

**GENERATING EQUITY: IMPROVING CLEAN ENERGY  
ACCESS AND AFFORDABILITY**

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**VIRTUAL HEARING**  
BEFORE THE  
SUBCOMMITTEE ON ENERGY  
OF THE  
COMMITTEE ON ENERGY AND  
COMMERCE  
HOUSE OF REPRESENTATIVES  
ONE HUNDRED SIXTEENTH CONGRESS

SECOND SESSION

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OCTOBER 1, 2020  
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## **GENERATING EQUITY: IMPROVING CLEAN ENERGY ACCESS AND AFFORDABILITY**

**THURSDAY, OCTOBER 1, 2020**

HOUSE OF REPRESENTATIVES,  
SUBCOMMITTEE ON ENERGY,  
COMMITTEE ON ENERGY AND COMMERCE,  
*Washington, DC.*

The subcommittee met, pursuant to call, at 10:10 a.m., via Cisco Webex online video conferencing, Hon. Bobby L. Rush (chairman of the subcommittee) presiding.

Members present: Representatives Rush, Peters, Doyle, Sarbanes, McNerney, Tonko, Loeb sack, Welch, Schrader, Kennedy, Kuster, Barragán, O'Halleran, Blunt Rochester, Pallone (ex officio), Upton (subcommittee ranking member), Latta, Rodgers, Olson, McKinley, Griffith, Johnson, Bucshon, Hudson, Walberg, Duncan, and Walden (ex officio).

Also present: Representatives Dingell and Schakowsky

Staff present: Jeffrey C. Carroll, Staff Director; Sharon Davis, Chief Clerk; Waverly Gordon, Deputy Chief Counsel; Perry Hamilton, Deputy Chief Clerk; Zach Kahan, Outreach and Member Service Coordinator; Rick Kessler, Senior Advisor and Staff Director, Energy and Environment; Brendan Larkin, Policy Coordinator; Jourdan Lewis, Policy Coordinator; Elysa Montfort, Press Secretary; Joe Orlando, Policy Analyst; Kaitlyn Peel, Digital Director; Tim Robinson, Chief Counsel; Medha Surampudy, Professional Staff Member; Rebecca Tomilchik, Policy Analyst; Tuley Wright, Senior Energy and Environment Policy Advisor; Mike Bloomquist, Minority Staff Director; William Clutterbuck, Minority Staff Assistant; Jerry Couri, Minority Deputy Chief Counsel, Environment and Climate Change; Tiffany Haverly, Minority Communications Director; Peter Kielty, Minority General Counsel; Ryan Long, Minority Deputy Staff Director; Mary Martin, Minority Chief Counsel, Energy and Environment and Climate Change; Brandon Mooney, Minority Deputy Chief Counsel, Energy; Brannon Rains, Minority Policy Analyst; and Peter Spencer, Minority Senior Professional Staff Member, Environment and Climate Change.

Mr. RUSH. The subcommittee hearing is called to order. Today the subcommittee is holding a hearing entitled "generating Equity: Improving Clean Energy Access and Affordability."

Due to the coronavirus, the public health emergency, today's hearing is being held remotely. All of the Members and the 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 wish to speak.

Documents for the record can be sent to Rebecca Tomilchik at the email address that we have provided to your staff. All of the documents will be entered into the record at the conclusion of the hearing.

And now we will begin the hearing, and the Chair now recognizes himself for 5 minutes for opening statement.

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

The ongoing coronavirus pandemic has exposed a series of daunting truths within our Nation. One of these truths is the disproportionate impact of pandemics on our most vulnerable communities and its inability to compound the structural inequalities that afflict our Nation. Today we examine these injustices as we work to achieve a clean energy economy to confront the sweeping pandemic of climate change and to ensure equitable access to clean energy technologies and their benefits.

Communities of color, low-income communities, and indigenous communities are disproportionately burdened by a traditional energy production system. According to the NAACP, nearly 70 percent of Black Americans live or have lived within 30 miles of a coal-fired power plant and, as a result, experienced adverse health consequences associated with the production of energy at these plants.

In addition to this, communities of color and low-income communities spend a higher percentage of their household incomes on electricity bills. According to an EIA report, 25 million of these households have foregone necessities like food and medicine to pay their electricity bill, many of which are faced with this decision each and every month.

In conjunction with this, low-income households are also at a higher risk of utility shutoffs, which effectively leaves them without access to a vital resource amid the ongoing pandemic.

Given these circumstances, we must improve access to clean energy technologies and the affordability of their benefits within the frontline communities to lower electricity bills, improve air quality, and reduce energy insecurity. A recent report by the American Council for an Energy-Efficient Economy demonstrates that energy efficiency and home winterization strategies have the ability to reduce low-income energy burdens by up to 25 percent.

The National Renewable Energy Laboratory also suggests nearly half of all U.S. residential rooftop solar potential exists on the existing roofs of low- and moderate-income households who would directly benefit from these resources.

The committee has worked to establish both short-term and long-term incentives to achieve these objectives through legislative proposals. Today it is my hope that the subcommittee and its witnesses will identify pathways and potential policies to address the various—that impede clean energy accessibility and affordability among these communities.

I want to thank all of the witnesses for their participation in this hearing.

And today I am going to yield right now to the chairman of the full committee, Mr. Pallone, for—I want to recognize Mr. Upton, rather, the ranking member of the subcommittee, for 5 minutes for his opening statement.

[The prepared statement of Mr. Rush follows:]

PREPARED STATEMENT OF HON. BOBBY L. RUSH

Good morning. The ongoing coronavirus pandemic has exposed a series of daunting truths within our nation. One of these truths is the disproportionate impact of pandemics on our most vulnerable communities and its ability to compound the structural inequalities that afflict our nation. Today, we examine these injustices as we work to achieve a clean energy economy to confront the sweeping pandemic of climate change—and to ensure equitable access to clean energy technologies and their benefits.

Communities of color, low-income communities, and indigenous communities are disproportionately burdened by traditional energy production. According to the NAACP, nearly 70 percent of Black Americans live or have lived within 30 miles of a coal-fired power plant and, as a result, experience adverse health consequences associated with the production of energy at these plants.

In addition to this, communities of color and low-income communities spend a higher percentage of their household incomes on electricity bills. According to an Energy Information Administration report, 25 million of these households have forgone necessities like food and medicine to pay their electricity bills - many of which are faced with this decision every month. In conjunction with this, low-income households are also at a higher risk of utility shutoffs, which effectively leaves them without access to a vital resource amid the ongoing pandemic.

Given these circumstances, we must improve access to clean energy technologies and the affordability of their benefits within frontline communities to lower electricity bills, improve air quality, and reduce energy insecurity. A recent report by the American Council for an Energy-Efficient Economy demonstrates that energy efficiency and home weatherization strategies have the ability to reduce low-income energy burden by up to 25 percent. The National Renewable Energy Laboratory also suggests nearly half of all U.S. residential rooftop solar potential exists on the vacant roofs of low- and moderate-income households, who would directly benefit from access to these resources.

The committee has worked to establish both short-term and long-term solutions to achieve these objectives through legislative proposals, like the CLEAN Future Act, and recent pandemic relief legislation to place a moratorium on utility shutoffs and to expand LIHEAP, the Low-Income Home Energy Assistance Program. However, today it is my hope that the Subcommittee, and its witnesses, will identify pathways and potential policies to address the barriers that impede equity in clean energy accessibility and affordability within the communities that need it most.

I thank our witnesses for their participation in today's discussion. I also thank the various stakeholders who shared their valuable insights in advance of this discussion. And with that, I yield to my friend and colleague, the gentleman from Michigan, Ranking Member Upton.

Mr. RUSH. And with that, I yield to my friend and colleague, the gentleman from Michigan, Ranking Member Upton.

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

Mr. UPTON. Well, thanks Mr. Chairman. Nice to see you.

Mr. RUSH. The same to you.

Mr. UPTON. I know we got started a bit late, but I am glad everything is working.

I appreciate today's hearing on energy access and affordability for sure. It is very timely as we head into the winter months, still battling COVID and the economic fallout from the pandemic.

Here in the U.S., of course, we are blessed with the most reliable and affordable supplies of energy and electricity in the world. Di-

iversity is the key to our success, which is why I support, many of us, all of us support, I hope, an all-of-the-above approach to energy.

Nationwide our top sources for electricity generation in ranked order are natural gas, then coal, nuclear, wind, hydropower, and solar. Most Americans and businesses rely on gasoline and diesel for their transportation needs; we know that. And last year petroleum products accounted for some 96 percent of total energy use for transportation; electric vehicles, far less than one percent.

So, it is important to understand why we as a Nation have such a diverse fuel mix and how it makes us more secure and more competitive than other nations. In the Pacific Northwest, they have got plenty of cheap hydro. Some parts of the country have more wind, more sun, or more fossil fuel resources, and in some States, of course, nuclear energy makes the most sense. In reality, it is the weather, the population, and geography that varies so widely across the country making it impossible to make sweeping generalizations.

In Michigan, households use more energy than the U.S. average. When the temperature drops, we use a lot more natural gas for electricity to heat our homes because it is more efficient and more affordable. We also use a lot of propane, particularly in the Upper Peninsula, in rural areas. That is why the one-size-fits-all Federal mandate, like proposals to ban natural gas and gasoline cars, doesn't work in States like Michigan.

Instead, the proper role of the Federal Government is to promote innovation and technological development and to ensure competition and consumer choice. It would be foolish to bet it all on one technology or energy resource. Congress doesn't have a crystal ball. Rather than mandate a top-down clean energy standard or a ban on fossil fuels, let's learn from the experience of all 50 States.

California's rush to green—even though it may have a good first name time, right, Bobby—is a perfect example. They have monopoly energy providers, an unstable grid that is prone to blackouts, and the Nation's highest prices. I have got serious concerns about a forced transition to implement the California standard nationwide.

With that, I look forward to today's hearing to learn about what Congress can do to make energy more reliable and certainly more affordable for all Americans.

I would also like to welcome the first witness, Dr. Reames. I plan to use today's hearing to focus on ways to promote innovation and new technologies. I think it is going to be useful to examine the lessons learned from States like California that appear to be struggling to provide reliable and affordable energy to consumers. In Michigan and States like Texas that are leading the Nation, we have got different models for incorporating clean energy. The key is to keep prices stable and affordable.

I look forward to a discussion about carbon-free nuclear energy, which is, of course, vital to meeting our shared clean energy goals.

The bottom line is we all want to see cleaner energy technologies, but whether we are talking about power generation or passenger vehicles, we are not going to get there by picking winners and losers. We should learn from the failure of the past and work together to make energy more affordable, reliable and affordable.

With that, I look forward to our witnesses today and the interaction. Welcome, everybody.

And, with that, I yield back the balance of my time.  
[The prepared statement of Mr. Upton follows:]

PREPARED STATEMENT OF HON. FRED UPTON

Mr. Chairman, thank you for holding today's hearing on energy access and affordability—a very timely topic as we head into the winter months, still battling COVID and the economic fallout from the pandemic.

Here in the United States, we are blessed with the most reliable and affordable supplies of energy and electricity in the world. Diversity is the key to our success, which is why I support an all-of-the-above approach to energy. Nationwide, our top sources for electricity generation—in ranked order—are natural gas, coal, nuclear, wind, hydropower, and solar. Most Americans and businesses rely on gasoline and diesel for their transportation needs. Last year, petroleum products accounted for 96% of total energy used for transportation. Electric vehicles accounted for less than 1%.

It is important to understand why we, as a nation, have such a diverse fuel mix, and how it makes us more secure and more competitive than other nations. In the Pacific Northwest, they have plenty of cheap hydropower. Some parts of the country have more wind, more sun, or more fossil resources. In some States, nuclear energy makes the most sense. The reality is that weather, population, and geography vary wildly across the nation, making it impossible to make sweeping generalizations.

My home state of Michigan, for example, is also unique. For one, Michigan households use more energy than the U.S. average. When the temperature drops, we use a lot of natural gas for electricity and to heat our homes because it is often more efficient and affordable. We also use a lot of propane.

This is why a one-sized-fits-all Federal mandate—like the proposals to ban natural gas and gasoline cars—is the wrong approach. Instead, the proper role of the Federal government is to promote innovation and technological development; and to ensure competition and consumer choice.

It would be foolish to bet it all on any one technology or energy resource. Congress does not have a crystal ball. Rather than mandate a top-down clean energy standard or a ban on fossil fuels, let us learn from the experience of other States.

California's "Rush to Green" is a perfect example. They have monopoly energy providers, an unstable grid that is prone to blackouts, and the nation's highest prices. I have serious concerns about a forced transition to implement the California standard nationwide.

With that, I look forward to today's hearing to learn what Congress can do to make energy more reliable and affordable for all Americans. I would also like to welcome our University of Michigan witness, Dr. Reames.

I plan to use today's hearing to focus on ways to promote innovation and new technologies. I think it will also be useful to examine the lessons-learned from States like California, that appear to be struggling to provide reliable and affordable energy to consumers.

My home state of Michigan, and States like Texas that are leading the nation, have different models for incorporating clean energy. The key is keeping prices stable and affordable. I also look forward to discussion about carbon-free nuclear energy, which is vital to meeting our shared clean energy goals.

The bottom line is that we all want to see cleaner energy technologies, but whether we are talking about power generation or passenger vehicles, we are not going to get there by picking winners and losers. We should learn from the failures of the past and work together to make energy more available, reliable, and affordable for all.

With that, I want to thank the witnesses for appearing before us today. Mr. Chairman, I look forward to working with you on these important issues, which I know we both care deeply about. Thank you, I yield back.

Mr. PALLONE. Am I supposed to speak?

Mr. RUSH. The Chair now recognizes Mr. Pallone, the chairman of the full committee, for 5 minutes for the purposes of an opening statement.

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

Mr. PALLONE. Thank you, Chairman Rush. Thank you for holding this important hearing on both energy affordability and clean energy access. Chairman Rush has been passionately working on including communities of color in the clean energy transition, especially through his blue collar and green collar jobs bill, and I thank him for his leadership on this and so many things.

Energy access and energy burden often do not get the attention they deserve. Throughout the country, low-income households and particularly communities of color face disproportionate negative impacts on traditional fossil fuel generation due to their proximity to power plants and the lack of clean energy options. And these communities see increased risks of polluted air and water, resulting in a greater likelihood of health conditions, like asthma or cancer. They also disproportionately suffer the devastating effects of fossil-fueled climate change, like severe damage and flooding to their homes during hurricanes. While we are all affected by climate change, we have to make sure that no one is overlooked in their efforts to build a clean and resilient future.

Along with climate and environmental threats, communities of color are also disproportionately affected by the COVID-19 pandemic. Americans in all regions are suffering from job loss and are spending more time at home, but that means that many of them are bringing home a lot less money than they were before the pandemic, and their energy bills are going up because they are using more energy at home, and it is just pushing struggling families further to the edge.

And as we experience a public health and economic crisis, unpaid electricity bills and the threat of electricity shutoffs should not be something struggling families are concerned about right now. Over 800,000 low-income customers are currently at risk of having their electricity shut off by their electric utility company, these communities, which already experience higher rates of COVID-19, are now being forced to deal with the potential loss of power. It is really an outrage, particularly since we included a moratorium on electricity and water shutoffs from the HEROES Act that passed in May, and that was four and a half months ago, but Senate Republicans have refused to act, and now we are again working to protect these valuable communities with a shutoff moratorium in our updated HEROES legislation, which may come up today. It is long past time for President Trump and Senate Republicans to recognize the need to act.

This assistance is critical right now because the pandemic is only exacerbating an unfortunate trend that already existed that many struggling families face high energy burdens. They are spending a higher percentage of their paychecks on energy because of factors like income, location of where they live, and the quality of the building where they live. Yet while low-income energy assistance programs exist, they have limited funding.

In the updated HEROES Act, we include \$4.5 billion to the Low-Income Home Energy Assistance Program, LIHEAP. And last week, the House passed the Clean Economy Jobs and Innovation

Act, which included numerous bills from the committee that support low-income clean energy projects, energy-efficiency programs, and rural energy development. And I think that bill is a step in the right direction for a clean and equitable energy future.

The transition to a clean energy economy has to be equitable and affordable. We must include all Americans in this enormous effort to ensure that no communities are abandoned or face the threats of climate change by themselves.

[The prepared statement of The Chairman follows:]

PREPARED STATEMENT OF HON. FRANK PALLONE, JR.

I thank Chairman Rush for holding this important hearing on energy affordability and clean energy access. Chairman Rush has been passionately working on including communities of color in the clean energy transition, especially through his Blue Collar and Green Collar Jobs bill, and I thank him for his leadership.

Energy access and energy burdens often do not get the attention they deserve. Throughout the country, low-income households - particularly communities of color—face disproportionate negative impacts from traditional fossil generation due to their proximity to power plants and a lack of clean energy options. These communities see increased risks of polluted air and water, resulting in a greater likelihood of health conditions like asthma or cancer.

They also disproportionately suffer the devastating effects of fossil-fueled climate change, like severe damage and flooding to their homes from hurricanes. While we are all affected by climate change, we must make sure that no one is overlooked in our efforts to build a clean and resilient future.

Along with climate and environmental threats, communities of color are also disproportionately affected by the COVID-19 pandemic. Americans in all regions are suffering from job loss and are spending more time at home during this public health emergency. That means many of them are bringing home a lot less money than they were before the pandemic, and their energy bills are going up because they are using more energy at home. This is just pushing struggling families further to the edge.

As we experience a public health and economic crisis, unpaid electricity bills and the threat of electricity shutoffs should not be something struggling families are concerned about right now. However, 800,000 low-income customers are currently at risk of having their electricity shut off by their electric utility company. These communities, which already experience higher rates of COVID-19, are now being forced to deal with the potential loss of power.

This is an outrage, particularly since we included a moratorium on electricity and water shutoffs in the Heroes Act that passed in May. That was four and a half months ago, but Senate Republicans have refused to act. Now we are again working to protect these vulnerable communities with a shutoff moratorium in our updated Heroes legislation. It is long past time for President Trump and Senate Republicans to recognize the need to act.

This assistance is critical right now because the pandemic is only exacerbating an unfortunate trend that already existed - many struggling families face high energy burdens. They are spending a higher percentage of their paychecks on energy because of factors like income, location of where they live and the quality of the building where they live. And while low-income energy assistance programs exist, they have limited funding.

Fortunately, the updated Heroes Act includes \$4.5 billion for the Low-Income Home Energy Assistance Program, or LIHEAP. And last week the House passed the Clean Economy Jobs and Innovation Act, which included numerous bills from this committee that support low-income clean energy projects, energy efficiency programs and rural energy development. This bill is a step in the right direction for a clean and equitable energy future.

The transition to a clean energy economy must be equitable and affordable. We must include all Americans in this enormous effort and ensure that no communities are abandoned to face the threats of climate change alone.

And, again, thank you, Chairman Rush, for taking the lead on so much of this. I would like to yield the remainder of my time to the gentlewoman from Michigan, Mrs. Dingell.

Mrs. DINGELL. Thank you, Mr. Pallone, for yielding.

I would like to briefly recognize a wonderful witness from the University of Michigan, who my colleague from Michigan also recognized, Dr. Tony Reames, a Ph.D., who is assistant professor in the School for Environment and Sustainability at the University of Michigan, located in the heart of my district. Go Blue.

Dr. Reames is a multidisciplinary scholar who has expanded the study of environmental justice to specifically focus on energy justice. Currently, Dr. Reames is exploring disparities that exist in residential energy generation consumption and affordability, focusing on the production and persistence of inequality by race, class, and location.

Dr. Reames, thank you for being here. You are going to provide this committee with a lot of important information, and there is just so much this committee can learn from you and from the other witnesses today. We look forward to your testimony—and the other witnesses.

And I would also like to thank the chairs of the full committee and the subcommittee for the work that has been done in the HEROES Act in working with Rashida and I. It is very, very important.

And I yield back.

Mr. PALLONE. I yield back as well, Chairman Rush.

Thank you, Mrs. Dingell.

Mr. RUSH. The Chair now recognizes Mr. Walden, the ranking member of the full committee, for 5 minutes for the purposes of an opening statement.

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

Mr. WALDEN. Well, good morning, Mr. Chairman, and colleagues, as well as our witnesses. Thank you all for your participation today.

Today's hearing will examine an important topic concerning access and affordability of energy for low-income or otherwise disadvantaged households. As a result of the COVID-19 related shutdowns and economic hardships, energy cost burdens have become more common. Sadly, many Americans now know what it is like to have to live on limited resources to pay to keep the lights on, the air-conditioning running, the car fueled. Fortunately, the economy is beginning to rebound a bit, and there is help available for many of these families.

Data from the American Council for an Energy-Efficient Economy, which we will hear from this morning, indicates 26 million households face a high energy burden. This means six percent or more of these households' spending goes towards energy, and this does not include fuel for necessary transportation, which further adds to the burden.

The Department of Energy data showed the States with the highest low-income energy burdens, ten percent or higher are in the Southeastern United States where the most electricity is used for heating and cooling. Low-income households in that region use approximately 36 percent more electricity than the national average for low-income households in other regions of the country. For-

unately, Southeastern States also enjoy some of the lowest electricity rates in the Nation.

So imagine the impact on low-income households in Mississippi, Alabama, Georgia, or South Carolina if energy prices drove up the price of electricity so much they had to pay the same rates as residents of Connecticut, where energy prices are nearly twice as high. Or consider other parts of the country, like my home State of Oregon. If policies driven by the radical environmentalists severely curtailed our State's dominant hydroelectric production, what would that mean to low-income households if we doubled our electricity rates to those of California levels? What would it mean for our ability to provide energy assistance?

So, there are many State and Federal programs aimed at relieving American families' energy burdens. These include efficiency and weatherization programs at the Department of Energy and subsidy programs at the Department of Health & Human Services, programs which are authorized by this committee.

Several witnesses this morning will talk about ways to improve coordination among Federal programs and how we measure poverty to expand energy access and affordability.

My point here is that whatever the value of these programs, we cannot lose sight of the powerful impact Federal, State, and local energy policies, including clean energy, have on the underlying affordability and reliability of energy. Renewable energy sources have a place, they certainly do, but they cannot come at the expense of families who are already struggling to make ends meet. Policies that drive up energy prices or curtail access to energy sources conflict directly with efforts to confront poverty. These policies risk depriving people of the key component of community and household prosperity. Access to affordable, reliable energy is essential for jobs and economic opportunities, especially in lower income communities.

This is plainly evident in the expensive energy policies of California. Mandates or regulatory policies are raising prices seven times faster than the rest of the Nation, as we will hear this morning. That is driving out high-paying energy jobs including thousands of jobs with zero-emissions nuclear energy.

New policies seeking to end use of natural gas and gas-fueled vehicles will further drive up housing and transportation costs, which is especially harmful to the working poor, who often have to commute great distances.

Robert Bryce, who is testifying today for the Foundation for Research on Equal Opportunity, will provide some useful perspective we should all keep in mind so we can consider various policies to accelerate to clean energy systems.

Throughout this Congress, Republicans have advocated for practical approaches to address climate risks and improve and protect the environment. We have advocated for removing regulatory barriers to promote innovation and to posture the deployment of new clean energy sources. Our view has been that the surest path to cleaner energy systems is to put the energy consumer front and center so we do not undermine our Nation's ability to make and do things nor to deprive people their opportunities for prosperity.

We know this can work because we have seen the benefits in cleaner air, world leading reductions in carbon emissions, and, at least prior to COVID-19, an increasingly productive economy. We should not lose sight of that larger picture as we work together on policies to help those most in need.

