taking on the same goal, is to make sure we are increasing our diversity and inclusion within our construction industry. And so that's a vital part of it.

And as these new jobs are created, like I mentioned before, we have got training facilities all across the country. Every State, we have got training facilities. So we are in a position that we can, you know, bring these new workers into our programs, get them the training that they need to be successful, and lead the industry as these new technologies and new opportunities open up.

Mr. McNerney. Thank you.

Dr. Saha, Dr. Fairchild, agriculture is the biggest economic sector in my district. In your testimony, you each highlighted the role of carbon farming in enhancing productivity, profitability, and resilience in the ag sector. Please describe the economic and climate benefits associated with improving soil health and sequestration.

Dr. Saha first.

Dr. Saha. Hi. So, yeah, so natural carbon capture in trees and agricultural soil actually lead to emission reductions. But they also have a lot of economic benefits in terms of enhancing productivity, profitability, and resilience in U.S. farms, forests, and rural communities. So one thing, one strategy is, you know, tree restoration, whether it is happening in forests or interspersed across, you know, nonforested rural landscape. That has, you know, one of the greatest potential to sequester carbon.

Also things like improved soil management can enhance carbon storage in agriculture soils by reducing carbon losses or increasing carbon uptake, and these practices also provide other benefits, including reduced erosion or resilience to drought and in some cases increased eels (ph).

So these can open up significant opportunity for rural farming communities to economically benefit from the adoption of improved soil management practices.

Mr. McNerney. Thank you.

Ms. Fairchild.

Dr. Fairchild. I want to speak to the probably the distribution and processing side of this which really accounts for as much as 25, 20 percent -- 26 percent of energy waste appeared energy emissions and what we are doing is building -- bringing the farmers closer to the markets by shortening the supply chain, working with anchor institutions, Eds and Meds, to buy sustainable foods and to buy locally.

And we are -- we are building now an 800,000 square foot sustainable food factory, hiring 250 union workers in sustainable foods, and at the same time buying within the 250-mile food shed food products from farmers to -- into that processing facility. So it addresses emission. It addresses jobs. It addresses business opportunities.

Mr. McNerney. Thank you.

All right. Mr. Chairman, I will yield back.

Mr. Tonko. The gentleman yields back.

The chair now recognizes the gentleman from South Carolina.

Representative Duncan, you are recognized for 5 minutes, please.

Mr. Duncan. Thank you, Mr. Chairman, and a very timely hearing. I want to thank all the panelists for being here. Bill Flores, great comments earlier.

I would be remiss if I didn't address the wildfires out West and really point to the failure of the folks in Western States from actively managing the Nation's forests. These are resources that the taxpayers own in many, many instances, and we are seeing over the last few years very rampant while fires out there. We have to ask ourselves: Why?

If you look at the fires last year in California, many were started from faulty transition lines arcing and sparking. This year we have seen lightning strikes. We have seen terrorism, ecoterrorists, and arsonists. We have also seen a gender reveal party start one of the largest fires in California. That is well beyond any sort of climate change that you are trying to blame these fires on.

Let's look at what actually is causing the rampant wildfires to be as large and out of control as they are, and that is lack of forest management over a number of decades. That is prescribed burning. We need to, as a Nation, realize that a little bit of nuisance during the winter and spring wet months for a prescribed burning, the smoke that is going come from prescribed burns that take that fuel out of the way is much better than the rampant smoke that we are seeing all across the West now coming from the wildfires in many, many States. And it is not just California. It is Washington. It is Montana. It is Oregon where we have not actively managed these fires.

We need to put in shading and firebreaks. We need to have prescribed burns. We need to manage the Nation's resources, and that is failure of many, many States and that is a policy, Mr. Chairman, I think we need to look at beyond climate change is look at how we manage the Nation's timber resources.

And all the experts in the field of forestry will agree with me that you have got to take the fuel away or you are going to experience this, regardless of the cause, whether it is a lightning strike or a faulty transmission line.

So, while I am talking about transmission lines, let's talk about what is going on in California this year that is pretty applicable to this hearing, and that is a 60-year failure of California energy structure to maintain and upgrade the transmission lines, the move toward renewable energy, which is intermittent. So, when you have really 100-plus days and a lot of demand, you see rolling brownouts and blackouts. That is going to

happen when you go to a more renewable energy source.