With that, Mr. Chairman, I yield back the balance of my time.  
[The prepared statement of Mr. Walden follows:]

#### PREPARED STATEMENT OF HON. GREG WALDEN

Today's hearing will examine an important topic concerning access and affordability of energy for low-income or otherwise disadvantaged households.

As a result of COVID-19 related shutdowns and economic hardships, energy cost burdens have become more common. Sadly, many Americans now know what it feels like to have limited resources to pay to keep the lights on, the air conditioning running, and the car fueled. Fortunately, the economy is rebounding and there is help available to these families.

Data from the American Council for an Energy-Efficient Economy, which we will hear from this morning, indicates 26 million households face a "high energy burden." This means six percent or more of these households' spending goes toward energy—and this does not include fuel for necessary transportation, which further adds to the burden.

Department of Energy data show the states with the highest low-income energy burdens—ten percent or higher—are in the Southeastern United States where the most electricity is used for heating and cooling. Low-income households in that region use approximately 36 percent more electricity than the national average for low-income households in other regions of the country.

Fortunately, Southeastern states also enjoy some of the lowest electricity rates in the nation. So, imagine the impact on low-income households in Mississippi, Alabama, Georgia, or South Carolina if energy policies drove up the price of electricity so much that they had to pay the same rates as residents of Connecticut, where prices are nearly twice as high.

Or consider other parts of the country—like my home state of Oregon. If radical environmentalist policies severely curtailed our state's dominant hydroelectric production, what would that mean to low-income households if we doubled our electricity rates to California's levels? What would it mean for our ability to provide energy assistance?

There are many state and federal programs aimed at relieving American families' energy burdens. These include efficiency and weatherization programs at the Department of Energy and subsidy programs at the Department of Health and Human Services - programs which are authorized by this Committee.

Several witnesses this morning will talk about ways to improve coordination among federal programs and how we measure poverty to expand energy access and affordability.

My point here is that whatever the value of these programs, we cannot lose sight of the powerful impact federal, state, and local energy policies—including clean energy—have on the underlying affordability and reliability of energy. Renewable energy sources have a place, but they cannot come at the expense of families who are already struggling to make ends meet.

Policies that drive up energy prices or curtail access to energy sources conflict directly with efforts to confront poverty. These policies risk depriving people of a key component of community and household prosperity. Access to affordable, reliable energy is essential for jobs and economic opportunity, especially in low-income communities.

This is plainly evident in the expensive energy policies of California. Mandates to increase renewable energy and electrification are raising prices for power seven times faster than the rest of the nation, as we will hear this morning, and driving out high-paying energy jobs—including thousands of jobs associated with zero-emissions nuclear energy. New policies seeking to end use of natural gas and gas-fueled vehicles will further drive up housing and transportation costs, which is especially harmful to the working poor.

Robert Bryce, who is testifying today for the Foundation for Research on Equal Opportunity, will provide some useful perspective we all should keep in mind as we consider various policies to "accelerate" to clean energy systems.

Throughout this Congress, Republicans have advocated for practical approaches to address climate risks and improve and protect the environment. We have advo-

cated for removing regulatory barriers to promote innovation and foster the deployment of new, clean energy sources. Our view has been that the surest path to cleaner energy systems is to put the energy consumer front and center so that we do not undermine our nation's ability to make and do things, nor deprive people their own opportunities for prosperity.

We know this can work because we have seen the benefits in cleaner air, world-leading reductions in carbon emissions, and—at least prior to COVID-19—an increasingly productive economy. We should not lose sight of that larger picture as we look at policies to help those most in need.

Mr. RUSH. I want to thank the gentleman.

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

At this time, I would like to recognize our witnesses for today's hearing.

The first witness that I want to recognize is Ms. Ariel Dreobl. She is a senior research associate for local policies at the American Council for an Energy-Efficient Economy.

She will be followed by Dr. Tony Reames, the assistant professor for the School of Environment and Sustainability at the University of Michigan.

Our next witness will be Mr. Robert Bryce, the visiting fellow for the Foundation for Research on Equal Opportunity.

And, lastly but not the least, our final witness will be Ms. Alexandra Wyatt, the policy and regulatory manager for GRID Alternatives.

And I want to thank each and every one of our witnesses for appearing before us today, and we certainly look forward to your testimony.

Ms. Dreobl, you are recognized for 5 minutes for an opening statement.

**STATEMENTS OF ARIEL DREOBL, SENIOR RESEARCH ASSOCIATE, LOCAL POLICY, AMERICAN COUNCIL FOR AN ENERGY-EFFICIENT ECONOMY; TONY G. REAMES, PH.D., ASSISTANT PROFESSOR, SCHOOL FOR ENVIRONMENT AND SUSTAINABILITY, UNIVERSITY OF MICHIGAN; ROBERT BRYCE, VISITING FELLOW, THE FOUNDATION FOR RESEARCH ON EQUAL OPPORTUNITY; AND ALEXANDRA M. WYATT, POLICY AND REGULATORY MANAGER, GRID ALTERNATIVES**

#### **STATEMENT OF ARIEL DREOBL**

Ms. DREOBL. Chairman Rush, Ranking Member Upton, and members of the subcommittee, thank you for the invitation to speak at this hearing on "Generating Equity: Improving Clean Energy Access and Affordability." My name is Ariel Dreobl. I am a senior research associate at the American Council for an Energy-Efficient Economy, also known as ACEEE, and I am the lead author of ACEEE's newly released energy burden report.

ACEEE is a nonprofit organization that acts as a catalyst to advancing energy-efficient policies, programs, technologies, investments, and behaviors so that all households can experience equitable benefits from energy efficiency.

Over the past five years, ACEEE has published three reports that analyze energy burdens across different populations. Energy burden is the percentage of annual income a household spends on its annual energy bills, and the energy burden metric is used widely to measure inequity in the energy sector.

On September 10, we published a new report which calculates energy burdens nationally, regionally, and in 25 of the largest metro areas. From the study, we found that energy affordability is a persistent national challenge. Of all U.S. households, 25 percent face a high energy burden, meaning that they pay more than 6 percent of their income on energy bills, and 13 percent face a severe energy burden, meaning they pay more than 20 percent. Low-income households fare the worse. Nationally 67 percent of low-income households face a high energy burden, and 60 percent of low-income households with a high burden face a severe burden. Low-income households spend three times more of their income on energy costs compared to other households. And compared to non-Hispanic White households, the median energy burden for Black households is 43 percent higher, the median for Hispanic households is 20 percent higher, and the median for Native American households is 45 percent higher.

This research shows that energy burdens are not equitable and that policy action is needed to improve energy affordability. High energy burdens are associated with inadequate housing conditions and have been found to affect physical and mental health, nutrition, and local economic development.

Researchers have found that high energy burdens are correlated with older, inefficient, and unhealthy housing, which is itself associated with other negative health impacts. These households are more likely to stay caught in cycles of poverty. Bringing policies to address high energy burdens can ensure a more just and equitable energy system.

COVID-19 has had a tremendous impact on energy affordability. More than 40 million Americans have filed for unemployment since the start of the pandemic, and many of them are low income. More than one-fourth of those who have lost jobs have reported skipping a utility bill payment.

Black, Hispanic, and Native American households are disproportionately burdened by COVID-19. They face greater long-term exposure to air pollution, and they are more likely to face energy insecurity, economic instability, and chronic diseases.

By expanding energy-efficiency programs, we can reduce overall energy consumption and our reliance on fossil fuels. Energy efficiency and weatherization provide a long-term solution to reducing high energy burdens. These strategies should complement bill-payment assistance and programs aimed at energy-saving education and behavior change.

In our report, we estimate that weatherization can reduce the median low-income households' burden by 25 percent, making this investment an effective strategy to reduce high energy burdens while also benefiting the environment. These investments are especially important in the wake of the pandemic as they can also help stimulate the economy by creating local jobs while helping households afford their energy bills in the long term.

Congress can take action to improve equity in the clean energy sector. We recommend expanding the low-income Weatherization Assistance Program and include funds for health-related home improvements. WAP currently serves about a hundred thousand homes per year through community funding and leverage funds from the Low-Income Home Energy Assistance Program. This number is far below the 15.7 million severely energy burdened households in the U.S. At this rate, it would take 360 years to weatherize all eligible households.

Weatherization can also stimulate the economic recovery by creating green jobs, maintaining employment for thousands of small business, and provide updates to furnaces and air ventilation that are critical to those most vulnerable to the impacts of COVID-19.

Congress can also increase funding for LIHEAP, leverage Medicaid funding to improve health and efficiency in homes, address efficiency and affordable local family housing, and provide national guidance on how to protect the home health of Americans during this public health crisis.

In conclusion, energy insecurity is a persistent national challenge that has been worsened by the global pandemic and economic crisis. Increasing investment in low-income energy efficiency and weatherization can provide a long-term solution to reducing high energy burdens for low-income households.

I thank the subcommittee for the opportunity to speak on this critical issue, and I welcome your questions and yield back the rest of my time.

[The prepared statement of Ms. Drehobl follows:]



## Testimony of Ariel Dreihobl

Senior Research Associate, American Council for an Energy-Efficient Economy

*SUBCOMMITTEE ON ENERGY OF THE U.S. HOUSE COMMITTEE ON ENERGY AND COMMERCE  
HEARING ON GENERATING EQUITY: IMPROVING CLEAN ENERGY ACCESS AND AFFORDABILITY*

OCTOBER 1, 2020

### Summary

While access to clean, affordable energy is vital to maintaining health and well-being, many U.S. households experience energy insecurity, meaning they are unable to adequately meet basic household energy needs. ACEEE's recent research on energy burdens—the percentage of household income spent on energy bills—has found that one-fourth of U.S. households face a high energy burden (meaning they spend more than 6% of their income on energy bills). Two-thirds of low-income households experience a high energy burden; Black, Hispanic, Native American, and older adult households, as well as families residing in low-income multifamily housing, manufactured housing, and buildings built before 1980, also experience disproportionately high energy burdens. High energy burdens are associated with inadequate housing conditions and have been found to affect physical and mental health, nutrition, and local economic development. Energy efficiency and weatherization provide a long-term solution to reducing high energy burdens, while also complementing bill payment assistance and programs aimed at energy-saving education and behavior change.

Congress can take action to improve equity in the clean energy sector in a number of ways. We recommend the following six actions: 1) expanding the low-income Weatherization Assistance Program and including funds for health-related home improvements, 2) doubling the incentives for moderate-income households under the proposed HOMES program, 3) targeting energy efficiency improvements in affordable multifamily housing, 4) leveraging Medicaid funding to improve health and efficiency in homes, 5) increasing funding for the Low-Income Home Energy Assistance Program, and 6) developing national guidance around utility-shutoffs, energy efficiency and COVID-19 recovery.

### Introduction

Thank you for the opportunity to testify on the topic of generating equity by improving clean energy access and affordability. The American Council for an Energy-Efficient Economy (ACEEE), a nonprofit 501(c)(3) organization, acts as a catalyst to advance energy efficiency policies, programs, technologies, investments, and behaviors so that all households experience equitable benefits from energy savings. We produce more than 30 reports and other resources each year on energy-saving technologies, programs, and policies, including research focus areas on health, energy insecurity, and equitable program access and policy development.

### Inequity in the Clean Energy Sector

Household access to affordable energy is central to maintaining health and well-being, yet many households are energy insecure. Energy insecurity is the inability to adequately meet basic household heating, cooling and energy needs over time, and this is a long-standing national issue. In 2015,

according to data from the U.S. Energy Information Administration's Residential Energy Consumption Survey (RECS), 31% of households reported facing a challenge in paying energy bills or sustaining adequate heating or cooling in their homes; 20% reported reducing or forgoing basic necessities like food or medicine to pay an energy bill; and 14% reported receiving a disconnection notice.<sup>1</sup> Five years later, the COVID-19 pandemic and recession have led to high unemployment, reduced income, and more time spent and energy used at home. These factors are leading to growing numbers of insecure households, especially in low-income communities.

Communities of color are more likely to experience negative health impacts from energy sector pollution. In particular, Black communities are 68% more likely to live near coal-fired power plants and are disproportionately exposed to dangerous particulate pollution, a trigger for asthma and other respiratory diseases.<sup>2</sup> Black children suffer from asthma at more than twice the rate of white children (14.2% vs 6.8%, respectively)<sup>3</sup> and are three times more likely to be admitted to the hospital for asthma attacks than white children.<sup>4,5</sup> The COVID-19 pandemic is exacerbating this injustice, as researchers at Harvard Chan School of Public Health found that long-term exposure to air pollution increases the risk of dying from COVID-19.<sup>6</sup>

Low-income communities and communities of color also experience disparate access to residential energy-saving appliances, upgrades, and clean energy investments. While low-income households and communities of color on average consume less energy than wealthier households, they are more likely to live in less-efficient housing with older heating and cooling equipment and appliances.<sup>7</sup> Low-income communities face economic, social, and information barriers that impact their ability to access available programs and resources, and many programs fail to address these barriers. In addition, inadequate health and safety conditions, which occur at higher rates for low-income households, can lead to deferrals that prevent families from participating in Research has found that 11 of the largest investor-owned utilities do not spend energy efficiency dollars proportionally on programs designed to reach

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<sup>1</sup> U.S. Energy Information Administration, "One in Three U.S. Households Faced Challenges in Paying Energy Bills in 2015." [www.eia.gov/consumption/residential/reports/2015/energybills/](http://www.eia.gov/consumption/residential/reports/2015/energybills/).

<sup>2</sup> Kikati, I., A. Benson, T. Luben, J. Sacks, and J. Richmond-Bryant. 2018. "Disparities in Distribution of Particulate Matter Emission Sources by Race and Poverty Status." *American Public Health Association*. [ajph.aphapublications.org/doi/abs/10.2105/AJPH.2017.304297](http://ajph.aphapublications.org/doi/abs/10.2105/AJPH.2017.304297).

<sup>3</sup> Centers for Disease Control and Prevention. 2020. "Most Recent National Asthma Data." March 24. [www.cdc.gov/asthma/most\\_recent\\_national\\_asthma\\_data.htm](http://www.cdc.gov/asthma/most_recent_national_asthma_data.htm).

<sup>4</sup> National Research Council. 2010. *Hidden Costs of Energy: Unpriced Consequences of Energy Production and Use*. Washington, DC: National Academies Press. [www.ourenergypolicy.org/wp-content/uploads/2012/06/hidden.pdf](http://www.ourenergypolicy.org/wp-content/uploads/2012/06/hidden.pdf).

<sup>5</sup> Patterson, J., K. Fink, C. Grant, S. Terry, R. Rosenberg, and C. Walker. 2014. *Just Energy Policies: Reducing Pollution and Creating Jobs: A State by State Guide to Energy Efficiency and Renewable Energy Policies*. Baltimore: NAACP (National Association for the Advancement of Colored People). [www.naacp.org/wp-content/uploads/2014/03/Just-Energy-Policies-Compendium-EXECUTIVE-SUMMARY\\_NAACP.pdf](http://www.naacp.org/wp-content/uploads/2014/03/Just-Energy-Policies-Compendium-EXECUTIVE-SUMMARY_NAACP.pdf).

<sup>6</sup> Wu, X., R. Nethery, M. Sabath, D. Braun, and F. Dominici., 2020. "Air Pollution and COVID-19 Mortality in the United States: Strengths and Limitations of an Ecological Regression Analysis." *Science Advances*. [doi.org/10.1101/2020.04.05.20054502](https://doi.org/10.1101/2020.04.05.20054502). Summary of research found at: [projects.iq.harvard.edu/covid-pm/home](https://projects.iq.harvard.edu/covid-pm/home).

<sup>7</sup> Bednar, D., T. Reames, and G. Keoleian. 2017. "The Intersection of Energy Justice: Modeling the Spatial, Racial/Ethnic and Socioeconomic Patterns of Urban Residential Heating Consumption and Efficiency in Detroit, Michigan." *Energy and Buildings* 143: 25-34. [doi.org/10.1016/j.enbuild.2017.03.028](https://doi.org/10.1016/j.enbuild.2017.03.028).

low-income populations.<sup>8</sup> This lack of equitable investment limits low-income households' and communities' of color access to the benefits of energy efficiency.

### Impact of COVID-19 on Energy Affordability

More than 40 million Americans have filed for unemployment since the start of the pandemic, and many of them are low income. More than one-fourth of those who lost jobs have reported skipping or needing to skip a utility bill payment.<sup>9</sup> A study released September 24 from Indiana University's O'Neill School of Public and Environmental Affairs surveyed American households and found that 17% of those surveyed reported not being able to pay an energy bill between June and August. In addition, 20% of Black households and 33% of Hispanic households could not afford their energy bills during one of the hottest summers on record, compared to only 12% of white households.<sup>10</sup> This is at a time when household energy use is even more important as children move to virtual, at-home learning and many adults are working from home.

Black, Hispanic, and Native American households are disproportionately burdened by COVID-19; they face greater long-term exposure to air pollution and are, simultaneously, more likely to face energy insecurity, economic instability and chronic diseases. By expanding energy efficiency programs, we can reduce overall energy consumption and therefore reduce our reliance on fossil fuels. This, in turn, can help clean our air and reduce the health disparities that result from air pollution.

Black families are 60% more likely than white families to be living in inadequate housing conditions, and Black and Puerto Rican children suffer from asthma at significantly higher rates than white children.<sup>11,12</sup> Now more than ever, weatherization and energy efficiency can help to not only reduce energy use and bills but also improve indoor air quality, comfort, and safety during a time when people are required to spend more time in their homes.

### New Energy Burden Research

Over the past five years, ACEEE has published three reports that analyze energy burdens across national, metro, and rural populations. Energy burden is the percentage of annual income a household spends on its annual energy bills, and the energy burden metric is used by many states, cities, utilities, and researchers to measure energy insecurity.

ACEEE published a report on September 10 of this year, *How High Are Housing Energy Burdens? An Assessment of National and Metropolitan Energy Burdens across the United States*, which calculates energy

<sup>8</sup> Reames, T., B. Stacey, and M. Zimmerman. 2019. *A Multi-State Analysis of Equity in Utility-Sponsored Energy Efficiency Investments for Residential Electric Customers*. Ann Arbor: University of Michigan. [poverty.umich.edu/files/2019/05/Energy\\_efficiency.pdf](https://poverty.umich.edu/files/2019/05/Energy_efficiency.pdf).

<sup>9</sup> Electric Power Research Institute (EPRI). 2020. "Impact of COVID-19 on Consumer Energy Use & Outlook: Results of EPRI National Survey." April 29. [mydocs.epri.com/Docs/public/covid19/COVID-19\\_survey\\_report.pdf](https://mydocs.epri.com/Docs/public/covid19/COVID-19_survey_report.pdf).

<sup>10</sup> Indiana University. 2020. "Households of Color More Likely to Have Utilities Disconnected, Not Receive Stimulus Checks." Sept 24. Press Release. [news.iu.edu/stories/2020/09/iub/releases/24-disconnected-utilities-disproportionate-impact-households-of-color.html](https://news.iu.edu/stories/2020/09/iub/releases/24-disconnected-utilities-disproportionate-impact-households-of-color.html).

<sup>11</sup> Calculated using data from the 2017 American Housing Survey – Table Creator: [www.census.gov/programs-surveys/ahs/data/interactive/ahstablecreator.html](https://www.census.gov/programs-surveys/ahs/data/interactive/ahstablecreator.html).

<sup>12</sup> Centers for Disease Control and Prevention. 2019. "Most Recent Asthma Data." [www.cdc.gov/asthma/most\\_recent\\_data.htm](https://www.cdc.gov/asthma/most_recent_data.htm).

burdens nationally, regionally, and in 25 of the largest metro areas, across different groups based on income, race and ethnicity, age, housing tenure, and housing type.<sup>13</sup> The study uses 2017 data – the most recent data available – from the U.S. Census Bureau’s American Housing Survey. We define high energy burdens as spending more than 6% of income on energy bills, and severe burdens as spending more than 10% of income on energy bills.<sup>14</sup>

The main findings from this research include the following:

- Energy affordability is a persistent national challenge. Of all U.S. households, 25% (30.6 million) face a high energy burden (meaning they pay more than 6% of income on energy bills) and 13% (15.9 million) of U.S. households face a severe energy burden (meaning they pay more than 10% of income on energy bills).
- Low-income households fare the worst. Nationally, 67% (25.8 million) of low-income households (< 200% of federal poverty level) face a high energy burden and 60% of low-income households with a high energy burden face a severe energy burden.
- Low-income households spend three times more of their income on energy costs compared to the median spending of non-low-income households (8.1% versus 2.3%).
- Black, Hispanic, Native American, and older adult (over 65) households, as well as families residing in low-income multifamily housing, manufactured housing, and buildings built before 1980 experience disproportionately high energy burdens compared to the median household nationally, regionally, and in the 25 metro areas in the study.
- The median energy burden for Black households is 43% higher than for non-Hispanic white households (4.2% versus 2.9%); the median energy burden for Hispanic households is 20% higher than for non-Hispanic white households (3.5% versus 2.9%); and the median energy burden for Native American households is 45% higher than for non-Hispanic white households (4.2% versus 2.9%).

Figure 1 highlights the disproportionate burdens experienced by low-income, Native American, Black, Hispanic, older adult households, and renters compared to the median energy burden and other similar households. The groups depicted below are not mutually exclusive.

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<sup>13</sup> Our Energy Burden landing page includes the new report, 26 metro and national factsheets, and a short video on the research: [www.aceee.org/energy-burden](http://www.aceee.org/energy-burden).

<sup>14</sup> Researchers and policymakers estimate that affordable housing costs should be no more than 30% of household income, and household energy costs should be no more than 20% of housing costs. This means that affordable household energy costs should be no more than 6% of total household income. For decades, researchers have used the thresholds of 6% as a high burden and 10% as a severe burden.

See APPRISE (Applied Public Policy Research Institute for Study and Evaluation). 2005. *LIHEAP Energy Burden Evaluation Study*. Washington, DC: HHS (Department of Health and Human Services). [www.acf.hhs.gov/sites/default/files/ocs/comm\\_liheap\\_energyburdenstudy\\_apprise.pdf](http://www.acf.hhs.gov/sites/default/files/ocs/comm_liheap_energyburdenstudy_apprise.pdf).

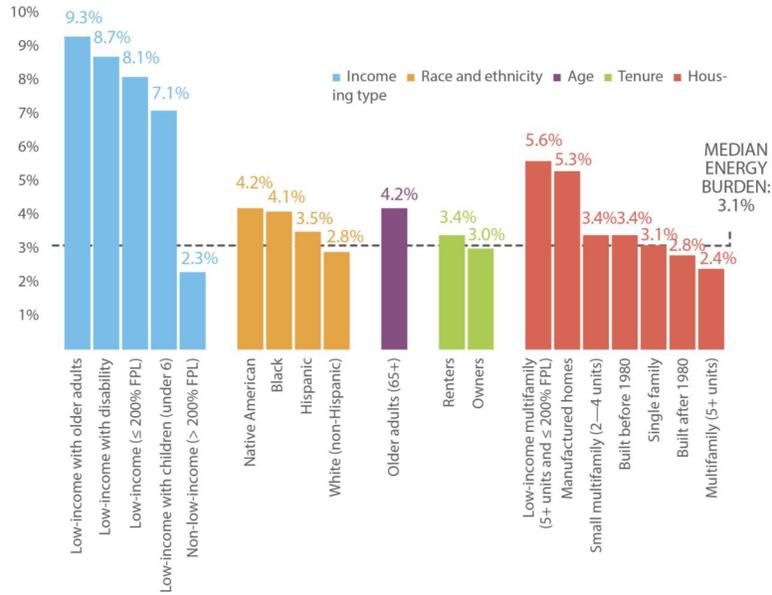


Figure 1. National energy burdens (i.e., % annual income spent on electric and heating bills) across subgroups compared to the national median energy burden.