Let me tell you what does work, and that is fossil fuels and nuclear power. If we want to lower our carbon footprint, we need to put more emphasis on nuclear power. In fact, let me show you this graphic. And there is a lot of windmills on that. I don't know that you can see this, but let me read this graphic. It takes 2,077 2-megawatt wind generators to produce about 9 million megawatt hours of electricity, 2,000 windmills. The same energy can be produced by -- one 1154-megawatt nuclear power plant produces about the same amount of energy. This -- the square footage, you could put all of that -- you know how much land it takes to put 2,000-something wind generators up? In less than 1 square mile footprint, you can have a nuclear power plant that is going to provide the same amount of low-carbon electricity generation. That is where we need to put our emphasis.

Ms. Fairchild, you talked earlier about hydro. I think Ms. Matsui was asking about hydropower and reservoir and clean water. This is rhetorical, but when was the last time that California built a reservoir to hold the water that is coming out of the Sierra Nevadas that is flowing into the ocean every year? Instead of holding that water to use as clean drinking water or use for hydropower, we are going to stop any sort of hydropower development in California because of a smelt order, not thinking about the need of human beings in California.

They need clean drinking water and the glaring need this year of good, stable, 24/7, 365 baseload power that is provided by nuclear power or hydro or fossil fuels that you are not going to get through renewables. And, look, I am all about renewables. I love it. I think it is groovy technology. I think it is part of the energy matrix. But we know what works, just like we know what works with active forest management of the resources that we have.

It is interesting that these wildfires aren't rampant in Canada or Mexico, a very similar topography as what we see in California. But when we see these wildfires are out of control, then we understand why. It is because we have not actively managed our forest resources, and we have got to do that. That is a policy change.

Mr. Chairman, I have 11 seconds. I want to thank you for this hearing.

And I think California and the Nation really needs to address active forest management and look at good, stable, 365, 24/7 baseload power supply generation that comes from fossil fuels, it comes from nuclear power, and upgrading our grid system to make sure that we don't have sparks that are causing a lot of fires in the past.

With that, I will yield back.

Dr. Fairchild. Congressman, I wanted to correct for the record. I did not make a -- take a position on water, on water power. So just wanted to correct that.

Mr. Tonko. Okay. Thank you. Recognized.

So the gentleman yields back.

The chair now recognizes the gentleman from California, Dr. Ruiz.

Representative Ruiz, you are represented for 5 minutes, please.

Mr. Ruiz. You know, as a Californian, it strikes me funny to hear a Republican from southern -- South Carolina blame environmental laws for climate change and also recognizing that the vast majority of forest land in California is Federal land.

Mr. Duncan. Will the gentleman yield?

Mr. Ruiz. No.

I am Congressman Raul Ruiz. I represent California's 36th Congressional District, which includes 11 federally -- I am sorry -- got the wrong thing. I got all worked up after hearing that. One second.

You know, thank you again, Mr. Chairman, for holding this hearing. Today's

hearing examines two of the most pressing issues facing Californians and my constituents right now: the massive economic toll of the COVID-19 pandemic and the devastating effects of climate change. Unemployment for my district remains above 13 percent, and small businesses from Hemet to Cathedral City have been contacting my office to share their specific hardships as a result of the pandemic.

At the same time, wildfires have torched 3.5 million acres in California, 3 percent of the State's total area including the 30,000-acre Apple fire, which threatened the city of Banning in my district. As climate change worsens, these fires will only get worse, more intense, and more frequent. And it is hard to imagine a worse fire season than what we have seen so far this year. That is why it is so important that we use this opportunity to invest in industries that can reduce our carbon output while also putting Americans back to work.

The daily high temperature in the Coachella Valley desert hasn't dropped below 100 degrees since June, and with more of my constituents at home during the day either because they are unemployed or working remotely, air conditioners are working overtime and requiring more energy and more costs than ever. There is no better time to invest in harnessing solar energy to lower utility bills, reduce carbon emissions, and save our environment and our health from climate change.

As of 2018, there were more than 2,300 individuals employed by solar energy companies in my district alone, and I believe that we can continue to grow this number and bring the promise of clean energy and secure unemployment to everyone. This is why I introduced H.R. 7849, the Renewable Energy Jobs Act, which would create a Federal grant to fund training programs that help people find good-paying jobs in renewable industries like wind and solar development.

Ms. Saha, in your testimony, you describe how investment in clean energy

industries can help put Americans back to work. Specifically you describe how every $1 million invested in renewable energy can generate 78 full-time equivalent jobs. Can you give this committee a better sense of what that that means and how investment translates into employment?

Dr. Saha. Absolutely.

Representative Ruiz, may I just take a few minutes to address something that --

Mr. Ruiz. We only have 1 minute and 50 seconds left. So, if you can address it in 10 seconds and then answer the question, that would be wonderful.

Dr. Saha. Absolutely.

We are hearing a lot of issues about how renewable energy is to blame for, you know, California's, you know, first rolling blackouts in 19 years. And I just want to say that that is a mischaracterization of the problem. So data shows that, right now, California's net electricity generation from one hydro renewable clean energy source is about 40 percent. Iowa has about 60 percent. So, clearly, the problem isn't the amount of renewable energy on the State's grid but what the State and its utilities are doing to balance its resources. So let's not blame renewable energy for rolling blackouts.

Mr. Ruiz. It is interesting that that argument also coincides with cuts in forest management in the budgets that we have seen over the past this administration and also the answer to this climate change is more reliance on fossil fuels.

Let me ask Mr. Stephenson a question, because I only have a few seconds. You know, we have worked closely with labor in making sure that labor has the ability to receive grant funding to train people in renewable energy jobs on-site. So how will investing in solar and wind energy development help create more job opportunities in places like the Coachella Valley where one of those large solar plants that we have been

working on together help create more jobs?

Mr. Stephenson. As the new jobs, new technologies continue to move forward, it is going to be new training. It is going to be needed, you know, bring in more workers in, into the industry and getting them trained on the -- on solar and wind, what have you. So and we are a part of that is our training programs. Like I said, we are all over the country. So we are prepared to do that and assess to get the trained people to not only do those installs, but also retrofit is also an important part of that process.

Mr. Ruiz. Thank you.

I have run out of time. So I will yield it back to the chairman.

Mr. Tonko. Okay. Thank you. The gentleman yields back.

The chair now recognizes the gentleman from Georgia. Representative Carter.

You are recognized for 5 minutes, please.

Mr. Carter. Thank you, Mr. Chairman.

And thank all of you for participating in this. This is certainly something that is extremely important, extremely timely. There is no question about that.

Dr. Foss, I want to start with you and ask you. When we discuss a transition to a low-carbon economy, we have to discuss the cost and the requirements that are associated with the supply chain. And certainly supply chains, as we know, are very important. I want to point out two examples of where supply chains are important.

First of all, I am old enough and I suspect there are some other members on this call who are old enough to remember the late 1970s when we realized that we were too dependent on foreign countries, particularly the Middle East, for our energy needs, and we needed to have more energy independence.

More recently, we have recognized that we are too dependent on other countries for our pharmaceutical needs. During this pandemic that we are experiencing right

now, we understand that they are essential ingredients that we can't do without in order to -- in order to manufacture some of our pharmaceuticals and in order to get those, we have to get them from other countries, and that is not a good position for us to be in.

So I appreciate the fact that you have pointed out that we need to look at this in detail. We need to look at the supply chain and to look at the cost and the sources of these materials.

I want to ask you, Dr. Foss. Do you believe that the energy policies that are being proposed really adequately factor in the requirements for mining for rare earth minerals, for the production of aggregates when we use -- that are used in concrete and cement industries are the locations of where these minerals are mined?

Dr. Michot Foss. No, sir, I don't.

Mr. Carter. Well, I appreciate that. I appreciate you being succinct about that because it is an important point, and certainly it is an important point for us to recognize this.

You know, I live in what I consider to be one of the most beautiful areas in south Georgia. I represent the entire coast of Georgia. And if you look at that, you know, we have had a number of companies that have looked at mining, and we have got the Okefenokee Swamp, which is a great national treasure that all of us love and none of us want to see disrupted. Yet there are minerals there that could save us and help us in this country, but nobody wants it in their back yard, and I get it. I understand that, and that is one thing I think we have to take into consideration.

You also mentioned, Dr. Foss, in your testimony how the United States was ranked 12th overall in nonfuel mineral production. We know that many of these critical minerals are mined in poor conditions in areas like the Republic of the Congo, or they are used for strategic advantage by the Japanese -- or by the Chinese -- excuse me -- and that

they use them, just like I mentioned earlier, that we are witnessing right now that they are using the pharmaceuticals to their advantage. We understand that that is not a good position for us to be in, and we should not be in that position.