Figure from ACEEE's 2020 report: *How High Are Housing Energy Burdens*

We found similar trends regionally. Across all nine regions, low-income household energy burdens are 2.1 to 3 times higher than the median energy burden. We found similar trends at the metro level, with the same groups experiencing disproportionately high burdens.

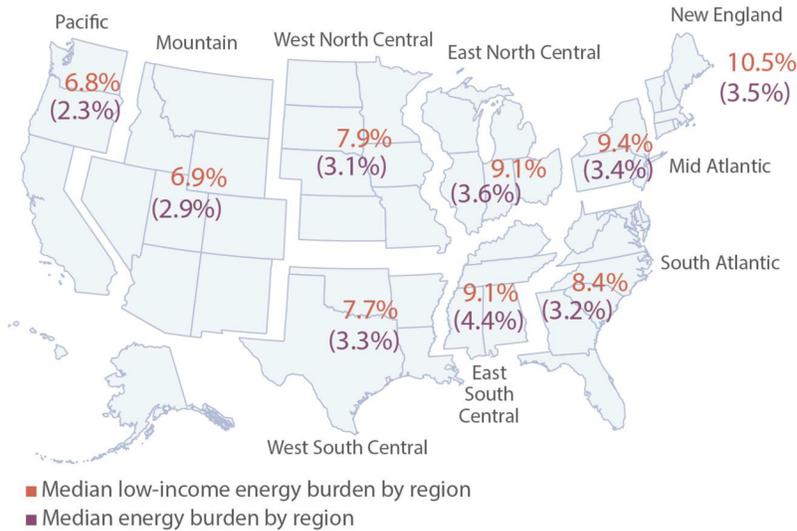


Figure 2. Median low-income (<200% FPL) energy burdens by region (red) compared to median energy burdens by region (purple)

Figure from ACEEE's 2020 report: *How High Are Housing Energy Burdens?*

This research shows that the energy burdens placed on low-income, Black, Hispanic, Native American, older adult, and renting households are not equitable, and that policy action is needed to improve energy affordability. We recognize by using 2017 Census data (the most recent data available), this data does not depict how COVID-19 has impacted energy affordability. Low-Income households and Black, Hispanic, and Native American communities, who have the highest burdens, are also disproportionately impacted by job losses during the pandemic. This means that current energy burdens are likely higher for many households.

### Causes and Impacts of High Energy Burdens

High energy burdens are the result of physical, socioeconomic, behavioral, and policy-related factors. Poor and inefficient housing conditions, chronic or sudden economic hardship, information barriers to obtaining government and other assistance, and insufficient and inaccessible programs and policies can lead to a household experiencing higher burdens. It is also important to recognize that historic national, state, and local policies have led to economic and/or social exclusion in Black, Indigenous, and People of Color communities, such as neighborhood segregation and redlining, lack of access to mortgages and other loans, mass incarceration, employment discrimination, and a legacy of segregated and

underfunded schools.<sup>15</sup> We must acknowledge that these types of systemic exclusions, underinvestment, discriminative lending practices, and limited housing choices have limited these communities' access to efficient and healthy housing, clean energy investments, and affordable energy.

High energy burdens are associated with inadequate housing conditions and have been found to affect physical and mental health, nutrition, and local economic development. Researchers have found that high energy burdens are correlated with older, inefficient, and unhealthy housing, which is itself associated with other health impacts, such as carbon monoxide poisoning, lead exposure, thermal discomfort, and respiratory problems such as asthma and chronic obstructive pulmonary disease (COPD).<sup>16</sup> High energy burdens can also lead to chronic stress, anxiety, and depression, and households with high burdens are more likely to stay caught in cycles of poverty.<sup>17,18</sup> Creating policies and programs to address high energy burdens is one strategy to ensure a more just and equitable energy system, one in which benefits are accessible to all.

### Low-Income Energy Efficiency and Weatherization as a Long-Term Solution

Energy efficiency and weatherization provide a long-term solution to reducing high energy burdens; these strategies should complement bill payment assistance and programs aimed at energy-saving education and behavior change. In our new report, we estimate that weatherization can reduce the median low-income household energy burden by 25%, making investment in energy efficiency and weatherization an effective strategy to reduce high energy burdens for households with high energy use while also benefiting the environment. These investments are especially important in the wake of the COVID-19 pandemic as they can also help stimulate the economy through local job creation and workforce development while helping households afford their energy bills in the long term.

### Policy Considerations

Congress can take action to improve equity in the clean energy sector by ramping up investment in low-income weatherization, bill payment assistance and other energy efficiency programs; target energy efficiency improvements to affordable multifamily housing; leverage Medicaid funding for low-income energy efficiency; and ensure national guidance around utility shut-offs, energy efficiency, and COVID-19 recovery.

#### 1. Expand the low-income Weatherization Assistance Program (WAP), including funds for health-related home improvements.

WAP currently serves about 100,000 homes per year through DOE funding and leveraged funds from LIHEAP and other sources. This number is far below the 15.7 million severely energy burdened households in the United States. At the current rate, it would take 360 years to

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<sup>15</sup> Rothstein, R. 2017. *The Color of Law: A Forgotten History of How Our Government Segregated America*. New York: Liveright Publishing.

<sup>16</sup> Brown, M., A. Soni, M. Lapsa, and K. Southworth. 2020. *Low-Income Energy Affordability: Conclusions from a Literature Review*. Prepared by Oak Ridge National Laboratory. Washington, DC: DOE. [info.ornl.gov/sites/publications/Files/Pub124723.pdf](https://info.ornl.gov/sites/publications/Files/Pub124723.pdf).

<sup>17</sup> Hernández, D., D. Phillips, and E. Siegel. 2016. "Exploring the Housing and Household Energy Pathways to Stress: A Mixed Methods Study." *International Journal of Environment Research and Public Health* 13 (9): 916–28. [pubmed.ncbi.nlm.nih.gov/27649222/](https://pubmed.ncbi.nlm.nih.gov/27649222/).

<sup>18</sup> Bohr, J., and A. McCreery. 2019. "Do Energy Burdens Contribute to Economic Poverty in the United States? A Panel Analysis." *Social Forces* November 16. [doi.org/10.1093/sf/soz131](https://doi.org/10.1093/sf/soz131).

weatherize all eligible households through WAP. Weatherization can also stimulate economic recovery by creating green jobs, maintain employment for thousands of small businesses (i.e., insulation contractors and HVAC, plumbing, and electrical businesses), and provide upgrades to furnaces and air ventilation that are critical to those who are most vulnerable to the impacts of COVID-19.

We recommend ramping up sustainable funding for the WAP program to greatly increase the capacity of the program over time. We also recommend allowing for additional funds (i.e., up to \$2,000 per home) that crews can use to implement measures to improve health (e.g., removing mold and reducing trip hazards for older adult residents) as well as including an increase budget for home repairs (e.g., roof repairs so attics can be insulated).

2. **Double incentives for moderate-income households under the proposed HOMES program.**  
The Home Owner Managing Energy Savings (HOMES) Act, introduced by Representatives Welch (D-VT) and McKinley (R-WV) and included in recent House-passed bills, provides incentives for home energy-efficiency improvements which can help improve energy affordability. These incentives range from \$800–4000 depending on the depth of work done, with the incentive capped at 30–50% of project cost. The proposal would now double these incentives for households with incomes below 80% of the area median income, and increase the caps to 60–80% of project cost. We estimate such an approach could serve 2.4 million homes over five years with a federal appropriation of \$6 billion, reducing carbon emissions by 60 million tons (or 13 million cars and light trucks per year).<sup>19</sup> This would help reach moderate-income households who do not qualify for WAP but cannot afford the up-front costs for weatherization.
3. **Target energy efficiency improvements in affordable multifamily housing.**  
Lower-income households disproportionately live in apartments. There are about 35 million rental units in the U.S. that are affordable to moderate-income households (those making less than 80% of area median income). Some of these are public housing, some use other housing assistance programs, and many are market-rate apartments. There are about 1.1 million units of occupied public housing; deep retrofits to one million of these units would cost about \$4.5 billion.<sup>20</sup> These funds can be provided as an infusion to Public Housing Authority capital accounts. For the other affordable rental units, we suggest that grants of \$2,500 per unit served be provided to state Housing Finance Agencies, as these agencies work extensively with rental housing in their states. These funds can be used to leverage additional financing. Successful programs are already in place in states like Minnesota and Maryland. If 10% of affordable rental units are served, this means 3.4 million units over five years, at a total cost of \$8.5 billion.
4. **Leverage Medicaid funding to improve health and efficiency in homes.**  
The Affordable Care Act enabled Medicaid funding to be used to make investments that will prevent illness and disease. One of the biggest opportunities to preventively address health

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<sup>19</sup> Ungar, L., J. Barrett, S. Nadel, N. Elliott, E. Rightor, J. Amann, P. Huether, and M. Specian. 2020. *Growing a Greener Economy: Job and Climate impacts from Energy Efficiency Investments*. Washington, DC: ACEEE. [www.aceee.org/white-paper/2020/09/growing-greener-economy-job-and-climate-impacts-energy-efficiency-investments](http://www.aceee.org/white-paper/2020/09/growing-greener-economy-job-and-climate-impacts-energy-efficiency-investments).

<sup>20</sup> Ibid.

threats is to mitigate dangerous conditions in housing. Under both the current and previous Administrations, the Department of Health and Human Services (HHS) has signaled support for using Medicaid dollars to address health and safety threats in the built environment but has not taken concrete action to enable use of the funds. Medicaid funds can help make people's homes healthier and safer through weatherization and/or complementary services.<sup>21</sup> The federal government can provide guidance on leveraging Medicaid funds to improve health and efficiency in homes.

**5. Increase funding for Department of Health and Human Services' Low-Income Home Energy Assistance Program (LIHEAP).**

LIHEAP is a critical, life-saving program that targets and serves the most vulnerable Americans, including older adults, individuals with disabilities, and children. LIHEAP funds help provide bill payment assistance, and states can also allocate 15% (or 25% with a waiver) of LIHEAP funds to support WAP.<sup>22</sup> Weatherization provides a long-term energy affordability for families that complements bill payment assistance. Ramping up funding for LIHEAP will not only lower energy burdens in the short-term through bill payment assistance, but will also lower them in the long-term through WAP.

**6. Develop national guidance around utility shut-offs, energy efficiency, and COVID-19 recovery.**

Federal recovery packages have offered little guidance on utility shut-off protections. As of October 1, one-third of states (17 states and DC) have in place state-ordered suspensions of gas, electric and water shut-offs. Of these, eight states will end shut-off protections at the end of October, and five will end protections at the end of December. Only 14% of states have moratoriums in place that will last until the end of the public health emergency or into 2021.

The federal government can offer guidance on how to protect the home health of Americans during this public health crisis through national guidance on utility-shutoffs and additional investment in energy efficiency to help address the affordability needs of overburdened households. Energy efficiency can be combined with other COVID-19 recovery policies and strategies to help Americans who are experiencing the greatest hardship, such as by directing resources towards those with the highest energy burdens.

## Conclusion

Energy insecurity is a persistent national challenge that has been worsened by the global pandemic and economic crisis. Our research finds that low-income, Black, Hispanic, Native American, older adult, and renting households all experience disproportionately high energy burdens, while also having less access to clean energy technologies and investments. We find that increasing investment in low-income energy efficiency and weatherization can provide a long-term solution to reducing high energy burdens for low-income households. Congress can act to improve equity in the clean energy sector by ramping up investment in low-income weatherization, bill payment assistance and other energy

<sup>21</sup> Hayes, S., and C. Gerbode. 2020. *Braiding Energy and Health Funding for In-Home Programs: Federal Funding Opportunities*. Washington, DC: ACEEE. [www.aceee.org/research-report/h2002](http://www.aceee.org/research-report/h2002).

<sup>22</sup> National Association for State Community Services Programs. N.d. "LIHEAP and WAP: A Dynamic Duo for Reducing the Low-Income Energy Burden." <https://nascsp.org/liheap-and-wap-a-dynamic-duo-for-reducing-the-low-income-energy-burden/>.

efficiency programs; target energy efficiency improvements to affordable multifamily housing; leverage Medicaid funding for low-income energy efficiency; and ensure national guidance around utility shut-offs, energy efficiency, and COVID-19 recovery.

Mr. RUSH. I want to thank the gentlelady.  
And, Dr. Reames, you are recognized now for 5 minutes.

**STATEMENT OF TONY G. REAMES, PH.D.**

Dr. REAMES. Good morning.

Chairman Rush and Pallone, Ranking Member Upton and Walden, Congresswoman Dingell, and members of the subcommittee. It is an honor to appear before you today, and I thank you for inviting me to discuss the importance of an equity-based approach to improving clean energy access and affordability.

My name is Tony Reames. I am an assistant professor in the School for Environment and Sustainability at the University of Michigan, and I lead the Urban Energy Justice Lab, which conducts research on the production and persistence of spatial, racial, and socioeconomic disparities, and energy access, affordability, and policymaking.

As Ms. Dreihobl testified, stark disparities exist in U.S. energy burdens. Both urban and rural low-income households spend substantially greater proportions of their income on energy costs when compared to non-low-income households. Moreover, Black, Latinx, indigenous, elderly, and multifamily and renter occupied households are disproportionately impacted by high energy burdens. This leaves millions of Americans in energy poverty.

Estimates before the coronavirus pandemic found that 25 million households had to forego food and medicine in order to pay their energy bills, 17 million households faced energy shutoff, and 6 million households were unable heat or cool their homes due to being disconnected. And we know that the pandemic has only exacerbated these issues as the same communities reeling from COVID-19 are racking up massive utility debt and fear the imminent end of shutoff moratoriums.

Thus, as policy discussions consider the transition to cleaner energy technology, acknowledging the nuance of energy poverty is critical to ensuring the transition is just, equitable, and affordable for all.

Investments in residential energy-efficiency improvements have long been a key site of intervention to reduce energy burdens with additional economic and environmental benefits. However, an equitable investment in energy efficiency must account for disparate vulnerabilities of groups most likely to reside in the least energy-efficient housing.

Our research shows that homes and neighborhoods with lower median incomes, more households below the Federal poverty level, and more racial ethnic minority head of households on average are less energy efficient. Furthermore, the persistence of racial segregation in America increases the energy poverty vulnerability of Black and Latinx households.

As we implement policies and programs to transition to a cleaner energy future, individual adoption of new technology is crucial. Therefore, new technology must be accessible and affordable for all. However, our research shows that even entry level clean energy technology, such as LED bulbs, can be both less available and more expensive in communities where households would benefit most from the energy savings provided by these products.

Moreover, millions of households that fall into the gap between qualifying for low-income energy assistance programs and having the resources to cover upfront costs for improvements have few to no avenues for improving energy efficiency in their homes or accessing renewable or other clean energy technology.

There are several actions Congress can take to address the disparities in clean energy access and affordability that we raise in our research. Components of legislation, such as the Clean Economy Jobs and Innovation Act and the Housing is Infrastructure Act are good examples.

In my written statement, I discuss the need for a national energy poverty and justice strategy and potential approaches that can be taken.

First, we can explore the feasibility of restructuring and integrating the Low-Income Home Energy Assistance, Weatherization Assistance, and other energy-related assistance programs into a streamlined comprehensive strategy for Federal energy assistance.

Second, develop a national framework to identify and quantify current residential energy equity gaps across geographies, race, ethnicity, income, and other social demographic groups.

Third, determine whether individual or place-based approaches to policy design and implementation best address the identified energy disparities.

And, fourth, establish measurable equity goals and transparent mechanisms for tracking progress, such as energy poverty reduction goals or employment equity targets in the clean energy industry, and institutionalize these equity metrics and set new policies, funding, and evaluation.

Again, I would like to thank Chairman Rush, Ranking Member Upton, and members of the subcommittee for this opportunity to discuss an important and timely issue, and I look forward to your questions and comments.

Thank you.

[The prepared statement of Dr. Reames follows:]

Prepared Statement

**Tony G. Reames, Ph.D.**  
**Assistant Professor**  
**University of Michigan**

before the  
U.S. House of Representatives Committee on Energy and Commerce  
Subcommittee on Energy

Hearing on  
*Generating Equity: Improving Clean Energy Access and Affordability*

September 29, 2020

Chairman Rush, Ranking Member Upton, and Members of the Subcommittee, thank you for inviting me here today to discuss an equity-based approach to improving clean energy access and affordability.

It is an honor to appear before the subcommittee. I am an assistant professor in the School for Environment and Sustainability at the University of Michigan. In 2016, I launched the Urban Energy Justice Lab, which conducts research on spatial, racial and socioeconomic disparities in energy access, affordability, and policymaking. The Urban Energy Justice Lab publishes peer-reviewed articles, policy briefs, and reports.<sup>1</sup> Our research has been funded by the U.S. Department of Energy, National Science Foundation, National Institutes of Health, and several philanthropic foundations. My early training is in civil engineering. Prior to becoming an academic, I served as an officer in the U.S. Army, and worked as a licensed professional engineer in both the public and private sectors. While my work in energy justice began within the last decade, issues of environmental justice were intricately woven through my upbringing in rural South Carolina and my professional life whether in state or local government agencies, transportation design firms, or Iraq.

I began my energy justice centered research as a public administration doctoral student at the University of Kansas during the Great Recession. I became very interested in the local and regional distribution and implementation of American Recovery and Reinvestment Act (ARRA) dollars. I was particularly intrigued by Congressman Emanuel Cleaver's proposal to geographically concentrate ARRA funds and leverage private

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<sup>1</sup> For more information on the Urban Energy Justice Lab please visit [www.urbanenergyjusticelab.com](http://www.urbanenergyjusticelab.com)

investments in portions of five adjoining neighborhoods in urban Kansas City and label it the “Green Impact Zone.” One notable effort in the Green Impact Zone was to target a significant portion of the Department of Energy Weatherization Assistance Program (WAP) dollars to the roughly 8,000 homes in the Zone. Studying both the successes and challenges of implementing WAP through a targeted, community-based approach, during an economic recession, established the foundation for my grounded knowledge in residential energy injustices and the critical role for public policy.

Moreover, climate change concerns highlight a number of serious social and environmental inequalities that can be traced to energy consumption. These concerns form the foundation of a growing field of scholarship, and activism, on energy justice. In 2015, Diana Hernández issued “A Call for Energy Justice,” which acknowledged four basic human rights to energy: the right to healthy, sustainable energy production; the right to the best available energy infrastructure; the right to affordable energy; and the right to uninterrupted energy service.<sup>2</sup> Yet, for the millions of households suffering from chronic energy poverty,<sup>3</sup> with mounting utility debt and the constant fear of disconnection, exacerbated by the coronavirus pandemic, these rights are mere unfulfilled promises. It is based on these experiences that I reflect on the moment that we are in and the possibilities that are granted us to be bold, innovative, and equitable in plans and proposals to transform our energy economy, improve the environment, and increase intra- and intergenerational quality of life metrics across the country.

My testimony today focuses on:

- The Response and Recognition of Energy Poverty in the U.S.
- Spatial, Racial and Socioeconomic Disparities in Residential Energy Efficiency
- Disparities in Access to Clean Energy Technology (Availability and Affordability)
- A Call for a National Energy Poverty and Justice Strategy
  - Improving the Implementation Effectiveness of Current Federal Energy Assistance Programs
  - Developing a Framework to Target, Measure and Track Equity Progress

### **Response and Recognition of Energy Poverty in the U.S.**

Stark disparities exist in U.S. energy burdens, the percentage of household income spent on energy bills. Both urban and rural low-income households spend substantially greater proportions of their income on energy cost as compared to non-low-income

<sup>2</sup> Hernández, D. (2015). Sacrifice along the energy continuum: a call for energy justice. *Environmental Justice*, 8(4), 151-156. <https://doi.org/10.1089/env.2015.0015>

<sup>3</sup> Many different terms are used to describe residential energy hardship (e.g., energy poverty, energy vulnerability, energy burden, energy insecurity, fuel poverty). For clarity, I use the term energy poverty throughout this testimony.

households.<sup>4</sup> Moreover, low-income, African American, Latinx, Native American, multifamily and renter households are disproportionately impacted by high energy burdens.<sup>5</sup> The U.S. Energy Information Administration (EIA) estimated that in 2015, 17 million households received an energy disconnect/delivery stop notice and 25 million households had to forgo food and medicine to pay energy bills.<sup>6</sup> These household experiences are indicators of energy poverty. Yet, the U.S. lacks a national strategy to annually measure and track progress toward energy poverty reduction.

Federal Government action at the intersection of energy and equity has been driven by either geopolitical or economic crises that affect energy prices, rather than by a comprehensive, long-term approach to address disparities in energy access and affordability. The U.S. energy poverty response, typically in the form of program creation and federal stimulus, has a nearly fifty-year history, beginning with response to the 1970's oil crisis, then economic recessions in the 1990s and again in the late 2000s, and now the current coronavirus pandemic. Figure 1 highlights a timeline of energy poverty response efforts in the U.S. over the last four decades.<sup>7</sup>

However, after nearly fifty years of federal energy assistance, the U.S. Energy Information Administration reported that one in three US households (37 million), experienced energy poverty in 2015.<sup>8</sup>

As current discussions of energy policy consider the transition to cleaner technology, acknowledging the problem and nuances of energy poverty is critical to ensuring a just, equitable and affordable energy transition for all. Thus, energy poverty is best viewed as a geographical assemblage of socioeconomic and demographic characteristics, networked infrastructures of energy, technology and policy provision, and material conditions of the home.<sup>9</sup>

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<sup>4</sup> Drehobl, A., Ross, L., and Ayala, R. (2020) How High Are Household Energy Burdens? An Assessment of National and Metropolitan Energy Burdens Across the U.S.

<https://www.aceee.org/research-report/u2006>

<sup>5</sup> Ibid.