How important is it for us to factor into the supply chain questions when we are planning for future energy investments?

Dr. Michot Foss. First of all, let me quickly correct the record. I had a cut-and-paste error in the testimony. We represent 12 percent of the global nonfuel mineral output, but we might as well be 12th when it comes to the things we don't produce sufficient amounts of.

So we have talked about -- we put governance on the table, which is what you are talking about again, responsible mining and minerals production, responsible energy production from any source; it doesn't matter where it comes from, what the technology is. Best practice, that is another phrase. What is best practice? We have lots of engineering standards that are used, widely used, and indicative of best practice.

The huge difference is that, in our country, for better or worse, when projects are proposed of any sort, any type of industrial project, they undergo tremendous amounts of scrutiny. We have laws and rules to protect people, property, and the larger environment, and we have transparency. And if something happens, we know about it.

And what we would like to see is we would like to see a level playing field and see these kinds of things adopted, these kinds of values and practices adopted in other countries that are going to supply the global economy.

Mr. Carter. Great. Well, I am out of time.

Dr. Foss, thank you very much.

And thank everyone who has participated in this today.

It has been a very good hearing, Mr. Chairman.

Mr. Tonko. I thank you. The gentleman yields back.

The chair now recognizes the vice chair of the full committee, Representative Clarke, from my home State of New York.

Represent Clarke, you are recognized for 5 minutes.

Ms. Clarke. Thank you so much, Mr. Chairman. And I thank our ranking member for convening today's hearing at such a critical time for our country.

As has been stated by numerous of my colleagues, we currently stand at the intersection of multiple crises: a public health crisis, an economic crisis, a crisis over longstanding racial injustice, and a climate crisis that threatens our very existence on this planet,

Now, as we look toward an economic recovery, we must address the deep-seated and interrelated issues with comprehensive solutions that put our country on the path to a more resilient and equitable future.

In my district in Brooklyn, we know the importance of resilience all too well. We have felt the impacts of climate change firsthand from Superstorm Sandy to summer heat waves that disrupt our power supply. And as our Nation experiences record fires out West and a record hurricane season down South, we know that resilience must be a primary consideration in all of our efforts to build a better future.

So I would like to begin by focusing on the idea of resilience starting with Dr. Saha.

Dr. Saha, in your testimony, you describe the importance of rebuilding a low-carbon economy that is resilient to future shocks from climate change and other crises. You also describe the importance of ensuring that decarbonization policies and technologies benefit all communities and not just those with the most resources.

Can you please expand on the need for what you refer to as climate-smart investments and how these investments in smarter, low-carbon technologies can start to

build an economy that is simultaneously more resilient, competitive, and inclusive?

Dr. Saha. Absolutely.

I think as we think about the benefits of transitioning to a low-carbon economy, we have to keep front and center issues of resiliency and equity because these are issues that are going to determine whether our climate policies are going to be effective in the long run as well.

So one of the things in terms of resiliency, let me, you know, give you an example from rural communities in this country. So plenty of research has shown that rural households suffer from a higher energy burden compared to their urban counterparts. So investments in things like energy efficiency can actually address that challenge that is being faced by rural communities, things like it can save them hundreds of dollars annually on utility bills. So, at a time when low income communities, whether in urban USA or in rural communities, are suffering from, you know, unemployment issues, thing like saving money on their utility bills is actually speaking to the whole resiliency issue.

So that is, you know, just one example that, you know, I would like to highlight.

Ms. Clarke. Absolutely. Thank you very much, Dr. Saha.

Dr. Fairchild, your organization, Emerald Cities, works to build resilience in communities that are on the front lines of climate change, including communities in New York City who were impacted by Superstorm Sandy. You also mentioned in your testimony the importance of climate equity and how we need to bounce forward and not bounce back.

Can you please discuss the importance of building resilience in communities that you work with and how these efforts go hand in hand with investments in clean energy and climate equity?

Dr. Fairchild. Thank you, Congresswoman, for the question.

And I was born and raised in Brooklyn and Queens. So I am homegirl.