<sup>6</sup> 2015 Residential Energy Consumption Survey (RECS) (US Energy Information Administration, 2018). <https://www.eia.gov/consumption/residential/data/2015/>

<sup>7</sup> Bednar, D.J., and Reames, T.G. (2020). Recognition of and response to energy poverty in the United States. *Nature Energy*. <https://doi.org/10.1038/s41560-020-0582-0>

<sup>8</sup> 2015 Residential Energy Consumption Survey (RECS) (US Energy Information Administration, 2018). <https://www.eia.gov/consumption/residential/data/2015/>

<sup>9</sup> Harrison, C., & Popke, J. (2011). "Because you got to have heat": the networked assemblage of energy poverty in eastern North Carolina. *Annals of the Association of American Geographers*, 101(4), 949-961. <https://doi.org/10.1080/00045608.2011.569659>

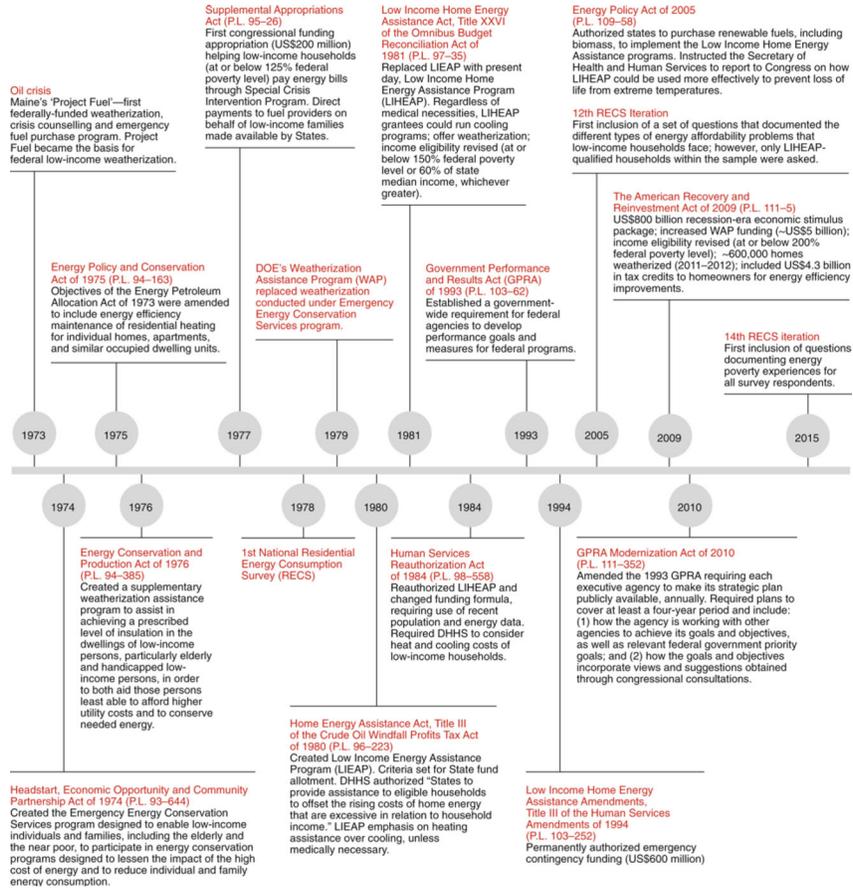


Figure 1. Timeline of U.S. Energy Poverty Response

**Spatial, Racial and Socioeconomic Disparities in Residential Energy Efficiency**

Investment in residential energy efficiency improvements has long been a key site of intervention to increase energy affordability. On average, low-income households consume less energy than non-low-income households. This assessment of consumption rather than efficiency, tends to mask energy poverty vulnerability. Instead,

when analyzing energy use intensity (EUI), or energy consumption normalized by building square area, as a proxy for energy efficiency, national data from the U.S. Energy Information Administration show that low-income households, on average, live in less energy efficient homes, with an EUI 27% greater than higher-income households. The spatial distribution of energy efficiency disparities is further complicated by the persistence of racial and income residential segregation that defines housing development and consumption patterns in many U.S. metropolitan areas.

In two studies using data from the U.S. Energy Information Administration's Residential Energy Consumption Survey (RECS) to model and explore disparities in residential heating energy efficiency. We estimated and mapped residential heating EUI in Kansas City, Missouri and Detroit, Michigan and found significant spatial, racial, and socioeconomic disparities.

The first study, published in 2016, found disparities in the relationship between heating EUI and spatial, racial/ethnic, and socioeconomic block group characteristics in Kansas City, Missouri.<sup>10</sup> Census block groups with lower median incomes, a greater percentage of households below poverty, a greater percentage of racial/ethnic minority headed-households, and a larger percentage of adults with less than a high school education were, on average, less energy efficient (higher EUIs). Results also implied that the persistence of racial residential segregation exposed Black and Latinx households to increased energy poverty vulnerability. Lastly, the spatial concentration and demographics of energy poverty vulnerable block groups suggest proactive, area- and community-based targeting of energy efficiency assistance programs may be more effective than existing self-referral, first-come-first-serve approaches.

The second study, published in 2017, illustrated spatial disparities in residential energy heating consumption and efficiency in Detroit, Michigan.<sup>11</sup> While the analysis found no statistical relationship between race/ethnicity and heating energy consumption, energy inefficiency was correlated with the racial/ethnic composition of census block groups. As the percentage of white householders increased, so did the modeled energy efficiency of homes in a census tract, relative to the efficiency in areas with greater percentages of African American or Latinx householders. Income and housing tenure (own or rent) revealed inverse relationships with heating energy consumption and efficiency. While

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<sup>10</sup> Reames, T. G. (2016). Targeting energy justice: Exploring spatial, racial/ethnic and socioeconomic disparities in urban residential heating energy efficiency. *Energy Policy*, 97, 549-558. <https://doi.org/10.1016/j.enpol.2016.07.048>

<sup>11</sup> Bednar, D. J., Reames, T. G., & Keoleian, G. A. (2017). The intersection of energy and justice: Modeling the spatial, racial/ethnic and socioeconomic patterns of urban residential heating consumption and efficiency in Detroit, Michigan. *Energy and Buildings*, 143, 25-34. <https://doi.org/10.1016/j.enbuild.2017.03.028>

census tracts with higher median incomes and homeownership rates exhibited higher consumption, they also benefited from greater energy efficiency than areas with lower median incomes and a greater percentage of renters. This study provides evidence supporting approaches for conservation and energy efficiency program targeting that recognizes the significance of race/ethnicity, place and class to understanding disparities and vulnerability.

### **Disparities in Access to Clean Energy Technology (Availability and Affordability)**

Individual participation in the transition to a low-carbon energy future, requires household adoption of clean energy technologies. For prolific adoption trends to materialize, new technology must be recognized as being both cost effective and socially accepted. It is therefore critical to understand energy transitions from a socio-technological perspective, exploring the interaction between humans and technology. Moreover, if transitions are to be equitable, or just, the implementation of new energy technologies, policies, and programs, must consider the impact on and participation of poor and other disadvantaged populations. In the U.S., lighting accounts for 10% of residential electricity consumption, 9% of the average household's primary energy consumption, and 20% of the average household's energy bill.<sup>12</sup> While replacing inefficient incandescent light bulbs with more efficient LEDs is seen as an expensive energy saving intervention, less than 30% of U.S. households have at least one LED bulb and only 1% of households have all LED bulbs.<sup>13</sup> Moreover, the adoption of energy-efficient lighting is not equitably distributed across socioeconomic groups, with poorer households less likely to adopt than higher-income households. The lack of parity in energy efficient lighting technology across socioeconomic groups has real implications for the imbalance in residential energy dynamics that exist between these groups, such as EUI and affordability disparities.

To understand other factors that may be contributing to LED lighting adoption disparities and its implications for broader clean energy technology access and adoption disparities, we conducted a study to explore the relationship between light bulb availability, price and household incomes in Detroit (Wayne County) Michigan.<sup>14</sup> Based on 130 in-store surveys in 19 zip codes in four poverty strata (<10% poverty, 10-20% poverty, 20-40% poverty, and >40% poverty), we found that energy-efficient lighting

<sup>12</sup> US EIA. Annual energy outlook 2017. Washington, DC: US Department of Energy; 2017. [https://www.eia.gov/outlooks/aeo/pdf/0383\(2017\).pdf](https://www.eia.gov/outlooks/aeo/pdf/0383(2017).pdf)

<sup>13</sup> 2015 Residential Energy Consumption Survey (RECS) (US Energy Information Administration, 2018). <https://www.eia.gov/consumption/residential/data/2015/>

<sup>14</sup> Reames, T. G., Reiner, M. A., & Stacey, M. B. (2018). An incandescent truth: Disparities in energy-efficient lighting availability and prices in an urban US county. *Applied energy*, 218, 95-103. <https://doi.org/10.1016/j.apenergy.2018.02.143>

availability and price varied across the county, with limited availability and higher prices disproportionately present in high-poverty areas. Figure 2 illustrates the mean lightbulb price for each bulb type from least to most energy efficient (incandescent/halogen- IHL, compact fluorescents- CFL, and light-emitting diode- LED) across the four poverty strata.

#### Major Findings

- Energy-efficient bulbs were less available in high-poverty areas and smaller stores
- Energy-efficient bulbs were more expensive in high-poverty areas and smaller stores
- The cost to upgrade from incandescent to LED was 2 times higher in high-poverty areas than low-poverty areas

Large retail stores, primarily in areas with less poverty, had the least-expensive compact fluorescent lamps and LEDs. The most expensive CFLs and LEDs were found at pharmacies and small retail stores. In fact, none of the small retail stores in the poorest zip codes (40% or more of the households living below the federal poverty level) carried LEDs, while 92% of them carried less-efficient incandescent and halogen bulbs. In the poorest zip codes, there was a \$6.24 mean price difference between IHLs and LEDs, a huge upfront cost in areas where 40% or more of the households live in poverty and roughly 27% do not have access to a personal vehicle. These disparities can lead residents of poorer neighborhoods to continue buying IHLs and thereby miss one of the simplest ways to cut home energy bills: residential lighting upgrades.

While availability and affordability access to clean energy technology present an acute barrier for low-income households and communities, an often-hidden barrier exists for moderate-income households – the **energy efficiency funding coverage gap**. Moderate income households, those with annual incomes between 200% and 300% of the federal poverty level (FPL), find themselves in what we call an energy efficiency funding coverage gap. That is these households do not qualify for most government energy assistance programs which typically support households with annual incomes at or below 200% of FPL, nor do they typically have the financial resources or the credit worthiness to cover or access friendly capital for energy efficiency or other clean energy technology upfront costs. In our study of this coverage gap in Michigan, we found that across the state 1 in 8 Michigan households fell into the energy efficiency funding coverage gap, or nearly 460,000 households.<sup>15</sup> Across the state's 83 counties, the number of households in the coverage gap ranged from 0% to as high as one-quarter (25%) of households falling into this energy efficiency funding coverage gap, leaving them unable to fully participate in money-saving and environmentally-beneficial clean

<sup>15</sup> Forrester, S. P., & Reames, T. G. (2020). Understanding the residential energy efficiency financing coverage gap and market potential. *Applied Energy*, 260, <https://doi.org/10.1016/j.apenergy.2019.114307>

energy investments. Understanding the market potential and geographic distribution of the energy efficiency funding coverage gap can support impact-driven financiers such as green banks or community development financial institutions (CDFIs) and inform improved targeting of public resources to this under-served market which can promote energy system improvements, facilitate multi-level policy goals, improve household living conditions, and achieve an equitable clean energy transition.

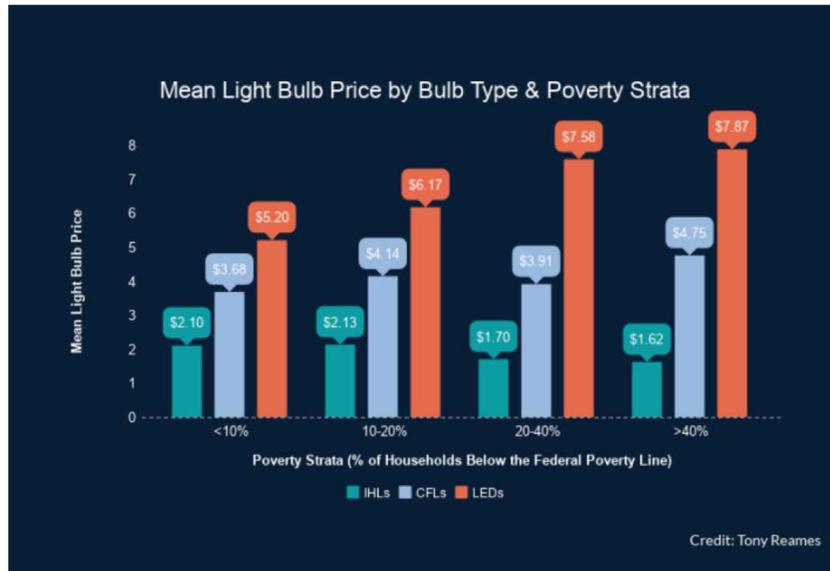


Figure 2. Mean Lightbulb price by bulb type and poverty strata

The growth of residential rooftop solar adoption has not occurred equitably across the country, nor across socioeconomic or racial/ethnic groups. In addition, to solar costs dropping more than 70% over the last decade, various state and federal policies have supported industry growth. Although the National Renewable Energy Lab estimates that approximately 42% of the nation's total rooftop megawatt (MW) potential is on low- to moderate-income (LMI) rooftops<sup>16</sup>, studies show households earning less than \$45,000 were only 10% of solar installations and households earning \$45,000 or more

<sup>16</sup> Sigrin, Ben, Mooney, Meghan. 2018. Rooftop Solar Technical Potential for Low-to-Moderate Income Households in the United States. Golden, CO: National Renewable Energy Laboratory. NREL/TP-6A20-70901. <https://www.nrel.gov/docs/fy18osti/70901.pdf>.

represented nearly 90% of solar installations.<sup>17</sup> Moreover, racial/ethnic disparities in national solar adoption have also been discovered. When compared to census tracts with the same median income, Black- and Latinx-majority census tracts have installed 69% and 30% less rooftop solar, respectively, compared to census tracts with no racial majority. Conversely, white-majority census tracts have installed 21% more rooftop solar than census tracts with no racial majority.<sup>18</sup>

As mentioned, rooftop solar deployment is not equitably distributed across the country. State and local governments have developed solar equity programs, primarily focused on increasing adoption by low- and moderate-income (LMI) households. In a study comparing the distribution of single-family rooftop solar potential and penetration in four U.S. cities - Riverside and San Bernardino, California, Washington, DC, and Chicago, Illinois – I found both universal and distinct local manifestations of disparities.<sup>19</sup> Single-family rooftops represent 68.4% of the nation's rooftop solar potential (61.8 million rooftops) and LMI-occupied households represent an estimated 37% of all solar-suitable single-family rooftops. Contrary to popular belief, some LMI-majority census tracts had higher rooftop potential than non-LMI-majority census tracts. However, higher rooftop potential did not necessarily translate to higher rooftop penetration, especially if higher potential was in LMI-majority census tracts. Several socioeconomic and demographic characteristics (e.g. race/ethnicity, limited English proficiency, age of housing stock, and internet access) had statistically significant relationships with rooftop solar penetration. For instance, a higher percentage of households with limited English proficiency, and without internet access, were associated with lower solar penetration. Census tracts with a higher percentage of the population aged 65 or older were associated with higher solar penetration in San Bernardino, but lower solar penetration in Washington, DC. There remains great potential for equitably expanding rooftop solar. Studies that seek to understand and illustrate the local dynamics of both solar potential and penetration can inform better policy development and implementation.

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<sup>17</sup> Kann, Toth, How wealthy are residential solar customers? Household income and solar adoption in the United States, GTM Res. (2017). <https://www.greentechmedia.com/squared/the-interchange-podcast/how-wealthy-are-residential-solar-customers>

<sup>18</sup> Sunter, D. A., Castellanos, S., & Kammen, D. M. (2019). Disparities in rooftop photovoltaics deployment in the United States by race and ethnicity. *Nature Sustainability*, 2(1), 71. <https://rael.berkeley.edu/wp-content/uploads/2019/01/Sunter-Castellanos-Kammen-Nature-SustainabilityDisparitiesPVDeploymentRaceEthnicity.pdf>

<sup>19</sup> Reames, T. G. (2020). Distributional disparities in residential rooftop solar potential and penetration in four cities in the United States. *Energy Research and Social Science*. <https://doi.org/10.1016/j.erss.2020.101612>

### **A National Energy Poverty and Justice Strategy**

The transition to a lower-carbon energy economy will inevitably produce and, in many cases, perpetuate pre-existing sets of winners and losers.<sup>20</sup> There are numerous options that Congress can take to address the disparities raised in our research and set the country on a path to a more equitable clean energy future. I will discuss two options for a national energy poverty and justice strategy: improving the effectiveness of current federal energy assistance programs; and developing a framework for targets, measuring and tracking clean energy equity progress.

#### ***Improving the Effectiveness of Current Federal Energy Assistance***

Despite the absence of federal statutes to characterize, measure and evaluate the landscape of and responses to energy poverty, the essence of this phenomenon has generally been recognized in the US as evidenced by two federally-funded energy assistance programs: the Low Income Home Energy Assistance Program (LIHEAP) and the Weatherization Assistance Program (WAP). LIHEAP and WAP are administered by two different federal agencies, the Department of Health and Human Services (DHHS) and the Department of Energy (DOE), respectively.

A national energy poverty and justice strategy would acknowledge that these programs have not been able to substantially reduce the persistence of energy burden disparities between low-income and non-low-income households. A restructuring of the processes and procedures of the Low-Income Home Energy Assistance and Weatherization Assistance programs could improve their impact and efficiency, in several ways:

Currently, the separate federal channels through which the two programs are administered limit opportunities for coordination – leading to incompatible eligibility requirements and redundant administrative and reporting duties for states and local agencies. To improve the situation, Low Income Home Energy Assistance could be transferred to the Department of Energy and treated as a bona fide energy assistance program rather than as a social welfare program. If the two major federal programs were combined under one agency, state and local administrators could be given flexibility to allocate funds to either energy-bill assistance or weatherization, or a combination as needed. Program consolidation would improve case management, helping officials to identify households that have repeatedly needed assistance paying bills and could be ideal candidates for weatherization. This could allow a shift from temporary patchwork approaches to reducing energy poverty toward interventions like

<sup>20</sup> Carley, S., & Konisky, D. M. (2020). The justice and equity implications of the clean energy transition. *Nature Energy*, 1-9. <https://www.nature.com/articles/s41560-020-0641-6?proof=t>

weatherization and other energy retrofits that promise longer term reductions in energy costs for low-income households. To be clear, this approach would elevate and integrate LIHEAP not eliminate it.

As currently authorized, both programs require individual households to apply for assistance. This can be a less effective approach. Often the same households tend to need help again and again. Needy households are concentrated in certain regions and neighborhoods – including in urban residential areas where racial and income segregation are associated with homes that lack energy efficiencies. Homes in areas with lower median incomes, a greater percentage of households below poverty, a greater percentage of racial/ethnic minority households, and larger percentage of population with less than a high school education are on average less energy efficient. Proactive, area-based targeting of communities where many households repeatedly need help would improve the implementation of federal energy assistance.

Lastly, energy assistance can be improved by going beyond single-household approaches to leverage social networks and community ties. Community-based approaches to the implementation of low-income energy efficiency efforts have been shown to be moderately more effective at getting people to participate and adopt innovations. Such efforts can transform the way people consume energy through group interaction, peer support, and communal resolve. In addition, community-based approaches can further equity and social justice by taking account of the unique assets and challenges of disadvantaged groups, including minorities. This is especially critical where underserved and disadvantaged people have previously lacked access to energy programs – and where agencies must take special care to overcome public distrust and fear.

In sum, the challenge of alleviating energy poverty and high household burdens for affordable energy remains to be fully addressed. Policymakers need to expand and rework existing programs and institutional capabilities to deliver assistance more effectively to households in need and use community ties to encourage full participation and innovative solutions.

***Develop a Framework for Targets, Measuring and Tracking Equity Progress***

I strongly believe the data you do not collect is the problem you will not see. Given the multidimensionality and variation of energy poverty regionally, the production of data that characterizes this problem for the U.S. should be intentional in its exploration. Thus, the development of quality indicators and data sets would aid capturing the essence of this problem beyond existing energy affordability measures. A standardized national instrument developed in concert with an independent, interagency working group is

critical to understand the landscapes of energy poverty temporally. Equipped with the capability to measure different dimensions of energy poverty, reasonable reduction-based objectives surface as an opportunity for local development and national coordination. Objectives establish baseline goals through which energy poverty reduction can be assessed and achieved. Formal energy poverty recognition alongside reduction-based objectives and performance measures would better align LIHEAP and WAP as an official energy poverty strategy that encourages longitudinal data collection and innovative solutions. Energy poverty reduction goals could be aligned with broader public health and carbon mitigation goals.

Energy efficiency evaluation, measurement and verification are vital in demonstrating the financial benefits of bill assistance and the multiple benefits of energy efficiency. Reduction focused performance measures and program evaluations offer a means to incorporate existing WAP evaluation components aimed at minimizing environmental and health risks, whilst maximizing energy and cost savings. Periodic evaluation would maintain a record of the effectiveness of deployed responses. Energy poverty and its responses can then be reassessed to understand how the landscape has changed and how the problem of energy poverty has evolved.

Furthermore, examples from state mechanisms to define, target, and track efforts for increasing solar equity may offer some examples for a national energy poverty and justice strategy. State governments have instituted four primary mechanisms: 1) targeting LMI households; 2) targeting EJ communities; 3) targeting LMI-serving nonprofit and public facilities; and 4) setting and tracking solar equity goals.

**Targeting LMI Households.** Most states with solar equity policies take a people-based approach focusing primarily on household-level socioeconomic indicators such as setting an area median income (AMI) threshold for LMI program eligibility and targeting. For example, Massachusetts' Mass Solar Loan program targets LMI households ( $\leq 80\%$  AMI) with three incentives for purchasing a solar PV system or a share in a behind-the-meter community shared solar system: a 1.5% interest rate buy down; a loan loss reserve for the lender when an applicant's credit record is less than perfect; and a 30% loan support incentive (up to \$10,500).<sup>21</sup> California's Single-Family Affordable Solar Housing (SASH) and Multi-Family Affordable Solar Housing (MASH) programs target LMI households ( $\leq 80\%$  AMI) in investor-owned utility territories for no-cost rooftop solar installations funded by the California Solar Initiative (CSI).<sup>22</sup>

<sup>21</sup> Mass Solar Loan. <https://www.masssolarloan.com>

<sup>22</sup> California Public Utility Commission. <https://www.cpuc.ca.gov/general.aspx?id=3043>

**Targeting Environmental Justice (EJ) Communities.** In addition to targeting LMI households that can live anywhere in the state, some states are implementing place-based solar targeting approaches that prioritize those who live in designated environmental justice communities. This approach is a recognition of the principle of environmental justice—that regardless of race, national origin, age, or income, no segment of the population should bear disproportionately high or adverse environmental burdens. In particular to the benefits of solar, on average majority black and Hispanic communities experience high pollution exposure and high energy burdens (or the proportion of income spent on energy costs). Nationally, EJ communities have been designated through mapping exercises and calculations publicly available through the US EPA’s Environmental Justice Screening and Mapping tool which displays census tracts with higher exposure to pollution and other environmental and socioeconomic risk factors. In California, the Clean Energy and Pollution Reduction Act of 2015 required the California Public Utility Commission to help improve air quality and economic conditions in disadvantaged communities which permitted the targeting of solar investments in those communities. In Illinois, the Future Energy Jobs Act which established the Illinois Solar for All Program required designating and targeting environmental justice communities for solar investments. California’s disadvantaged communities are easily identified on the state’s online CalEnviroScreen mapping tool, while Illinois has an online tool to search an address to determine its EJ community designation status as well as users can apply for review to designate an area as an EJ community.

**Targeting LMI-serving non-profit and public facilities.** Some states have committed to providing explicit solar incentives to nonprofit and public facilities that serve LMI and environmental justice communities with a goal of offsetting energy costs so savings can be put toward programming that benefit the communities they serve. For example, Illinois seeks to increase solar equity by targeting nonprofit and public facilities serving LMI and environmental justice communities such as public housing, K–12 public schools, homeless shelters, and places of worship. The Illinois Solar For All Program commits 15% of the budget to support the Incentives for Nonprofits and Public Facilities sub-program. According to a NREL report, solar systems on LMI-serving non-profit and public facilities could be oversized to share some of the solar power that is generated with the surrounding community.

**Setting and Tracking Solar Equity Metrics and Goals.** Beyond defining solar equity targeting approaches, some governments have set measurable and trackable solar equity goals. For example, Washington, DC has set goals for its Solar For All program to install rooftop solar on 100,000 LMI households and

reduce LMI energy burdens by 50% by 2032. Illinois has set a goal that a minimum of 25% of its solar incentives be allocated to projects located within environmental justice communities. Additionally, California has established a transparent online resource for tracking its solar equity progress. The statistics and charts are frequently updated based on completed applications for its SASH and MASH programs.