The essence of resilience is that there is at least minimally issues of redundancy. If the central energy grid goes down, people still have the ability to turn on their lights, to cook, and to plug in their iPhones. The same with the food system, as in COVID, when the food central distribution system falls down, where do we get our food from? So we are doing things like, for example, just in Brooklyn, the Armory is actually -- and this is what frontline communities are organized to do -- putting solar on top of the Armory that would feed clean energy, renewable energy to the surrounding neighborhoods. I believe it is about 2 kilowatts, 2 megawatts of clean energy that is being produced. Folks are looking for micro grids, community energy districts that will allow them to be resilient in the case of -- so we don't see a Puerto Rico, where the whole city, whole county goes black because there is no backup generation, no energy.

So how do we build these decentralized energy infrastructures, decentralized food infrastructure that allows us to be resilient in the case of extreme whether?

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

I yield back.

This is a very good hearing. Look forward to much further consideration and conversation as we move forward to advance our Nation with clean energy future. Thank you.

And I yield back.

Mr. Tonko. Thank you. I have to note that all roads lead to Brooklyn, according to --

Ms. Clarke. Yes, they do, sir.

Mr. Tonko. So the gentlelady yields back.

And I now recognize the gentlelady from Michigan, Representative Dingell, you

are represented for 5 minutes, please.

Mrs. Dingell. Thank you, Chairman Tonko. Thanks for holding this hearing. As my other colleagues having said, it's a great hearing.

And thank you to all of the witnesses, who I know by the time you get to somebody like me, you will be glad when this is over.

But today's hearing is incredibly important as we find ourselves confronting multiple intersecting crises. No State, no community, no sector of our economy has been spared from COVID-19, and the public health and economic impacts have been devastating, and tragically this crisis is only getting worse.

But the parallels to the climate crisis are unmistakable. The human and economic toll of unmitigated climate change aren't a distant inevitably. They are here and wreaking havoc on our communities. If you just look at the headlines this week: The West is on fire. Hurricane Sally is pounding the Southern States, and scientists believe two major Antarctic glaciers are on the verge of breaking free.

This is what climate change looks like, but we have got time to work together and to act boldly. It is time to reboot our economy and create a cleaner, more inclusive future for all Americans. And I hope that all of us can work together to summon the courage to act with the urgency that we need to tackle the climate crisis and come together on a way forward.

It is always good to see my brothers and sisters in labor at the table. I think they are a very important voice. Mr. Stephenson, your testimony discusses how Congress and this committee in particular can revive American manufacturing. I think that is critical.

Can you please expand on how manufacturing policy, coupled with major public investments, can support America's middle class while addressing the climate crisis? It

is not either/or but especially in the context of today's economic downturn.

Mr. Stephenson. Yes. Thank you.

And it is critical that all the jobs that could be created or should be created as we continue to move into a more carbon neutral or renewable energy source; there is lots of manufacturing jobs that could be out there. And that is going to not only, you know, when you go into the auto industry and converting to more electric vehicles and all the building, the manufacturing of the batteries that we have already talked about, the solar panels, the wind turbans. If we could truly manufacture that here in States, it would create hundreds of thousands of good-paying, quality jobs for Americans in this country.

Mr. Duncan. Thank you.

And your testimony also expressed support for a national climate bank, much like the one that I have introduced this session. That program, the Clean Energy and Sustainable Accelerator, was included in the infrastructure bill that passed the House in June and is also in the Clean Economy Jobs and Innovation Act that was introduced yesterday. With $20 billion in funding, the accelerator would finance and stimulate private investment in low and zero carbon technologies and infrastructure, creating millions of new jobs.

Mr. Stephenson, can you tell us how Federal investment and climate action would help mobilize private investment and why attaching strong labor protections to recovery spending would benefit Americans workers?

Mr. Stephenson. Yes. Again, you know, with the investment of the United States Government in moving this, you know, these initiatives forward, we have more people stepping up, entrepreneurs that are looking at getting involved, even small business people that could participate in this as we are, you know, continuing to build the infrastructure that is needed. Like I said, we have all the materials to provide for the

services for the manufacturing. There are just multiple ways that investment would help encourage and build those companies, those employers, and their workers.

Mrs. Dingell. Thank you.

The Clean Energy and Sustainable Accelerator also includes designated funding for one of my top priorities, which is accelerating the electrification of vehicles and fleets.