In sum, for a national energy poverty and justice strategy, Congress may consider the following four actions:

- Explore restructuring of the processes and procedures of the Low-Income Home Energy Assistance and Weatherization Assistance programs to improve their impact and efficiency.
- Quantify the current residential energy equity gaps by exploring disparities spatially (e.g., between counties), racially, and socioeconomically.
- Determine and define the desired people- and place-based approaches to policy design and implementation that best address identified disparities. This will facilitate targeting, public engagement, and investment strategies.
  - If a people-based approach is considered, determine the household income threshold that best defines the state's LMI population
  - If a place-based approach is considered, conduct an environmental justice mapping exercise using established methods (e.g., US EPA, California, or Illinois) centered on environmental, socioeconomic, and demographic risk factors.
- Establish measurable equity metrics and goals (i.e. energy poverty reduction, employment equity increases) and transparent mechanisms for tracking progress. Institutionalize equity metrics into project funding and evaluation.

Thank you, Chairman Rush, Ranking Member Upton and Members of the Subcommittee, for the opportunity to appear before you today to discuss these important and timely issues. I look forward to your comments and questions.

Mr. RUSH. The Chair thanks Dr. Reames.  
Dr. Bryce, you are recognized for 5 minutes.

**STATEMENT OF ROBERT BRYCE**

Mr. BRYCE. Good morning, Mr. Chairman. Thank you. I am not a doctor. I am barely a mister, but I appreciate the honorific.

My name is Robert Bryce. I am a journalist. I am a filmmaker. I am a podcaster. I have been writing about the energy business for 30 years. I am also a visiting fellow at the Foundation for Research on Equal Opportunity.

These discussions about energy burden are important and, as Dr. Reames and Ms. Drehobl pointed out, very timely. But more attention must be paid to how policies designed to address climate change are resulting in higher energy prices for low-income ratepayers and consumers.

I will talk about three issues this morning: Renewable energy mandates, natural gas restrictions, and electric vehicles.

California has mandated the State's electric utilities procure at least 60 percent of the electricity they sell from renewables by 2030 and to be selling 100 percent zero carbon electricity by 2045. The imposition of these mandates over the last 12 years has coincided with a dramatic increase in our electricity prices. Between 2011 and 2019, according to the Energy Information Administration, the average price of electricity in California for all users has jumped by nearly 30 percent. That is more than seven times the rate of increase in the rest of the U.S. California now has the highest electricity prices in the Continental U.S. outside of the Northeast.

In Ontario, Canada, after the province introduced the Green Energy Act and shuttered traditional generation plants and began providing big subsidies for renewables, electricity prices soared. Between 2008 and 2016, residential electric rates in the province jumped by 71 percent, which was more than double the average seen in the rest of Canada over that time period.

Germany, which has pledged to slash its greenhouse gas emissions by 95 percent by 2050, has seen its electric rates also increase dramatically. Between 2007 and 2018, according to the think tank Agora Energiewende, residential electric rates in Germany jumped by 50—50—percent. German residential customers now pay the highest rates in Europe, about 37 cents per kilowatt hour, which is three times the average residential rate here in the United States.

So why are these renewable mandates pushing up prices? Last year, Michael Greenstone and Ishan Nath of the University of Chicago published a study which concluded that renewable energy mandates lead to—I am quoting—substantial increases in electricity prices that mirror the programs' increasing stringency over time.

The report said the intermittent nature of renewables meant that backup capacity must be added and that, by mandating an increase in renewable power, base load generation is prematurely displaced and some of the cost is passed to consumers.

Bans and restrictions on natural gas will also mean higher prices. As I noted in a recent report for the Foundation for Research on Equal Opportunity, more than 30 local governments in

California have passed bans or restrictions on the use of natural gas in buildings. These restrictions are being done, of course, in the name of climate change, but they are in practice a form of energy taxation. By banning the direct use of natural gas, these regulations will force homeowners and renters to use electricity instead, which costs four times as much per joule of energy delivered as natural gas. These higher energy costs could amount to hundreds of dollars per year for each household.

Finally, electric vehicles, these aren't—the subsidies and mandates are, in fact, a form of regressive taxation. As pointed out by Assemblyman Jim Cooper from California, one California Senate district in the Bay Area has collected EV rebates from the State totaling more than \$55 million. That is more than has been collected by seven other senate districts in the State combined so that you have residences and homeowners, families in low- and middle-income senate districts subsidizing luxury electric vehicle purchases by wealthy individuals in the Bay Area. This makes no sense.

Subsidies are only part of the cost. Consumers are also facing dramatic—potentially dramatic increases in electricity prices to pay for public charging stations needed to refuel the costs for those cars. I have calculated, in California alone, the increase in electricity use due to electrification of that State's electric transportation could result in an increase in electricity demand in California of 50 percent. This is in a State that is already experiencing blackouts.

In summary, these efforts to increase access to clean energy are laudable, but policymakers must be paying attention. If we want to decrease inequality, policymakers have to be attentive so that the costs of decarbonizing America's enormous energy and power sector is not borne by low- and middle-income American families.

Thank you.

[The prepared statement of Mr. Bryce follows:]



TESTIMONY BEFORE THE UNITED STATES CONGRESS

*House Subcommittee on Energy*

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## **GENERATING EQUITY**

Improving Clean Energy  
Access & Affordability

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**ROBERT BRYCE**

Visiting Fellow

The Foundation for Research on Equal Opportunity

October 1, 2020

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## INTRODUCTION

Chairman Rush, Ranking Member Upton, and members of the Energy Subcommittee, thank you for inviting me to speak today.

Discussions about energy burden and access to cleaner forms of energy are needed and important. But these discussions must focus more attention on how policies designed to address climate change can result in higher costs for ratepayers and consumers.

I will address three issues: renewable mandates, natural-gas restrictions, and subsidies for electric vehicles.

## RENEWABLE MANDATES AND PRICES

Dozens of states have implemented mandates or goals for renewable energy deployment.<sup>1</sup> In addition, according to the Sierra Club, “over 160 cities, more than ten counties, and eight states” have goals to power their communities solely with renewable energy.<sup>2</sup> But as states have added renewables, some have seen significant increases in electricity prices.

One of the first studies to demonstrate this phenomenon was published in 2017 by Steve F. Hayward and Peter J. Nelson for the Center of the American Experiment. Hayward and Nelson analyzed the impact that renewable-energy mandates have had on Minnesota’s ratepayers. They reported that between 1990 and 2009, the “retail price of electricity in Minnesota was, on average, 18.2 percent lower than the national average.” But as the state added increasing amounts of wind energy, that price advantage disappeared.

Hayward and Nelson found that if over the previous seven years, Minnesota had maintained its historic price advantage on electricity “the state’s consumers would have paid nearly \$4.4 billion less than what the actual cost of electricity turned out to be.” Why did Minnesota’s rates increase along with increased wind capacity? Hayward and Nelson pointed to filings made by Xcel Energy in its requests for rate increases. In one of those documents, the utility said that it had been focusing on carbon-free generation and that it had to spend on new generation units and transmission capacity to “deliver this generation to load. These investments were in addition to the capital investments we always need to make in our distribution, transmission, and generation assets to help ensure we can safely and reliably serve our customers.”

The report also points out that Xcel had to build expensive new high-voltage transmission to comply with Minnesota’s renewable-energy mandates at a cost of some \$1.8 billion. Those costs were passed on to ratepayers. Hayward and Nelson concluded that through

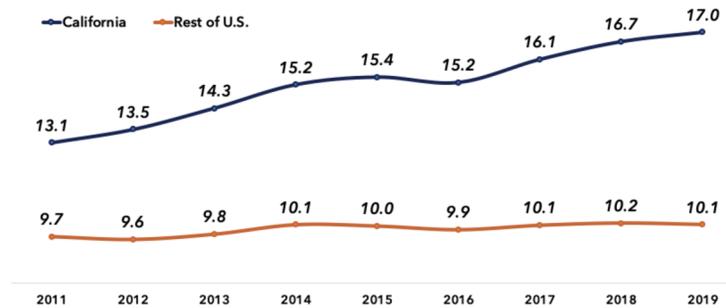
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<sup>1</sup> <https://www.ncsl.org/research/energy/renewable-portfolio-standards.aspx>

<sup>2</sup> Sierra Club, “What are 100% Clean Energy Commitments?”, undated, <https://www.sierraclub.org/ready-for-100/commitments>

2017, the “cost to build out the wind farms currently serving the state’s mandate amounts to around \$10.6 billion.”<sup>3</sup>

**Figure 1. California Electricity Prices vs. Rest of United States, 2011–2019**  
(cents per kilowatt-hour)



**California’s electricity rates are rapidly rising.** Since 2011, California’s electricity prices increased at a rate that was seven times as fast as the rate seen in the rest of the U.S. (Source: Energy Information Administration; Graphic: FREOPP)

### CALIFORNIA: BIG MANDATES, HIGH PRICES

California has implemented some of the most aggressive renewable-energy policies. That push for renewable energy has coincided with huge increases in electricity prices. Indeed, California’s electricity rates have been rising far faster than the U.S. average.

In 2008, then-Governor Arnold Schwarzenegger signed an executive order that required the state’s utilities to obtain a third of the electricity they sell from renewables by 2020.<sup>4</sup> In 2015, Gov. Jerry Brown signed a law that boosted the mandate to 50% by 2030.<sup>5</sup> In 2018, California lawmakers imposed yet another mandate that requires the state’s electric

<sup>3</sup> Steve F. Hayward and Peter J. Nelson, “Energy Policy in Minnesota: The High Cost of Failure,” Center of the American Experiment, October 2017, <https://2lffqo2moysixpyb349z0bj6-wpengine.netdna-ssl.com/wp-content/uploads/2017/10/MN-Energy-10.2017-Final.pdf>

<sup>4</sup> <http://www.schwarzenegger.com/issues/milestone/protecting-the-environment-and-promoting-clean-energy>

<sup>5</sup> <https://www.sfchronicle.com/business/article/California-may-reach-50-renewable-power-goal-by-12354313.php>

utilities to procure at least 60% of their electricity from renewables by 2030, and to be producing 100% “zero-carbon” electricity by 2045.<sup>6</sup>

The imposition of these mandates coincided with a dramatic increase in electricity prices. Between 2011 and 2019, the average price of electricity in California for all users— industrial, commercial, and residential—jumped by nearly 30 percent, or more than seven times the rate of increase seen in the rest of the U.S.<sup>7</sup>

### **MANDATES CORRELATE WITH SURGES IN ELECTRICITY PRICES**

Renewable-energy proponents often claim that the price of generating electricity from wind and solar is falling. That may be true. But integrating those sources into the electric grid is expensive. Those integration costs include new wires, poles, transformers, high-voltage transmission capacity, and batteries.

All of the wind and solar capacity that gets added to the electric grid must be matched by an equal amount of traditional generation (or perhaps, batteries) to assure reliability when the sun isn’t shining or the wind isn’t blowing. This need for firm generation capacity means that utilities or grid managers must continue operating—and paying for— traditional generation units. This dynamic was explained in a 2017 analysis by James Bushnell, an economist at the University of California, Berkeley. Bushnell said that the renewable energy being added to California’s grid was driving down wholesale electricity prices. That sounds like a positive thing. But Bushnell went on to explain:

Since wholesale prices cannot support the cost of this much generation (new and old), increasingly the gap must be made up through rising margins between wholesale and retail prices. Utilities and other retailers have to pay high market prices for new renewables instead of being able to “buy low” on the wholesale market. Because all retailers face the same regulation, they pass these costs on to end-users. And this doesn’t even consider the costs of new transmission, most of which is being added to boost the power system’s ability to access and absorb large amounts of renewable energy. Transmission costs, which are also charged through to electricity end-users as part of the retail prices...will continue to grow in coming years.<sup>8</sup>

A 2019 study done by academics at the University of Chicago came to the same conclusions as Bushnell. The study’s authors, Michael Greenstone and Ishan Nath, found that renewable-energy mandates “raise electricity prices more than previously thought” due to “hidden costs that have typically been ignored.” It said that the mandates “come at a high cost to consumers and are inefficient in reducing carbon emissions.”

The report identified the factors that drive up the cost of power: “the intermittent nature of renewables means that back-up capacity must be added” and that “by mandating an

<sup>6</sup> <https://www.sacbee.com/news/politics-government/capitol-alert/article218128485.html>  
<https://www.npr.org/2018/09/10/646373423/california-sets-goal-of-100-percent-renewable-electric-power-by-2045>

<sup>7</sup> <https://www.eia.gov/electricity/monthly/>

<sup>8</sup> James Bushnell, “Breaking News! California Electricity Prices Are High,” Energy Institute at Haas, February 21, 2017, <https://energyathaas.wordpress.com/2017/02/21/breaking-news-california-electricity-prices-are-high/>

increase in renewable power, baseload generation is prematurely displaced, and some of the cost is passed to consumers.” It concluded that renewable-energy mandates lead to “substantial increases in electricity prices that mirror the program’s increasing stringency over time.”<sup>9</sup>

### ONTARIO AND GERMANY SEE BIG PRICE INCREASES

The same issues—and price increases for consumers—are also apparent in Canada and Germany. In Ontario, in 2009, the provincial government launched the Green Energy Act which guaranteed long-term contracts to renewable-energy generators at prices that were well above market rates. To pay for the measure, Ontario, which is home to nearly a third of Canada’s 36 million residents, added surcharges to ratepayers’ electric bills. The province also forced the closure of coal plants, claiming that doing so would improve public health. The result: between 2008 and 2016, residential electricity rates in the province jumped by 71 percent, which was more than double the average increase in the rest of Canada over that time period.<sup>10</sup>

Germany also shows how aggressive renewable mandates push up electricity prices. Between 2000 and 2017, Germany spent about \$222 billion on renewable energy subsidies as part of its efforts to slash its greenhouse-gas emissions. The country has pledged to slash those emissions by 40 percent compared to 1990 levels, by 2020, and by 95 percent by 2050.<sup>11</sup> The total invoice for the Energiewende may total some \$500 billion by 2025 and that figure only counts the investment needed in the electricity sector.<sup>12</sup>

According to Agora Energiewende, a think tank that focuses on Germany’s transition toward renewables, residential electricity prices in Germany jumped by 50 percent between 2007 and 2018. The result: German residential customers now have some of the highest-priced electricity in Europe, about \$0.37 per kilowatt-hour.<sup>13</sup>

<sup>9</sup> Michael Greenstone and Ishan Nath, “Do Renewable Portfolio Standards Deliver,” Energy Policy Institute at the University of Chicago, May 2019, <https://epic.uchicago.edu/wp-content/uploads/2019/07/Do-Renewable-Portfolio-Standards-Deliver.pdf>

<sup>10</sup> Elmira Aliakbari, Kenneth P. Green, Ross McKittrick, and Ashley Stedman, eds., “Understanding the Changes in Ontario’s Electricity Markets and Their Effects,” Fraser Institute, April 2018, [https://www.fraserinstitute.org/sites/default/files/understanding-the-changes-in-ontarios-electricity-markets-web-final\\_0.pdf.ii](https://www.fraserinstitute.org/sites/default/files/understanding-the-changes-in-ontarios-electricity-markets-web-final_0.pdf.ii).

<sup>11</sup> Stanley Reed, “Germany’s Shift to Green Power Stalls, Despite Huge Investments,” *New York Times*, October 7, 2017, <https://www.nytimes.com/2017/10/07/business/energy-environment/german-renewable-energy.html>

<sup>12</sup> Soren Amelang, “How much does Germany’s energy transition cost?” Cleanenergywire.com, June 1, 2018, <https://www.cleanenergywire.org/factsheets/how-much-does-germanys-energy-transition-cost>

<sup>13</sup> Patrick Graichen, Alice Sakhel, and Christoph Podewils, “The Energy Transition in the Power Sector: State of Affairs in 2017,” Agora-energiewende.de, [https://www.agora-energiewende.de/fileadmin/Projekte/2018/Jahresauswertung\\_2017/Energiewende\\_2017\\_-\\_State\\_of\\_Affairs.pdf](https://www.agora-energiewende.de/fileadmin/Projekte/2018/Jahresauswertung_2017/Energiewende_2017_-_State_of_Affairs.pdf), 37.

### RESTRICTIONS ON NATURAL GAS ARE REGRESSIVE TAXES

Bans or restrictions on natural gas can also lead to higher prices for consumers. As I noted in a recent report for the Foundation for Research on Equal Opportunity, more than 30 local governments in California have passed bans or restrictions on the use of natural gas in buildings.<sup>14</sup> These restrictions, which were approved by California regulators, are being done in the name of climate change and decarbonization, but they are, in practice, a form of energy taxation.<sup>15</sup> Prohibiting the direct consumption of natural gas in furnaces, stoves, clothes dryers, and water heaters forces residential consumers to buy electricity, which in California is four times as expensive as natural gas on an energy-equivalent basis.

In 2019, the average cost of residential electricity in California was 19.2 cents per kilowatt-hour. That was the highest price in the continental U.S. outside of the Northeast.<sup>16</sup> There are 3,412 Btu in each kilowatt-hour of electricity. Therefore, assuming a 100% efficient use of electricity, California residents are paying about \$56 per MMBtu for the electricity they consume. By contrast, the average residential price of natural gas in California in 2019 was \$13.32 per MMBtu.<sup>17</sup> Assuming that gas is consumed in an appliance or heater that is 95% efficient, the cost of natural gas to residential consumers is about \$14 per MMBtu.<sup>18</sup> Thus, by banning gas-fired appliances, California regulators are poised to require homeowners and renters to pay four times as much for their household energy as they would if they were consuming natural gas directly. Those higher energy costs could amount to hundreds of dollars per year for each household.<sup>19</sup>

### EVS ARE FUELED BY SUBSIDIES

Electric vehicle subsidies provide another example of how climate goals are imposing costs on low- and middle-income consumers. This can be seen by once again, looking at California, where the state subsidizes the purchase of EVs. An analysis of data published by the Clean Vehicle Rebate Project shows that California Senate District 13, in the Bay Area, has collected more than 23,000 rebates from the state worth about \$55.3 million. That sum is more than what was rebated to residents of seven other senate districts in the state, *combined*.<sup>20</sup> That list includes:

- Senate District 16: \$6.1 million
- Senate District 14: \$2.2 million

<sup>14</sup> <https://freopp.org/the-high-cost-of-california-electricity-is-increasing-poverty-d7bc4021b705>

<sup>15</sup> <https://www.energy.ca.gov/news/2019-12/cec-approves-first-local-energy-efficiency-standards-go-beyond-2019-statewide>. Note that the CEC's says it is "leading the state to a 100 percent clean energy future. It has seven core responsibilities: developing renewable energy, transforming transportation, increasing energy efficiency, investing in energy innovation, advancing state energy policy, certifying thermal power plants, and preparing for energy emergencies."

<sup>16</sup> <https://www.eia.gov/electricity/monthly/archive/february2020.pdf>, Table 5.6.B.

<sup>17</sup> [https://www.eia.gov/dnav/ng/ng\\_pri\\_sum\\_a\\_FPGO\\_PRS\\_DMcf\\_a.htm](https://www.eia.gov/dnav/ng/ng_pri_sum_a_FPGO_PRS_DMcf_a.htm)

<sup>18</sup> <http://www.amsenergy.com/fuel-cost-calculator/>

<sup>19</sup> <https://www.consumeraffairs.com/homeowners/gas-vs-electric-appliances.html>

<sup>20</sup> <https://cleanvehiclerebate.org/eng/cvrp-rebate-map>

- Senate District 12: \$3.6 million
- Senate District 5: \$9.1 million
- Senate District 4: \$6.7 million
- Senate District 40: \$6.5 million
- Senate District 8: \$13 million

Wealthy EV drivers have been getting subsidized for years. In 2016, two academics at the University of California, Berkeley, Severin Borenstein and Lucas W. Davis, published a paper which concluded that the majority of the money being collected under federal programs aimed at promoting energy efficiency and alternative transportation was going to wealthy Americans. They found “the most extreme disparity is in the program aimed at electric vehicles, where we find that the top income quintile has received about 90% of all credits.” They continued saying that taxpayers who had adjusted gross incomes “in excess of \$75,000 have received...about 90% of all credit dollars aimed at electric cars.”<sup>21</sup>

In addition to helping pay for the subsidies given to EV buyers, consumers are also facing increases in electricity rates to pay for the public charging stations needed to refuel those cars, as well as the grid upgrades that will be required to meet additional electricity demand.

The cost of EV infrastructure and the grid upgrades that will be needed to support widespread adoption of those vehicles has received scant attention. But the costs of supporting hundreds of millions of EVs will be enormous. In January, New Jersey Gov. Phil Murphy issued an executive order requiring the state’s regulators to “make sweeping regulatory reforms...to reduce emissions and adapt to climate change.” The order says the state should be running on 100-percent “clean energy” by 2050. The goals in the order include “100-percent carbon-neutral electricity generation and maximum electrification of the transportation and building sectors.”<sup>22</sup> But shifting transportation energy use from liquid fuels to electricity and full electrification of buildings will result in dramatic increases in electricity demand.

A report published by the state that accompanied the governor’s executive order, notes that achieving the clean energy target will require doubling the state’s electricity use.<sup>23</sup> Accommodating such a dramatic increase, and doing so in just 30 years, will require a complete overhaul of New Jersey’s electric grid. While the final costs of such an overhaul are not known, the price tag will likely total tens of billions of dollars—all of which will have to be paid for by consumers.

<sup>21</sup> <https://www.journals.uchicago.edu/doi/full/10.1086/685597>

<sup>22</sup> <https://www.nj.gov/governor/news/news/562020/approved/20200127a.shtml>

<sup>23</sup> [http://d31hzhk6di2h5.cloudfront.net/20200127/84/84/03/b2/2293766cd081ff4a3cd8e60aa/NJBPU\\_EMP.pdf](http://d31hzhk6di2h5.cloudfront.net/20200127/84/84/03/b2/2293766cd081ff4a3cd8e60aa/NJBPU_EMP.pdf), see page 262, Figure J, and text which says that gas-fired generation will decline “even as total electricity use increases by more than 100%.”

**CONCLUSION**

In summary, efforts to increase access to cleaner energy and power sources are laudable. But while considering how to make that happen, policymakers must have frank and transparent discussions about how to lighten the energy burden, not increase it. Decarbonizing our energy and power systems cannot be done quickly or cheaply. If the goal is to decrease inequality, policymakers must be attentive so that the cost of decarbonizing America's enormous energy sector is not borne by low- and middle-income American families.

Mr. RUSH. The gentleman yields back.  
And the Chair now recognizes Ms. Wyatt for 5 minutes for an opening statement.

**STATEMENT OF ALEXANDRA M. WYATT**

Ms. WYATT. Thank you very much. Chairman Rush, Ranking Member Upton, Chairman Pallone, distinguished members of the subcommittee, thank you.

My name is Alexandra Wyatt, and I am here on behalf of GRID Alternatives, where I am policy and regulatory manager. GRID is the Nation's largest nonprofit solar installer and a leader in helping low-income communities, communities of color, and Tribal communities nationwide get clean, affordable solar power and solar jobs.

Since 2004, we have served more than 16,000 families, all low-income households and tenants of affordable housing, with residential, multifamily, and community solar systems that have brought them more than \$400 million in lifetime savings. We administer a number of equity-focused solar, clean mobility, and workforce training programs.