Dr. Saha, your testimony discusses the importance of electrifying vehicles and expanding EV infrastructure. Can you please elaborate on the benefits of investing in transportation electrification? What scale of investment is needed to truly move the needle on electrification to realize both its economic and climate benefits?

Dr. Saha. Absolutely. Let me just say that transportation is now the largest source of greenhouse gas emissions in the United States. So we need a comprehensive set of policies that addresses vehicles, fuels, infrastructure, as well as mobility options. So, in terms of infrastructure, I think Congress needs to facilitate the development of an electric vehicle charging network that anticipates and enables the transition to 100 percent zero emission vehicle fleet.

Mrs. Dingell. Thank you.

Mr. Chairman, my time is up but I would like to request unanimous consent to submit a report by the Political Economy Research Institute at the University of Massachusetts Amherst on the job creation estimates for various economic stimulus proposals, showing the benefits of a recovery based on the principles of the thrive resolution.

Mr. Tonko. Without objection.

[The information follows:]

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

Mrs. Dingell. Thank you, Mr. Chairman.

Mr. Tonko. I would like to -- I believe that completes the list of colleagues who wanted to ask questions of our witnesses.

With that, I would certainly thank our witnesses for joining us for today's hearing. I thank you for your time, for your patience, and certainly for your input. It has been a very valuable hearing.

And 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.

I ask that our witnesses please respond promptly to any such questions that you may receive.

I now have a long list of requests for unanimous consent to enter into the record. So allow me to just run through this list.

A letter from the Evangelical Environmental Network; a letter from the coalition of communities, environmental groups, and researchers regarding critical minerals; a letter from the American Lung Association and accompanying report entitled "The Road to Clean Air: Benefits of a Nationwide Transition to Electric Vehicles"; a report from Resources For the Future and the Environmental Defense Fund entitled "Environmental Remediation and Infrastructure Policies Supporting Workers and Communities in Transition"; a report from Resources for the Future and the Environmental Defense Fund entitled "Economic Development Policies to Enable Fairness For Workers and Communities in Transition"; a report from World Resources Institute entitled "America's New Climate Economy: A Comprehensive Guide to the Economic Benefits of Climate Policy in the United States"; a letter from Clean Transportation Stimulus Coalition; a letter

from Earthjustice and an accompanying report entitled "Equitable and Just National Climate Platform"; a report from the Political Economy Research Institute at the University of Massachusetts at Amherst entitled "Job Creation Estimates through Proposed Economic Stimulus Measures"; a letter from the Solar Energy Industries Association; a Federal registered final list of critical minerals; a May 2019 Foreign Policy article entitled "China Raises Threat of Rare-Earths Cutoff to the United States"; a December 2018 Bloomberg article entitled "China Has a Secret Weapon in the Race to Dominate Electric Cars"; a May 2020 Foreign Policy article entitled "U.S. Falters in Bid to Replace Chinese Rare-Earths"; a report from the Department of Energy entitled "Critical Materials Rare-Earth Supply Chain: A Situational White Paper"; a report from the Department of Commerce entitled "The Federal Strategy to Ensure Secure and Reliable Supplies of Critical Minerals."

Mr. Shimkus. [Inaudible.]

Mr. Tonko. Do we have a problem with that one?

Mr. Shimkus. No, no, sir.

Mr. Tonko. Okay. A December 2017 executive order from Donald J. Trump entitled "Presidential Executive Order on a Federal Strategy and Reliable Supplies of Critical Minerals"; a January 2020 AAAS article, AAAS article, entitled "Sustainable Minerals and Metals for a Low-Carbon Future"; and, finally, the announcement from Exelon entitled "Nuclear Plants in All Regions of the Country Have Announced Premature Retirements."

With that, I now request unanimous consent to enter these items into the record.

Mr. Shimkus. Mr. Chairman, we reserve the right to object. I am not going to object. I want to take this time to thank the panelists. They did a great job.

It is virtually this is always challenging, but you took a lot of great questions, and I

think it was a very good hearing.

So I will not object, Mr. Chairman. And thank you for having it.

Mr. Tonko. Okay. I share your sentiments totally. We thank you for your participation and cooperation on the other side of the aisle.

And, without that objection to request for unanimous consent, so ordered.

[The information follows:]

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

Mr. Tonko. And at this time, the subcommittee is adjourned.

Thank you, everyone.

[Whereupon, at 12:51 p.m., the committee was adjourned.]