There are few more urgently needed and high return investments our society can make than mitigating climate change through eliminating greenhouse gas emissions, preventing needless death and suffering by reducing toxic pollution, and reducing high energy burdens that contribute to economic insecurity and worse, crises that all result largely from our traditional energy system and that all disproportionately hurt low-income communities and communities of color.

The dollar value of addressing these problems is in the trillions, and their importance in matters of racial and economic justice is invaluable. Undervaluing and externalizing these problems has stacked the deck in favor of fossil fuels artificially and unfairly. Yet, luckily, the clean energy transition already underway can help solve all of these problems at once, while spurring economic development. Policy choices will determine whether and how well it does. GRID's work shows that it is possible.

Through policies that get pollution sources out of underserved communities and clean healthy zero-carbon resilient local energy solutions into them while protecting communities that have depended on fossil fuels for their livelihoods, Congress can seize the opportunity to leverage the clean energy transition as a solution to some of our country's highest needs, including equity and racial justice.

GRID has seen firsthand how expanding access to clean energy can solve multiple problems. When families, like our clients, struggling with high energy burdens, particularly now in the pandemic, have access to bill savings from solar, they get significant, long-term financial relief. That then leads to social stability, economic development, and community health. When clean energy solutions are combined for underserved communities, like solar plus efficiency, weatherization, electrification, electric bikes or cars and chargers, and storage, their benefits multiply.

When a more diverse range of communities sees clean energy technology as viable solution, markets can move beyond early

adopter phases and scale faster. When communities have control and ownership over their energy, their energy systems better meet their needs and their energy dollars stay local. When there are accessible and inclusive on-ramps to well-paying jobs in the fast-growing clean energy industries, industries get the skilled and diverse work force they need, and more Americans can support their families.

Last but not far from least, when communities at the front lines of the climate crisis have energy storage and resilience, devastation from such is reduced. And when pollution from traditional energy sources no longer poisons the disproportionately low-income Black and Brown communities outside their fence lines, those communities won't suffer and die from the health problems, neighborhood disinvestment, and other effects resulting from that environmental injustice. They can breathe.

Despite all of these benefits, low-income households face a number of barriers to clean energy even though they often benefit the most.

On top of threshold financial hurdles of lack of access to capital and credit, lower income households may be shut out of incentives like the Federal investment tax credit. Other obstacles may include language, education, mistrust, home ownership status and housing conditions more often in these communities. Well-designed community solar programs can overcome some of those barriers, but they are not available everywhere. All together, these barriers contribute to market disinterest in the absence of targeted intentional policies and investments.

My written testimony makes a number of specific policy recommendations to address these barriers. They are drawn from GRID's years of direct on-the-ground-and-roof experience working exclusively with low- and moderate-income households and underserved communities. They are also informed by our partnerships with community-based organization; though, to be clear, we don't purport to speak for the communities we serve or substitute for their own input.

To summarize, first, equitable and just processes are necessary for success. Frontline communities aren't just experts on equity issues. They are experts, period. People closest to the problem are closest to the solution; however, they are often not actively included in decisions early on.

Second, financial hurdles are threshold barriers for low-income and low-wealth families. Policy and investments recognize this and cite incentives to enable clean energy with no upfront or variable costs. The investments can be made in a number of means, including careful coordination with existing energy assistance programs. The ITC should be extended with a direct pay option to make it available to low-income households, as well as nonprofits and Tribes, as ineligibility puts them at a competitive disadvantage. Well-designed policies won't shift any additional costs on to low-income taxpayers or ratepayers.

Third, policies must comprehensively account for the many wide-ranging and intertwined benefits of clean energy access, including racial equity and work force development. GRID's work shows that models combining these benefits work.

Finally, it is not just electric power that people need, but also political power, powers in their communities, and power over their own futures. Policymakers can use a number of strategies to promote local community-level ownership and control over energy systems.

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

[The prepared statement of Ms. Wyatt follows:]



**Testimony of Alexandra M. Wyatt  
Policy and Regulatory Manager, GRID Alternatives**

**Before the Energy Subcommittee of the  
U.S. House of Representatives Committee on Energy and Commerce  
Hearing on "Generating Equity: Improving Clean Energy Access and Affordability"**

**Thursday, October 1, 2020**

Chairman Rush, Ranking Member Upton, Chairman Pallone, and distinguished members of the Subcommittee: Thank you for the opportunity to provide testimony to the Energy Subcommittee on improving equitable access to clean energy and increasing affordability. My name is Alexandra Wyatt, and I am a Policy and Regulatory Manager at GRID Alternatives ("GRID"). GRID is a national 501(c)(3) nonprofit organization whose mission is to make renewable energy and job training accessible to underserved communities. GRID is the nation's largest nonprofit solar installer and a leader in helping low-income communities, communities of color, and Tribal communities nationwide get clean, affordable solar power and solar jobs. GRID implements residential, multi-family, and community solar projects that exclusively benefit low-income households and tenants of affordable housing. Since 2004, we have installed nearly 14,000 systems. We have also launched electric vehicle and solar-plus-storage initiatives that maximize the economic and environmental benefits of solar and increase resilience against climate change impacts. GRID administers a number of low-income solar, clean mobility and workforce training programs on behalf of state agency, utility commission and utility partners. GRID is also a leading advocate for equitable solar, clean energy, clean mobility, and climate policies, and maintains the Low-income Solar Policy Guide as an online resource in partnership with Vote Solar.

Improving clean energy access and affordability are urgent needs, and tremendous opportunities. Through the growth of renewable energy, the United States can address some of the greatest challenges facing lower-income and disadvantaged communities: the high costs of housing and energy, unemployment and underemployment, pollution and health disparities, climate impacts, and racial injustice. Expanding access to distributed renewable energy sources like solar can provide significant and long-term financial relief to families struggling with high and unpredictable energy costs, particularly now in light of the economic turmoil and increased home energy needs resulting from the pandemic. At the same time, equitably expanding access to clean energy can provide living-wage career paths in fast-growing clean energy industries that now employ millions of people, outpacing fossil fuel sectors several times over. Along with these and other significant economic benefits, renewables can be sources of clean, healthy, zero-carbon, resilient local energy, sited in and benefiting communities that have been disproportionately impacted by traditional energy generation. GRID's experience shows that it is crucial for policymakers to recognize and value all of these diverse benefits together, and to deliberately make equity a driving principle throughout policy design and implementation by letting communities lead. Our specific policy recommendations also arise from our on-the-ground experience.

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I. **Why the Transition to Clean Energy Must Be Equitable**

A. **Overall Benefits of the Transition to Clean, Renewable Energy**

There are few more worthwhile and urgently necessary investments than mitigating climate change through reducing greenhouse gas emissions and preventing needless death by reducing toxic air pollution emissions,<sup>1</sup> even before accounting for the fact that low-income communities and communities of color disproportionately bear the brunt of both of these crises. The benefits are easily in the trillions of dollars.<sup>2</sup> When acknowledging the environmental justice component of these issues and the high costs that already overburdened communities face for their energy, it becomes even more apparent that we must transition away from the polluting ways that we have produced and consumed power for our homes, buildings, industries, transportation, and more, and that we must do so as rapidly as possible. An energy transition is, indeed, already underway. Yet the transition itself can either replicate or remedy existing economic and racial injustices, depending on policy choices. Congress can seize the opportunity of the current moment to leverage clean energy as a force to promote equity and racial justice along with economic development, solving multiple problems at the same time. My testimony addresses why and how.

B. **Energy Burdens**

The traditional, fossil fuel-based system has provided great benefit to some, but it has imposed severe and disproportionate costs on others. Those costs have too often either gone unrecognized or been dismissed as economic “externalities.”<sup>3</sup> Some of these costs are very direct, in that energy simply costs more for lower income families. Low-income households spend three or more times as much of their income on energy costs compared to non-low-income households, even though low-income households consume less energy per capita than other households. Households of color also spend substantially higher percentages of their incomes on energy than white households. High energy burdens (the percentage of gross household income spent on heating, cooling, and other home energy services) can lead to energy insecurity and force families to choose between paying for essential utilities and investing in their own futures. Some Americans, particularly residents of Tribal areas, also face costs resulting from energy poverty—that is, not having modern energy sufficient to meet their needs.<sup>4</sup> At GRID, our clients have told us that the savings they’ve gotten from solar have given them peace of mind and let them maintain safe and healthy home conditions, support their families, handle unexpected expenses, and simply make ends meet.

C. **Environmental Injustice**

The traditional energy system has also imposed severe environmental and health costs. It has done so in a very unjust and racially inequitable way that has distorted our entire economy and contributed to our overall current state of societal inequality. For generations, fossil fuels have disproportionately impacted the health and well-being of low-income communities, particularly communities of color and indigenous communities. Communities outside the fence lines of power plants and energy infrastructure are subjected to toxic pollutants that contribute to high rates of asthma, cancer, heart disease, and birth defects,<sup>5</sup> and now, COVID-19 mortality as well,<sup>6</sup> along with cycles of poverty and

public disinvestment in neighborhoods that can least afford it.<sup>7</sup> In addition to causing many serious health and quality of life impacts, these same energy sources are a major contributor to climate change. Structural vulnerabilities mean that low-income families are at the front lines of the climate crisis. They are impacted first and worst by climate change-related extreme weather, disasters, and health impacts, despite having contributed less to our greenhouse gas emissions.

#### **D. Impact of Policy on Equity**

Our energy system is now changing. Policy choices will, in part, determine whether the uptake of clean energy technologies will be rapid enough to align with climate science, as well as whether it will be equitable enough to benefit all Americans without imposing new harms or perpetuating inequality. Getting away from the old, polluting, and racially unjust fossil fuel-based system is good and necessary, but it isn't enough. Beyond getting pollution sources out of fenceline and frontline communities, we need to get solutions into them too, while protecting communities that have traditionally depended on fossil fuels for their livelihoods. Equitable access to clean, renewable energy can directly remedy the problems and burdens caused by the traditional energy system. There are myriad reasons for policy-makers to leverage the energy transition as a tool to promote equity and help constituents.

#### **E. Results of Equitable Energy Policy**

Equity and racial justice are, of course, sufficient goals in their own right. People disadvantaged by existing systems are in crisis and need solutions now. Additionally, as a matter of fairness, low-income taxpayers and utility ratepayers have helped pay for clean energy research and incentives, and they should benefit from them too. Yet equitable access to affordable clean energy, especially distributed energy resources, benefits everyone. It addresses so many problems at once.

GRID Alternatives has seen firsthand: when the energy bill savings provided by solar reach those who need them most, it contributes to social stability, economic development, and community health, and helps families avoid displacement and provide for better futures. When the most vulnerable communities have access to energy storage and resilience, the devastation from disasters is reduced and economic recovery improves. When an economically and racially more diverse range of communities see various clean energy technologies as viable solutions, local markets can move beyond the "early adopter" phase and scale more rapidly.<sup>8</sup> When there are accessible and inclusive on-ramps to well-paying jobs in clean energy industries, the industries get the skilled and diverse workforce that they need, and more Americans can provide for their families while building meaningful careers that contribute to their communities. When communities have control and ownership over their energy, their energy systems better meet their needs and their energy dollars stay local.

With the energy transition unquestionably underway, we simply can't afford not to include everyone. According to a 2018 report by the Department of Energy (DOE) National Renewable Energy Laboratory (NREL), 43% of the U.S. population is at or below 80 percent of their area median income (the Department of Housing and Urban Development (HUD) definition of low-income), representing 49.8 million low-income households.<sup>9</sup> An estimated half of these households are in buildings suitable for solar,<sup>10</sup> or even better, solar plus energy storage and other technologies, while most of the remaining

households could benefit greatly from community solar and other clean energy sources. Moreover, Tribal areas constitute 2% of the country's land base but 5% of its renewable energy potential.<sup>11</sup> Federal policies targeting equity could open up access for these communities on a large scale.

## II. Barriers to Clean Energy Access and Affordability

Despite the cost savings and many other benefits of clean energy, low income households and communities have faced barriers to access—even though they could benefit the most. People of color are also less likely to be getting the direct benefits of renewable energy, even controlling for income.<sup>12</sup>

### A. Financial Barriers

First and foremost, any upfront investment required to go solar remains a significant threshold barrier for the families who most need relief from energy bills. An average four kilowatt (kW) solar electric system on a home will cost more than \$15,000. This is no small chunk of change, particularly when we consider that the national median household income is \$65,712 for all Americans in 2019, but even lower for Hispanic/Latino (\$55,658) and Black (\$43,862) Americans.<sup>13</sup> Popular existing clean energy financing mechanisms, such as leasing or power purchase agreement (PPA) relationships, do enable homeowners to install solar with little or no upfront costs; however, participation in these models generally requires a credit score or debt-to-income ratio minimum that can be a barrier to low-income consumers and people of color who, on average, are more likely to have lower credit scores.<sup>14</sup> Furthermore, solar leases and PPAs are currently unavailable to customers in some markets. Consumer loan customers with lower credit scores also either fail to qualify or are charged higher interest payments that reduce the benefits of solar ownership.<sup>15</sup> There is often anxiety related to taking out new loans or entering new financial arrangements that can be prohibitive on its own to the process of going solar, and maintenance costs may also be a concern.

Low-income families may be unable to take advantage of the largest public incentive to making solar affordable, the federal solar Investment Tax Credit (ITC), or any additional state and local tax credit incentives. People with lower incomes are often not in a qualifying tax bracket or otherwise do not have the tax burden needed to make the nonrefundable federal ITC valuable. Likewise, Tribal entities and nonprofits cannot directly access the ITC without a direct payment option.

### B. Locational Barriers

Homeownership status, physical factors, and housing conditions also present barriers. Many homes cannot host solar due to tree shading, orientation, or other factors.<sup>16</sup> Moreover, 32 percent of residents nationwide live in multi-unit buildings or homes with shared roofs. Renters have difficulty participating in rooftop solar even if their home is suitable; there is a fundamental disconnect between the entity that would benefit most from the utility bill savings of solar (the tenant) and the entity who would need to make or approve the solar investment (the property owner). These issues are particularly pronounced for low-income households, who are more likely to live in multifamily housing or rent their homes. Those that do own their homes<sup>17</sup> are disproportionately likely to have unsuitable roofs. The history of suburbanization, redlining, and discriminatory housing policies means that people

of color and families with low incomes are more likely to live in older homes that need repairs and upgrades, including expensive roof repairs. In more rural communities, over one third of homes are manufactured housing, which also presents challenges to clean energy access. As discussed below, community solar can be a solution for these households, but it is not available everywhere, and programs are not always well designed to serve low-income customers.

#### **C. Client Acquisition Barriers**

A number of outreach and educational barriers contribute to the challenges involved in extending the benefits of solar to vulnerable communities. Often the targets of scams, customers in low-income communities may be distrustful of claims relating to energy bill savings and may have concerns about their privacy. Traditional sales teams may not be prepared to discuss solar energy with multilingual and multicultural households. Low-income families may be less familiar with solar or may regard it as a luxury for the wealthy, and so may not believe that they can participate in solar energy at all.

#### **D. Market Barriers**

All these barriers together contribute to another large one: market disinterest. With so many issues to address, successfully serving solar markets in low-income and disadvantaged communities requires that a company's marketing, sales and account management activities be focused to that end. The additional effort and investment needed to serve this market has limited the number of companies that are recruiting customers from these communities. Without supportive policies at federal, state, and local levels, together with targeted, intentional incentives for investments, the low-income solar market will not develop or scale as with the general market.

### **III. Federal Policy Recommendations to Expand Access to Clean Energy Benefits and Savings**

#### **A. Ensure Inclusive and Equitable Processes**

##### **1. Legislative Branch**

Policies must ensure that underserved communities are empowered to design their own energy futures. Communities most impacted by the problem are closest to the solution. Community-driven solutions thus capture essential expertise and are more comprehensive, robust, and durable. Policy design without vulnerable communities at the table results in outcomes that are not only inequitable, but unworkable and incomplete. As this Subcommittee has recognized through its convening of a number of equity-focused hearings, legislation must be developed through equitable processes which center environmental justice and the perspectives of frontline communities.<sup>18</sup> Congress could further expand its own institutional capacity by creating a Climate and Environmental Equity Office.

##### **2. Executive Branch**

Equitable processes are also needed at the agency level. Many federal agencies and commissions have relevance to expanding clean energy access and affordability, including not only the Department of

Energy but also the Departments of Housing and Urban Development, Transportation, Labor, Education, Interior, and Justice; the Federal Emergency Management Agency; the Environmental Protection Agency; the Federal Energy Regulatory Commission; and others. Inter-agency coordination on environmental justice and clean energy access, with oversight body(ies) or advisory council(s) with direct representation from Tribes, low-income, underserved and frontline communities, would greatly benefit the efficacy and equity of regulations and policy implementation. Communities should be empowered not just to advise, but also to hold decision-makers accountable for meeting the goals shaped by their input. During program implementation, meaningful education and outreach in partnership with trusted community organizations is invaluable.

### 3. Achieving Inclusive Participation

At all levels, policy design and implementation processes must recognize and address participation barriers that low income and underserved communities face, such as full-time jobs, unpredictable schedules, childcare needs, and other burdens and constraints. Policymakers should recognize the value of community-based contributors' time through intervenor compensation or other means where appropriate,<sup>19</sup> and provide capacity building and technical assistance resources to community-based and grassroots organizations so they can participate meaningfully in stakeholder processes. It's not enough to open the door to participation; decision-makers must actively solicit these perspectives to get the whole picture and craft realistic and robust policy. For equity to be a driving principle throughout policy design and implementation, not an afterthought, frontline communities must lead.

#### B. Address Financial Barriers and Incentive Structures

Financial barriers are a threshold issue that must be addressed for low-income access to clean energy. Policies and programs should aim to enable low-income households and underserved communities to benefit financially from clean energy without either upfront costs, or a risk of variable costs over time.

##### 1. Near-Term Stimulus

Families and businesses are suffering. Investing now in affordable, reliable and renewable energy, energy storage, and clean mobility will help families weather financial hardship related to the ongoing pandemic, help strengthen community resilience to economic and other shocks, and spur much-needed economic recovery and opportunity across the country. A focus on equity will enhance the effectiveness of clean energy as an economic driver. The federal government should coordinate with states and Tribal Nations to identify shovel ready projects for green stimulus, in direct consultation with frontline communities to prioritize equity and access.

The Solar Investment Tax Credit has been an effective financial incentive for the growth of solar, but is currently scheduled to decline starting in 2021. The timing of this step-down is an unnecessary burden on clean energy. The ITC should be extended (and expanded to include energy storage). There should be a direct pay option or other cash payment such as that offered previously through the 1603 Program,<sup>20</sup> to ensure that low-income customers and other entities without tax appetites, including Tribes, may equitably access the benefits of the ITC without incurring additional transaction costs.

## 2. Longer-Term Incentives and Investment

### a. Investments to Overcome Financial Barriers to Clean Energy Access in Low-Income and Underserved Communities

One exemplary policy pioneered by communities in New York requires directing 40% of all governmental investments in clean energy toward disadvantaged communities, utilizing data obtained through equity impact mapping.<sup>21</sup> This or similar benchmarks should be scaled up to the federal level to ensure proportionate and effective distribution of funds, while encouraging long-term market development.

There have been a variety of legislative proposals in recent years to provide federal funding to bridge gaps and promote low-income residential, multifamily, and community solar and energy storage through grants, loans, or other incentives. Properly designed and deployed, such investments would be highly effective and result in very high returns in terms of financial security, health, economic development, workforce development, resilience, and climate benefits. Funds could be distributed through a variety of means including newly designed programs, Green Bank-style financial institutions,<sup>22</sup> revival of DOE's Energy Efficiency and Conservation Block Grant program, and expansion of existing programs such as DOE's State Energy Program and the Office of Indian Energy. Existing legislative authorities can be updated to explicitly allow solar, energy storage, community solar, grid modernization, low-income energy burden reduction programs, demand reduction, non-wires alternatives, electrification, and energy resilience projects such as microgrids.<sup>23</sup>

HUD should commit to deploy solar for all federally-assisted affordable housing properties. Such deployment should encourage integration of storage and other distributed energy resources to the extent practicable, aimed at increasing resiliency.

Tribal Nations should have access to administer all grants, incentives and funding directly, and would also benefit from technical assistance and greater flexibility with respect to cost match requirements.

### b. Harmonization with and Expansion of Energy Assistance Programs

Solar and clean energy assistance programs should be funded separately from or incrementally to the existing Low-Income Home Energy Assistance Program (LIHEAP) and Weatherization Assistance Program (WAP). These programs should, themselves, be fully funded to be able to serve all eligible households nationally. Clean energy access should not be set up to appear to compete for funds with energy assistance and weatherization, which are vitally and increasingly important.

These general energy assistance programs nevertheless should be well integrated with federal and state clean energy efforts. Solar can offer a longer-term and more cost-efficient solution than simply paying utility bills, especially in combination with efficiency and weatherization.

For the LIHEAP program, the WAP spending allowance should be expanded, and states should be allowed to use up to 100% of the funds on energy efficiency, smart thermostats, solar, energy storage, home electrification, and community solar projects that serve eligible households.

Funding to meet needs that can be prerequisites to going solar, like roof repairs or electrical upgrades, can also help more rapidly deploy clean energy where it can have the most impact.

Under WAP, a number of unnecessary and outdated restrictions that hamstring state administrators can be loosened to improve the program,<sup>24</sup> and nonprofits and other entities with experience in solar and clean energy access should be allowed to administer funds, in addition to community action agencies.

Raising income eligibility thresholds for programs to 80% of Area Median Income, with commensurate funding, would also enhance clean energy access and affordability.

### 3. Other Supportive Policies

#### a. Federal Policy to Support Funding and Financing from Non-Federal Sources

A federal Renewable Electricity Standard, building on successful state programs,<sup>25</sup> would promote equitable access to clean energy with strong carve outs for distributed energy resources benefiting low-income and underserved communities and owned and/or controlled by those communities.

Federal policies should also encourage state regulators and utilities to fully value and compensate for the benefits of renewable energy generation, especially for low income customers. Compensation for solar generation via net metering, a billing mechanism that credits solar energy system owners for the electricity they add to the grid, has proven to be a straightforward, effective, and overall equitable way to incentivize the installation of distributed energy systems around the country.<sup>26</sup>

To ensure that residents of subsidized housing can access savings from net metering or other compensation mechanisms, HUD should be directed to issue a national exemption of solar bill credits when calculating utility allowances, similar to the memorandum issued by HUD concerning virtual net metering credits in California.<sup>27</sup>

The Public Utility Regulatory Policies Act of 1978<sup>28</sup> could also be amended to require each utility, to the extent practicable, to make investments in programs aimed at expanding access to clean energy technologies benefitting low-income households and underserved communities.

#### b. Community Solar

Community solar programs, sometimes known as “shared solar” or “solar gardens,” are not currently authorized in every state, but they can help address both the physical and financial barriers that low income households face to directly benefiting from solar. Community solar allows individual subscribers to directly benefit from a solar installation sited elsewhere in the community, eliminating the need for roof space. Subscribers receive a credit on their utility bill for the clean energy produced by the system using the Virtual Net Energy Metering mechanism, saving money each month.

The federal government should institute or encourage equitable community solar policies that are flexible enough to allow for a variety of ownership and contract models to meet different consumers’ preferences and financial standing; don’t undermine other existing renewable energy programs;

contain strong consumer protections; and include a targeted focus on serving low-income consumers, such as through a carveout or incentive adder.<sup>29</sup>

c. Reducing “Soft Costs” and Other Barriers

Other ways to further reduce the costs of solar and extend it to more communities include soft cost<sup>30</sup> reduction, such as the SolarAPP+ (Solar Automated Permit Processing) initiative supported by DOE’s NREL<sup>31</sup> to make the process of going solar easier and cheaper for customers, and allow local governments to quickly and safely approve applications.

Strong, uniform federal consumer protection standards can also provide necessary reassurance for low-income households and reduce customer acquisition costs. Clean energy benefits businesses as well as consumers, but successful clean energy policies should not create incentives for predatory lending or exploitation of communities for financial gain. Rather, they should seek to maximize benefits, most importantly bill savings, for participating households. Community input can shape robust consumer protection measures, disclosures, and accountability measures that protect both vulnerable customers and small businesses.

**C. Maximize and Capture the Many Benefits of the Clean Energy Transition**

1. Integrate Programs and Address the Energy Transition Comprehensively

It is important for policymakers to recognize, measure, and capture the many benefits of clean, renewable energy, including equity. Failing to do so artificially tilts the market toward dirtier, environmentally unjust fossil fuels, and interferes with the deep decarbonization that is needed. Aligned solutions or co-benefits should be addressed together whenever possible, via prior planning.

At the levels of policy and program design and general implementation, integration and harmonization across programs, agencies, and sectors can result in greatly increased efficacy per federal dollar.

At the point of delivery of these solutions to Americans, there may be limited outreach opportunities to have the attention of a household, affordable housing provider, or community leader about their energy, especially in low-income communities. Each “touch” should therefore be put to maximum advantage both for their benefit and for the benefit of a faster, better energy transition.

Opportunities to change electricity sources from fossil fuels to renewables should be integrated with complementary opportunities to obtain weatherization, healthy home, and energy efficiency products and services; to gain resilience with energy storage; to engage in beneficial electrification of heating and cooling systems and appliances that run on gas; and to electrify transportation and mobility, with equitable access to electric vehicles and vehicle charging infrastructure.<sup>32</sup>

2. Target Policies to Maximize Inclusive Clean Energy Workforce Development

Finally, addressing climate change demands a rapid transition to a renewable energy-based economy

nationally, which in turn requires building up a large-scale workforce with the capacity to execute this transition. Federal policy should expressly aim to expand this clean energy workforce and to ensure that clean energy jobs remain increasingly good jobs. Particularly as the country struggles to recover from the economic impacts of the pandemic, Congress can start by expanding existing federal job training programs, like the HUD Jobs Plus Program, and adding emphasis on clean energy jobs.

Congress can also expand existing grants that provide solar and renewable energy training, especially focused on low-income and underserved communities, and workers who are displaced from fossil fuel industries or otherwise impacted by the energy transition. GRID particularly supports funding for the SolarCorp Program supported through the AmeriCorps VISTA grant.

Because career choices are shaped by experiences and education prior to entry into the workforce, Congress should provide and incentivize resources for colleges and universities including HBCUs, Tribal colleges, and minority serving institutions, as well as high schools and technical schools to support solar and renewable energy training and placement programs.

There is also ample opportunity to create new renewable energy, storage and electric vehicle infrastructure-focused training programs that provide living wages and health benefits during training, along with holistic wrap-around support services to reduce employment barriers.<sup>33</sup> Wages and benefits during training are crucial to building a more inclusive workforce, as individuals from disadvantaged communities are less likely to be able to take unpaid time to engage in training and professional development. The Solar Works DC program in the District of Columbia, a program of the District's Department of Energy and Environment and the Department of Employment Services that is implemented by GRID Alternatives Mid-Atlantic, provides one scalable model for delivering paid clean energy training that reduces barriers to full-time employment with real-world experience, while at the same time helping the community benefit through low-income solar.<sup>34</sup>

#### **D. Promote Energy Democracy and Community-Owned, Community-Benefitting Energy**

It is not just electric power that people need, but also political power, power within their communities, and power over their own futures. To strengthen local community-level ownership and control over energy systems, technical assistance can specifically aim to build capacity for democratized, community-owned, community benefiting energy. Driven by communities themselves, incentives can be structured to encourage ownership and access for Tribes, low-income communities and communities of color, and to maximize benefits such as local job creation and economic opportunity for minority and disadvantaged business enterprises. Policies can promote opportunities for communities, including Tribal Nations, to opt into ownership or increased agency over their electricity generation, such as community or Tribal choice aggregation<sup>35</sup> or legislation to support Tribal energy sovereignty.

Entrepreneurship programs and assistance aimed at fostering solar and clean energy businesses, especially focused on Tribes and minority and disadvantaged business enterprises, can also help address market barriers while keeping the financial and economic benefits of clean energy where they're most needed.

## Endnotes and References

- <sup>1</sup> See generally House Committee on Oversight and Reform, “The Devastating Health Impacts of Climate Change,” Hearing (Aug. 5, 2020) and Linked Testimony, <https://oversight.house.gov/legislation/hearings/the-devastating-health-impacts-of-climate-change/>.
- <sup>2</sup> *Id.*; Stephen Mufson, *Moody’s Analytics says climate change could cost \$69 trillion by 2100*, WASHINGTON POST (Jul. 8, 2019), [https://www.washingtonpost.com/climate-environment/moodys-analytics-says-climate-change-could-cost-69-trillion-by-2100/2019/07/02/f9fb94ac-99cb-11e9-916d-9c61607d8190\\_story.html](https://www.washingtonpost.com/climate-environment/moodys-analytics-says-climate-change-could-cost-69-trillion-by-2100/2019/07/02/f9fb94ac-99cb-11e9-916d-9c61607d8190_story.html).
- <sup>3</sup> See, e.g., Machol, B. & Rizk, S., *Economic value of U.S. fossil fuel electricity health impacts*, ENVIRON. INT’L 52:75-80 (Feb. 2013), <https://www.sciencedirect.com/science/article/pii/S0160412012000542?via%3Dihub> (“Fossil fuel energy has several externalities not accounted for in the retail price, including associated adverse human health impacts, future costs from climate change, and other environmental damages.”).
- <sup>4</sup> See generally, e.g., Brown et al., *Low-Income Energy Affordability: Conclusions from a Literature Review*, OAK RIDGE NATIONAL LABORATORY ORNL/TM-2019/1150, available at <https://info.ornl.gov/sites/publications/Files/Pub124723.pdf>.
- <sup>5</sup> See Machol, *supra* note 3; NAACP and Clean Air Task Force, *Fumes Across the Fence-Line: The Health Impacts of Air Pollution from Oil and Gas Facilities on African American Communities* (Nov. 2017), [https://www.naacp.org/wp-content/uploads/2017/11/Fumes-Across-the-Fence-Line\\_NAACP-and-CATF-Study.pdf](https://www.naacp.org/wp-content/uploads/2017/11/Fumes-Across-the-Fence-Line_NAACP-and-CATF-Study.pdf); McKenzie et al., *Congenital heart defects and intensity of oil and gas well site activities in early pregnancy*, ENVIRON. INT’L 132:104949 (Nov. 2019), <https://pubmed.ncbi.nlm.nih.gov/31327466/>.
- <sup>6</sup> Wu, X. et al., *Air pollution and COVID-19 mortality in the United States: strengths and limitations of an ecological regression analysis*, Science Advances (in press, 2020), <https://projects.iq.harvard.edu/covid-pm>.
- <sup>7</sup> See EPA, *Smart Growth and Equitable Development*, <https://www.epa.gov/smartgrowth/smart-growth-and-equitable-development>.
- <sup>8</sup> Solar is contagious. See Graziano, M. & Gillingham, K., *Spatial patterns of solar photovoltaic system adoption: the influence of neighbors and the built environment*, J. Econ. Geogr. 15, 815–839 (2015) (noting spatial neighbor effects conveyed through social interaction and visibility).
- <sup>9</sup> Sigrin, B., and Mooney, M., *Rooftop Solar Technical Potential for Low-to-Moderate Income Households in the United States*, NATIONAL RENEWABLE ENERGY LABORATORY NREL/TP-6A20-70901 (2018), <https://www.nrel.gov/docs/fy18osti/70901.pdf>.
- <sup>10</sup> *Id.*
- <sup>11</sup> Doris et al., *Geospatial Analysis of Renewable Energy Technical Potential on Tribal Lands*, DOE Office of Indian Energy Policy and Programs (2013), <https://www.nrel.gov/docs/fy13osti/56641.pdf>.
- <sup>12</sup> See Sunter et al., *Disparities in rooftop photovoltaics deployment in the United States by race and ethnicity*, NATURE SUSTAINABILITY Vol. 2, 71-67 (Jan. 2019).
- <sup>13</sup> U.S. Census Bureau American Community Survey Briefs, Household Income: 2019 (ACSBR/20-03, issued 2020), <https://www.census.gov/content/dam/Census/library/publications/2020/acs/acsbr20-03.pdf>.
- <sup>14</sup> See Choi et al., *Explaining the Black-White Homeownership Gap: A Closer Look at Disparities across Local Markets*, URBAN INSTITUTE HOUSING FINANCE POLICY CENTER (Oct. 2019), [https://www.urban.org/sites/default/files/publication/101160/explaining\\_the\\_black-white\\_homeownership\\_gap\\_a\\_closer\\_look\\_at\\_disparities\\_across\\_local\\_markets\\_0.pdf](https://www.urban.org/sites/default/files/publication/101160/explaining_the_black-white_homeownership_gap_a_closer_look_at_disparities_across_local_markets_0.pdf).
- <sup>15</sup> Groups like Solstice are trying to change the historical reliance on credit scores with their EnergyScore tool. Solstice, *EnergyScore: An Alternative to FICO Credit Requirements for Low-to-Moderate Income Community Solar* (2018), <https://solstice.us/wp-content/uploads/2018/08/2018-08-09-EnergyScore.pdf>.
- <sup>16</sup> Sigrin et al., *supra* note 9.
- <sup>17</sup> Approximately half of households with less than the national median family income own their homes, as compared to 78% of households with incomes greater than or equal to the median income, according to 2017 U.S. Census data.
- <sup>18</sup> See also, e.g., 100% Network, *Comprehensive Building Blocks for a Regenerative and Just 100% Policy* (2020), [https://www.100percentnetwork.org/uploads/cms/documents/100-network\\_comprehensive-building-blocks-for-a-just-regenerative-100-policy-2020.pdf](https://www.100percentnetwork.org/uploads/cms/documents/100-network_comprehensive-building-blocks-for-a-just-regenerative-100-policy-2020.pdf).
- <sup>19</sup> For example, the California Public Utilities Commission’s Intervenor Compensation Program allows qualified parties in proceedings before the Commission to request compensation for their participation (allowable fees and costs) to ensure that

individuals and groups have the financial resources to bring their concerns and interests to the Commission during formal proceedings. See <https://www.cpuc.ca.gov/icomp/>.

<sup>20</sup> For more information see Solar Energy Industries Association (SEIA), *Tax Basis for the ITC and 1603 Applications* (2012), <https://www.seia.org/research-resources/tax-basis-its-and-1603-applications>.

<sup>21</sup> Climate Leadership and Community Protection Act (CLCPA), S. 6599/A, 8429 (2019), <https://legislation.nysenate.gov/pdf/bills/2019/S6599>; see also NRDC, *Unpacking New York's Big New Climate Bill: A Primer* (June 2019), <https://www.nrdc.org/experts/miles-farmer/unpacking-new-yorks-big-new-climate-bill-primer-0>.

<sup>22</sup> Coalition for Green Capital, <https://greenbankus.com/>.

<sup>23</sup> Opportunity Zones, created to promote economic development in low-income communities by allowing companies to defer capital gains taxes, have been promoted and used in some instances as means of bringing renewable energy to those communities. However, this program is highly limited in its ability to advance residential clean energy, timelines and rules may further limit energy applications, and the place-based tax incentive doesn't equate to benefits for communities. Relatively little Opportunity Zone investment has gone toward renewable energy, especially renewable energy directly financially benefiting the communities where it is sited.

<sup>24</sup> 42 U.S.C. § 6864. (1) Shift from metrics of reducing energy usage to outcome-oriented measures such as reducing energy burden; improving residents' health and safety; and increasing energy resilience and renewable energy access. (2) Eliminate the following: household spending cap, one-time only rule, efficiency-first mandate, cost effectiveness mandate/ savings-to-investment ratio, and the outdated Appendix A list of technologies. (3) Spur innovation by allowing the private sector to compete to implement projects. (4) Widen eligibility to 250% Federal Poverty Level or 80% Area Median Income and loosen household income verification requirements. (5) Explicitly allow green roofs; cool roofs; roof repair and replacement; and electrical system upgrades, as well as workforce training programs.

<sup>25</sup> For more information on state renewable portfolio standards, see NREL, State, Local, and Tribal Governments: Renewable Portfolio Standards, <https://www.nrel.gov/state-local-tribal/basics-portfolio-standards.html>.

<sup>26</sup> Even payment for solar power at utility retail rates (net metering) is unlikely to fully capture the benefits and lower cost of service for residential utility customers with solar photovoltaic systems; see, e.g., William Driscoll, *SEIA finds rooftop solar is worth 24¢/kWh in Michigan*, PV MAGAZINE (June 29, 2020), <https://pv-magazine-usa.com/2020/06/29/seia-finds-rooftop-solar-is-worth-24¢C2%A2-kwh-in-michigan/>. However, net metering is simple and relatively intuitive for customers and has a demonstrated history of success.

<sup>27</sup> HUD Memorandum re: Treatment of Solar Virtual Net Energy Metering Credits on Tenant Utility Bills (July 8, 2019), [https://calsomah.org/sites/default/files/docs/SOMAH\\_HUD\\_Solar\\_VNEM\\_Credits\\_memo\\_2019-07-08.pdf](https://calsomah.org/sites/default/files/docs/SOMAH_HUD_Solar_VNEM_Credits_memo_2019-07-08.pdf).

<sup>28</sup> 16 U.S.C. § 2621(d).

<sup>29</sup> For more information on community solar program design options, see *Low Income Solar Policy Guide*, <https://www.lowincomesolar.org/best-practices/community-solar/>, and resources linked therein.

<sup>30</sup> DOE Solar Energy Technologies Office, *Soft Costs*, <https://www.energy.gov/eere/solar/soft-costs>.

<sup>31</sup> See NREL SolarApp website, <https://solarapp.nrel.gov/>.

<sup>32</sup> GRID Alternatives is helping pioneer clean mobility programs in alignment with its solar and other programs in California and elsewhere, including partnering with the California Air Resources Board to administer its One-Stop-Shop pilot, a statewide project to create easy and comprehensive access to California's clean transportation-related programs for residents and communities that have historically faced the most harm from environmental injustice. For more information, see <https://gridalternatives.org/what-we-do/access-electric-vehicles> and links therein.

<sup>33</sup> The Solar Foundation and Solar Training Network, *Strategies for Solar Workforce Development: A Toolkit for the Solar Industry* (2018), available at <https://www.americansolarworkforce.org/>.

<sup>34</sup> For further discussion of the Solar Works DC program, see Cortlynn Stark, *As demand for solar energy grows, D.C. job training offers both employment and community results*, Washington Post (Aug. 30, 2019), [https://www.washingtonpost.com/local/dc-politics/as-demand-for-solar-energy-grows-dc-job-training-offers-both-employment-and-community-results/2019/08/30/744fd1dc-bf65-11e9-a5c6-1e74f7ec4a93\\_story.html](https://www.washingtonpost.com/local/dc-politics/as-demand-for-solar-energy-grows-dc-job-training-offers-both-employment-and-community-results/2019/08/30/744fd1dc-bf65-11e9-a5c6-1e74f7ec4a93_story.html).

<sup>35</sup> EPA Green Power Partnership, *Community Choice Aggregation*, <https://www.epa.gov/greenpower/community-choice-aggregation>.

Mr. RUSH. The Chair wants to thank all of the witnesses for their opening statements, and we have concluded the opening statements.

And now we will move to member questions. Each member will have 5 minutes to ask questions of the various witnesses.

I will start by recognizing myself for 5 minutes.

The ongoing coronavirus pandemic continues to demonstrate the importance of affordable energy and its relevance to our most vital and basic needs.

Dr. Reames, you are the founder and director of the University of Michigan's Urban Energy Justice Lab. Given your energy justice research, would you describe the importance of viewing energy-related topics and airing of topical discussion through what we would call a justice lens?

Dr. REAMES. Yes, Chairman. Thank you for that question.

The whole idea behind energy justice is that a just energy system fairly disseminates both the benefits and costs of energy services and is also representative and impartial in energy decisionmaking.

I started this work during our last crisis, the economic recession, and was really impressed by a policy that or a program that Congressman Cleaver proposed in Kansas City called the Green Impact Zone. And this project looked at concentrating Federal dollars from the stimulus in one area, recognizing the disproportionate challenges that disinvested urban communities, African-American communities experience. And a big component of that was focusing on energy, whether it was access to renewable, access to clean energy technology such as energy efficiency. And in studying that and looking at this issue across the country, again, you see that, you know, vulnerable communities are living in less efficient housing, have less access to energy-efficient technology and appliances, and if those things are available, they are more expensive and so they can't afford them.

So this idea that if we want to transition to a cleaner energy future, we can't disregard the vulnerability that communities already face, and that is across race. That is across income groups. There are gender disparities in energy access participation. And so a justice idea not only recognizes existing vulnerabilities but ensures that decisionmaking doesn't focus on just equality but actually equity.

Mr. RUSH. I want to thank you, Dr. Reames.

Ms. Drehobl, under this current administration, DOE has failed to update or even rolls back essential energy-efficiency standards. How does this impact the availability and the affordability of these energy technologies within vulnerable communities?

Ms. DREHOBL. Thank you for the question.

DOE has already missed the legal deadlines to update product standards. A recent report from ACEEE has found that updates to existing standards could save \$43 billion per year on utility bills U.S. families by 2035. Because low-income households already spend three times more of their income than other households, the loss of these savings will hit them harder. Low-income households are often renters or live in multifamily housing, and they don't always have direct control over what appliances are in their homes, and landlords frequently buy the cheapest or the least efficient

models. But standards can ensure that they are replaced with more efficient versions when the time arises for replacement. Failure to update standards breaks this cycle and leaves less efficient appliances in place as they are being replaced for low-income households.

So, you know, not updating standards definitely has an impact on low-income households in this way and doing so could save a lot of money for U.S. families on their energy bills.

Mr. RUSH. Ms. Wyatt, in the statute, FERC has established Federal energy capacity marketing rules that can come at a cost to consumers that hinder marketing access for clean energy sources. In what ways will these rules impact clean energy accessibility and affordability within vulnerable communities?

Ms. WYATT. Thank you, Mr. Chairman.

As you say, these types of Federal decisions absolutely impact vulnerable communities, in this particular decision that you are referencing, negatively.

First, it is key that State support for clean energy correct market distortions without, you know, an economywide carbon price or something like that, that forces polluting resources to internalize this whole cost escalation, which are enormous and unjust, the resource mix is inefficiently weighted towards these resources, not a level playing field. But FERC has failed to recognize that. And how the decision works, you know, even as distributed clean energy growers—and to be clear, distributed energy is GRID's area of work—utilities still have to source wholesale energy in much of the mid-Atlantic and Northeast and Midwest.

This happens through the PJM regional transmission organization and their auction mechanism. Unfortunately, this mechanism is indifferent to resources, environmental and equity profiles. And the recent decision from FERC further overrides State support for clean energy. So the minimum offered price rule, or MOPR, prevents wholesale energy sellers from recognizing State support in their offers, pushing bids higher than what they would otherwise be. And if that sounds like it directly raises prices for utility ratepayers, including those like our clients who can least afford it, it does.

It also slows climate action again with inequitable impacts on vulnerable communities because some renewable resources won't be able to clear it in that market.

Mr. RUSH. And my time is—it is the end of my time. So would you conclude your answer, please?

Ms. WYATT. Sure, thank you.

Yes, the long and short of it is that, you know, the FERC decision forces States to provide greater support to clean energy resources, making them more expensive, or cut back on climate policy. And it is worth taking a fundamental look at FERC's role in including climate and equity in their mandate.

Mr. RUSH. Thank you very much.

The Chair now recognizes Mr. Upton, the subcommittee ranking member, for 5 minutes for purposes of asking questions of the witnesses.

Mr. UPTON. Well, thanks again, Mr. Chairman, and thanks to our witnesses for their testimony.

I would say I have always been a huge supporter of clean energy, but, obviously, issues like reliability and affordability are critical. In Michigan, we have had a clean energy standard. It was passed by our State legislature, I don't know, 80 years ago or so. It has helped spur utility investments, keeps prices relatively low and stable, and that is in large part because we have a pretty diverse fuel mix.

And I would note that, a couple of weeks ago, I was down in Niles, Michigan, which is just north of South Bend on the State line, and literally they are building a new gas turbine electric facility, natural gas for electricity, and it is going to be the most efficient natural gas facility probably within 300 or 400 miles of that spot. So they are encouraged. And, of course, in Michigan we will see the closing of a number of coal plants as we meet the renewable standards, which are going to, frankly, probably double in terms of the percentage over the next 10 or 15 years.

I want to see us continue to lead the Nation, but I am worried about going the same route as California, imposing a national clean energy standard. They have rushed ahead with some pretty strong renewable mandates, natural gas bans, which, of course, would impact this new facility in Niles, a billion-dollar facility in a relatively small town. EV subsidies, a new ban on gasoline cars, obviously, would impact Michigan in a pretty big way. And, of course, we know that California's utility bills are among the highest in the Nation, rapidly rising. The grid has been unstable. We have seen that particularly with the fires. And as you said, Mr. Bryce, they would expect perhaps a 50-percent increase in the electricity demand.

Mr. Bryce, where are they going to get that electricity knowing this path that they are on?

Mr. BRYCE. Well, Mr. Upton, I have no idea, and it doesn't appear that California has a plan. They relied heavily—have been relying heavily on imports, and that was what led to the rolling blackouts that occurred in August. I would point out that California has these mandates for renewables, but it is a State where it is extraordinarily difficult to build new renewable energy capacity. In fact, the amount of wind energy capacity in California has been flat essentially since 2013. Since last December, two major wind projects have been rejected in the State of California, one in Humboldt County and one, I think it was just in April, near Lompac. So California—in fact, they recently rescinded moves to prematurely close some of their gas-fired generation because they realized that they couldn't afford to keep that—they needed those plants to stay on line to ensure grid reliability.

So I think California provides a case study on a lot of different fronts. But, first and foremost, is the land use question because these discussions about moving the entire economy and they—you know, the people that are pushing for these kinds of policies to have economywide renewables are completely ignoring the land use challenge. And I have documented this.

Over the last six years, over 280 communities or local governments from Maine to California have rejected or restricted wind energy projects. We are seeing increasing resistance to solar energy projects. If you can't build it in California, where do they think

they are going to put it? Well, somewhere else? You can't build it in Vermont. There are no wind projects being built in Bernie Sanders' home State.

The same thing applies to high-voltage transmission, which is other critical part of this discussion, which is not being included. But the best renewable sources are outside of cities. I have rooftop solar. I believe in the growth of solar. It is going to continue growing. But the challenge in siting the scale of the renewable capacity that will be needed in California or any other State is just enormous.

Mr. UPTON. Well, didn't they have problems years ago when they were looking at doing a major solar farm there and they were sued because they weren't able to get access to the grid to be able to send that renewable solar power to parts of the State?

Mr. BRYCE. Mr. Upton, I don't know. I can't answer that question. I do know that the siting of the large thermal solar projects in the State have been very controversial because of their impacts on desert communities. And, you know, I think one of the—the key challenges there for California, this is a State that has the highest poverty rate in America, and yet their electricity rates are continuing to rise, and this is bad for low- and middle-income consumers, and I think these problems are going to be even worse in the years to come in California, unfortunately.

One last point, San Bernardino County, the largest county by area in America, last year banned all large-scale renewables. So if you can't build them in San Bernardino County in California, again, where are you going to put it? These land use issues are key to this entire discussion and almost completely ignored.

Mr. UPTON. I know my time has expired. Thank you very much. Thank you all.

Mr. BRYCE. Thank you, sir.

Mr. RUSH. The gentleman yields back.

The Chair now recognizes Mr. Pallone, the full committee chairman, for 5 minutes for the purposes of asking questions.

Mr. PALLONE. Thank you, Chairman Rush. As we have heard, the ongoing COVID-19—excuse me. I will just turn my phone off here. We have heard over and over again that the ongoing COVID-19 pandemic has led to an increasing number of unpaid electricity bills, and some utilities are reporting more than 20 percent of their customers are falling behind.

Recent figures estimate there will be between \$19 and \$25 billion in unpaid electricity bills by the end of the year. So let me ask Ms. Drehobl. In light of these mounting unpaid bills, what can be done to ensure that the system remains operational, and homeowners are not left in the dark? What more can the Federal Government do to be helpful.

Ms. DREHOB. Thank you for your question. I think the Federal Government can provide guidance on this issue. Right now, it is up to States to decide if they will have moratoriums in place to keep people's lights on. And as you stated, you know, as of today, only 21 States and the District of Columbia still have connection bans in place for electricity, gas, and water.

And as we move into the winter months, a lot of people are going to be in danger of losing their electricity. This is going to place a

massive burden on families and will have wide ramifications for the economy as we work towards recovering from the public health crisis. I think more funding for LIHEAP could definitely help in the short term, and I think energy efficiency investments can also act as a long-term solution to help people afford their energy bills in the long term.

Mr. PALLONE. Well, as I mentioned earlier, the House is expected to debate today an updated version of the HEROES Act, and that provides an additional \$4.5 billion for LIHEAP. It includes a moratorium on energy and water shutoffs.

You know, let me ask. Let me go back to you, Ms. Dreobl, and I will ask Dr. Reames. You know, in light of these mounting unpaid electricity bills, I mean, would you say that this is a good thing to do, that we need these shutoff moratoriums and this additional funding for LIHEAP?

Let me start with you, and then I will go to Dr. Reames.

Ms. DREOBL. I would say definitely, we do. We definitely need more support to help people keep their lights on as we move into the winter months and as the pandemic continues.

Mr. PALLONE. And then, Dr. Reames, in light of these mounting unpaid electricity bills, what do we do to ensure that lights stay on for vulnerable communities and that system has enough resources to remain operational?

So on the one hand, you know, do you support what we are doing in this updated HEROES Act with additional LIHEAP money and a moratorium on energy and water shutoffs? But at the same time, what do you think we should be doing to make sure that there are enough resources in the industry to remain operational? I will ask you both things.

Mr. REAMES. Yes. Thank you for that. I do think the additional funds for LIHEAP are definitely very important. I think this also allows us a time for there to be greater coordination between this idea of the long-term strategies of weatherization and the short-term benefits of LIHEAP. It is also a time to discuss with utilities and State regulatory bodies on, one, how we are tracking this mounting debt that people are having, what parts of the community are experiencing this at greater proportions, and then to think about long-term strategies to reduce energy burdens and energy debt. There needs to be a really serious conversation about what do we do on the other side of this pandemic with all the debt that people are accumulating and may not be in an economic position to pay, and then how can LIHEAP be distributed more effectively to pay off some of that debt.

Mr. PALLONE. I mean, I really believe that without the moratorium on shutoffs, because there are just too many people that will be shut off and won't have power, won't have water, et cetera, and obviously, you both agree with that. But I also think in addition to helping people with the LIHEAP, we have to figure out how the system remains operational, and I think that probably means some kind of Federal assistance as well.

But, again, I am going to reiterate that, you know, this is an updated bill that the House is going to pass, but the most important thing is that we get Leader McConnell and President Trump to

come to a consensus bill that we can pass, you know, in the next few weeks, and hopefully we are moving in that direction.

So I thank you both, and I yield back, Chairman Rush.

Mr. RUSH. The Chair yields back.

The Chair now recognizes the ranking member of the full committee, Mr. Walden, for 5 minutes.

Mr. WALDEN. Well, thank you very much, Mr. Chairman, and thanks again to all our witnesses. Your testimony has been most helpful.

It is unfortunate that the HEROES Act 1 and HEROES Act 2, Republicans were completely excluded from the discussions on this. When we did do the CARES Act, we were involved, and those bills passed nearly unanimously, I think, and we came together as a country and as two parties with different views to stand up and work for the American people.

Sadly, in both of these initiatives, HEROES 1, HEROES 2, it is just a proffer for the Senate, and we have not been included in those discussions. It is a one-way communication strategy that is doomed to fail unless things change. It didn't have to be that way.

I would like to enter into the record two recent advocacy ads in the Los Angeles Times, one from the Sierra Club and another in response by the United Latinos Vote, a low-income advocacy group in California. The reaction to the Sierra Club ad pushing for gas bans and electric vehicles underscores the poor and working-class concerns about California policy very well. I would encourage members to read this.

Mr. Chairman, without objection, I would ask that those be entered into the record.

Mr. RUSH. So ordered. So ordered.

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

Mr. WALDEN. Thank you, sir.

Mr. Bryce, you raise a point that I think we should all bear in mind, and that is transitioning to clean energy carries costs that are not always discussed thoroughly to the people that have to pay those costs. And we have talked today about affordability, especially during the pandemic.

You enlightened us about what is happening in Germany, what is happening in other States. Oregon is a big renewable energy State with hydroelectricity. My district has thousands of megawatts of wind energy generation capacity as well as big solar fields and great potential for geothermal.

Last week, California's governor, though, called to eliminate sales in the State of light duty gasoline-powered vehicles. In your analysis, what impact will that have on communities that benefit from the ban on gas-fueled vehicles? Is this going to hurt low income communities?

Mr. BRYCE. I think there is simply no doubt, sir, that this ban on internal combustion engines which, in my view, is remarkable after the auto cycle engine was designed in the 1880s. It has been over the past 140 years continually improved. The technology has gotten cleaner. The power density has increased, and gasoline prices have been flat for over 40 years, according to the EIA.

The fact is, sir, and I was at Costco the other day. There was a Chevy Volt out in front, a brand new electric vehicle. The sticker price was \$46,000.

Mr. WALDEN. Right.

Mr. BRYCE. Tradesmen, the working class Americans, working class Californians are not going to be able to afford electric vehicles. And that was some of the—the United Latino vote made this point. Assemblyman Jim Cooper in California has made this point, that these alternative fuel vehicles are simply out of reach for most Americans, and it is unfortunate, and I think it is a misguided policy.

Mr. WALDEN. Well, and I know—I think you mentioned rolling blackouts and capacity issues on the grid in California with the existing system. I believe that it was energy from Snake River dams in the northwest, 50,000 megawatt hours, a 25 percent output increase ship power to California that kept the lights on.

Many of these same groups that are pushing these policies also want to pull out those dams and eliminate that carbon-free hydro power. What impact does that have, do you think, if that happens?

Mr. BRYCE. Well, sir, I am no expert on the hydropower politics and the situation in the northeast. I will answer the question, maybe, that I think is more critical to the low carbon electricity grid nationally is the ongoing shutdown of nuclear power plants. We have seen that at the Indian Point nuclear plant in New York. I am not a partisan. I am not a Democrat. I am not a Republican. But the Democratic States—in New York, they are closing Indian Point. The San Onofre nuclear plant in California has been closed. They are closing Diablo Canyon.

Exelon just announced they are going to close two nuclear power plants in Illinois. This is the wrong direction to be going if we are serious about pursuing low and no carbon electricity.

Mr. WALDEN. Mr. Bryce, I have had people tell me that we should stop talking about the need for firm baseload power, that is unnecessary in today's marketplace, and it is a complete red herring. Do you agree with that?

Mr. BRYCE. I do not.

Mr. WALDEN. Why?

Mr. BRYCE. Well, we live in an as-needed electric grid, not an as-wanted grid. You know, solar and wind energy are growing. They are getting very significant subsidies, but these are intermittent sources of energy. You can't count on them, and that was what we learned just most recently in California.

So the cost—as the University of Chicago study showed, the cost of making intermittent electricity sources firm is large because you need that standby generation or potentially in the future very large batteries. Well, consumers are going to have to pay the cost of all of those.

So baseload electricity, the idea that these plants aren't needed anymore, is simply not true.

Mr. WALDEN. All right. I have used up my time, Mr. Chairman. You have been most generous.

Thank you again to all our witnesses as we work on these important issues, and I yield back.

Mr. BRYCE. Thank you, sir.

Mr. RUSH. The gentleman yields back.

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

Mr. PETERS. Well, thank you, Mr. Rush. And I guess since I am the first Californian called on, I just have to respond briefly to my colleagues who criticize my State's effort to lead the country, and frankly, lead the world in climate action. We might agree on some land use policies that California could improve on, and I am sympathetic to baseload power, but when my colleagues cite increased costs of action, they pretend that there are no costs to inaction which we all know is false.

Climate change is going to be expensive, but it is going to be a lot less expensive if we act now. So I am willing to discuss whether what California is doing makes sense because we are running the first experiments, and we are going to make mistakes. But acting now on climate is not an example—it is not a mistake; it is an example;

Now, to today's topic. We have heard our witnesses talk about the importance of targeted policies like energy efficiency requirements in buildings and appliances, investments in community-based energy efficiency assistance programs. We have also heard that policymakers need to do more to ensure policies that incentivize clean energy technologies.

I just want to say that the big picture here is that because these disadvantaged communities are disproportionately harmed by the effects of climate change, everything we do to reduce the rate of climate change helps these communities the most, and that is the urgency. I think that is the important frame to keep in mind here as we talk about what to do, because generally, action would be helpful.

And we didn't talk about it today, but I wanted to talk about another topic that I raised before which is the price on carbon. A 2017 DOE energy report showed that continued investments in clean energy technologies, coupled with the price of carbon, will cut CO2 emissions faster than the sum of each approach on its own.

But I also want to talk about in this context how important it is that the price of carbon be designed to offset the energy burden on low income housing, on low income households. And I call your attention to a 2018 CRS study that was prepared by Joseph Rosenberg of Columbia that assessed the household impact of a \$50 per ton metric—\$50 per metric ton carbon tax that was designed with a per capita household rebate that generated for the lowest income quintile a four percent increase in household income in 2025.

I think it is very important to combine these kinds of technologies in terms of private investment with public investment and send that incentive to the private sector to do the right thing and to make investments. But we have to design these things with these disadvantaged communities in mind, and I think we can do that.

I wanted to ask Ms. Drehobl a question about something you said. Can you elaborate on how incentives for home energy efficiency improvements can aid in reducing carbon emission by what I think you said in your testimony was 60 million tons? That seems

like a benefit not just to these households but to the whole effort nationally to fight climate change.

Ms. DREHOBL. Yes. Thank you for your question. Reducing household energy use not only helps reduce burdens on individual homeowners who are paying those bills, but it also reduces the amount of pollution generated from carbon-polluting energy facilities which improves public health overall and has multiple benefits for communities as well as job benefits which I think are really important right now as we work to rebuild the economy.

So from a climate change perspective, energy efficiency and weatherization updates not only impact indoor air quality and health but also helps with climate change overall.

Mr. PETERS. Thank you.

Dr. Reames, I believe it was you, and it might have been someone else, and so they can chime in as well. I wanted to talk a little bit about energy efficient products like light bulbs and why they are more expensive and not affordable in areas of high poverty.

Can you explain that to me and talk a little bit also about what incentives or aid do you think Congress should provide or could provide to help low income communities transition to affordable clean energy to combat the climate crisis?

Mr. REAMES. Yes. Thank you for your question. We did a study in Detroit looking at store prices of light bulbs. And what we found in poor communities, because of the type of stores that are there and the partnerships that stores have with utilities, that most of the rebates were in big box stores which we know are located in the suburbs and not in the urban core.

And the stores also did not carry the most efficient appliances either because they, you know, can't afford to stock them, or that is just not a part of their inventory.

And so in places, particularly where transportation access is low and people go to local stores in those communities, they will not have access to either the most efficient technology or the most affordable technology. And so offering rebates from a Federal level that also targets those communities would help those communities with access.

Mr. PETERS. My time has expired, Mr. Chairman. Thank you for the hearing, and I yield back.

Mr. RUSH. The gentleman yields back. The Chair now recognizes Mr. Latta for 5 minutes.

Mr. Latta.

Mr. Latta. Here we go.

Well, thanks, Mr. Chairman, and thanks to our witnesses for appearing before us today.

Over the past few months, the American people have been hard hit by the outbreak of COVID-19. Many have lost their jobs and are finding it difficult to continue to pay their bills. We have also seen businesses and manufacturing plants shut down or curtail production which have caused ripple effects across the greater economy. For years, our country has been trying to bring back more manufacturing jobs lost to China, Mexico, and other countries, and COVID-19 has only made the effort more difficult.

Given all of this, the last thing that working families and businesses need to see is rising electric bills. Unfortunately, if we were

to adopt the energy mandates like those in the Green New Deal, that is exactly what would happen.

My district in northwest and west central Ohio is home to over 60,000 manufacturing jobs. Thankfully, in part due to the policies implemented by the Trump administration and the American energy renaissance, I believe we are seeing growth in the manufacturing sector. I have been told by model businesses in Ohio that one of the reasons for this is reduced cost of energy.

Companies small, medium, and large, want to pay Americans what they deserve in these manufacturing jobs, and they have found they can do so by saving on energy and operating costs. They can also, in turn, bring these jobs home, build up the local tax base, and inject more money into our local towns and economies.

Mr. Bryce, if I could ask, start with you. In your testimony, you point out that imposing arbitrary energy mandates would actually increase the cost of the electricity to rate payers. Wouldn't companies be dissuaded from bringing back manufacturing jobs if they are forced to pay higher electricity costs?

Mr. BRYCE. Well, I think, yes—sir. Mr. Latta, I think that the answer is yes. And I think that it is clear that what we have seen, thanks to the shale revolution, since 2005, the U.S. has seen the biggest increase in energy production in world history. The scale of the increase in U.S. oil and gas is truly unprecedented, and that has resulted in a big surge in manufacturing jobs in the United States, in particular, due to lower cost natural gas, but electricity figures into that as well.

I think it was last year the Council on Economic Advisors released a report that said that the shale revolution has saved American consumers something on the order of \$200 billion a year, and most of those savings are occurring because of lower cost electricity, and that is a knock on effect on the fact that we are using more low cost natural gas to generate power.

So all of these things are connected, but yes, I think there is just simply no doubt the industrial base in the U.S. has benefitted greatly from this increase in domestic oil and gas production.

Mr. LATTA. Well, if I can continue with another question for you because the ranking Republican member from Oregon brought this up when you were talking about baseload capacity and also volume peaking. And the real question is, really, if you could go into more details on the impact on manufacturing plants since they would be—you know, you would also be required to use the renewable mandates and maintain that baseload capacity, those differences there.

Because, again, you know, I talked to some companies out there, again, in my district, and I have got a lot of companies that use a lot of electricity. But, you know, what would be those differences in cost out there?

The other would be that you wouldn't even have that ability if you didn't have that baseload to have that company there because we have got to rely on the baseload to turn the factory on in the morning.

Mr. BRYCE. Well, sir, I am not exactly sure how to answer your question, but I will answer it this way, that what I know and from talking with people that I know, investors here in Texas that put

money into plants, for instance, in Mexico. They have built an electric plant near an auto plant near Monterey, and the electric load there is enormous because of the heavily—they use a lot of robotics.

So I think as manufacturing becomes more automated, not only is electricity supply more important, but electricity reliability is more important.

So these are key issues and key challenges because we have a very diffuse ownership of the grid in the United States, incredibly diffuse, partly as a result of the new deal where we have about 800, 900 different electric cooperatives, we have a lot of investor-owned utilities, locally owned utilities. They all have to coordinate. But the key here is reliability and low cost, and those are the key challenges that I think that the United States is facing now in trying to talk about going to cleaner energy and power systems is how is all of this going to be coordinated while assuring lower prices and reliability?

Mr. Latta. Well, thank you very much, Mr. Chairman. My time is about to expire, and I yield back.

Thank you very much.

Mr. Bryce. Thank you.

Mr. Rush. The gentleman yields back.

The Chair now recognizes Mr. Doyle for 5 minutes.

Mr. Doyle. Thank you, Mr. Chairman and Ranking Member Upton, for holding this hearing, and thank you to the witnesses for being online with us.

It is a disgrace that so many people in this country have energy bills they can't afford. We have to attack this issue aggressively so that no families have to choose between food or electricity or face having their power shut off because they can't make a payment. It is clear that we must invest in solutions like weatherizing homes and deploying cheap, clean energy systems, and right now is the time for us to be making those investments.

We have the technical capability, we have many people looking for good-paying jobs that can be done safely, and the government currently can borrow money basically interest free. Making the right investments now can help people afford their bills, provide a cleaner future, and help dig us out of this economic hole created by the pandemic.

I also believe that as we figure out how to make these investments, we must provide people from low income and particularly minority communities with access to the education and training they need to get good-paying jobs in the construction and rehabilitation industry for the clean energy industry.

We must also make sure we are not leaving behind communities who have lost fossil fuel jobs as they are also struggling and have a skilled workforce that can be deployed to build and run clean energy systems.

I would like to start by asking Ms. Drehobl. Can you please expand on how helpful to advancing clean energy systems it would be to allow the weatherization assistance program to also cover the cost of things like roof repairs so solar could be installed or having an attic insulated?

Ms. Drehobl. Sure. Thank you for your question.

Often, households who are eligible for weatherization have health and safety issues or things that need to be repaired before they are able to participate in the program. Including additional funding to cover some of those costs such as roof repairs, such as addressing mold or other issues, can help many more households be able to access the benefits of these programs.

So that was one of our recommendations was including more funding for health and safety repairs within the weatherization program.

Mr. DOYLE. Thank you.

Ms. Wyatt, a large percentage of households that face high energy costs, these people live in multi-family homes or they are renters. The challenge, it seems, is incentivizing landlords to install clean energy systems since they don't live in the home or pay utilities.

So how effective would making the solar or solar plus storage investment tax credits refundable or providing direct pay for be in getting these landlords to install these systems? And how do we design such a system so that we don't end up simply giving wealthy landlords a larger tax write off for all their properties?

Ms. WYATT. Thank you very much for your question. You are absolutely right to flag the incentive structure difficulties with making sure that residents of multi-family housing, including affordable housing, can receive the benefits of clean energy and that the owners of that housing who are often non-profit entities are incentivized to go solar even if they are not necessarily the ones paying the energy bills.

Different programs have been pioneered around the country, including solar and multi-family affordable housing in California, with which GRID Alternatives co-administers. The ITC making that—the Federal investment tax credit making that refundable for non-profits would, again, enable non-profits, including affordable housing providers, to directly access the benefits of that incentive for installing clean energy systems.

And, you know, in terms of tax write-offs for—you know, who gets the benefit of the clean energy? One of the strategies that we found useful, it pioneered in California which, of course, has done a lot of experimenting on clean energy policy and how to make it more equitable is, you know, requiring the beneficiaries of clean energy incentives that are multi-family housing owners and providers to pass on those benefits in tangible ways, either in bill savings if the energy bills are structured that way, or other tangible benefits like maybe they get better internet service or other services for residents.

Mr. DOYLE. I see. Mr. Chairman, I see my time is about to expire, so I will yield back.

Mr. RUSH. The gentleman yields back.

The Chair understands that Mrs. McMorris Rodgers is not available, so the chairman will recognize Mr. Olson for 5 minutes.

Mr. OLSON. I thank my good friend from the south side of Chicago, Chairman Bobby Rush. My friend, I am compelled to apologize in advance. If your White Sox beat Mr. McNerney's Oakland As today, my Houston Astros have bats and brooms. There is going to be a big, old sweep in the baseball world.

Mr. RUSH. I choose not to respond to wishful thinking.

Mr. OLSON. Wonderful witnesses. A special howdy to a Texas Longhorn, Robert Bryce, who knows what six words come after four quick claps; deep in the heart of Texas.

I have a few questions for you, Mr. Bryce. Like all Texans, you understand that we have the best and most competitive electric market in the Nation. It is a free market with competition. That means lower prices for consumers. We lead the Nation in renewables, number one in wind, number four in solar.

In your testimony, you mentioned that California has, quote, "big mandates with big prices," end quote. Do you mind discussing how the Texas competitive market keeps prices so low while we lead the way in renewables and how California, with their hard push for green energy without the means to achieve that, is going to pay such a high price for electricity now and in the future?

Mr. BRYCE. Well, thank you, sir. I did graduate from the UT a long time ago, but I am still from Oklahoma, so I still—you know, I still root for the Sooners, so just got a full disclosure here. Nevertheless—

Mr. OLSON. Sorry to hear that.

Mr. BRYCE. Nevertheless, sir, there is a contrast, a big contrast, between what we see in California and what we see in Texas. Texas has had a much lighter hand in terms of regulation. You saw Governor Gavin Newsom announcing that he wanted to ban hydraulic fracturing in California despite the fact that hydraulic fracturing has led to this renaissance in the U.S. oil and gas business that has saved every consumer in this country an enormous amount of money.

So as far as the details of the electric markets, those are complex. They are very complicated markets. But Texas has been successful, but I will—in terms of how it has structured its market, California, I was interested in Mr. Peters admitting that there had been mistakes in California, but there have been 20 years of mistakes that have not been corrected.

So what we have seen in Texas, I think more than anything, is that the State has, and particularly the electricity consumers, have benefitted due to low cost natural gas.

Remember, it was about in the mid 2000s the average price of gas in the-- natural gas in the United States was as high as \$7 or \$8 on an annual basis. And now we are at \$2 and change. This is a remarkable reduction, and that reduction is saving consumers not just in electricity but in home heating.

In industry, we see the increased investment in foreign direct investment in chemical plants, petrochemicals along the Gulf Coast. These are massive investments that are benefitting American workers and the American consumers.

Mr. OLSON. You mentioned natural gas. As you know, America now is awash in natural gas. We are exporting liquified natural gas. It is the cleanest, most versatile, and cheapest source of energy for power.

You also mentioned that three local governments in California have passed bans or restrictions on the use of natural gas in buildings. You point out that these are being done in the name of cli-

mate change and decarbonization, but they are, in practice, a form of energy taxation that many of these people can't afford.

I think that is a factor why SpaceX moved to Austin, why Toyota moved their North American headquarters to Plano, and why 90,000 Californians moved to Texas in 2018. Can you elaborate on this phenomena about banning natural gas for buildings?

Mr. BRYCE. Well, I understand the sentiment. What I think is remarkable, though, is when you look at the residential sector in terms of natural gas use in the United States, consumption in that sector has been effectively flat for 50 years at about 5 trillion cubic feet per year. And California, I think, if memory serves, has a higher percentage of homes, has I think about 80 percent of homes in California are connected to the natural gas grid.

So even the California Public Advocates Office has issued a report talking about the regressive effects of banning natural gas, and particularly for renters and for low income households, that if they are forced to give up the direct use of natural gas, they will have to use electricity instead.

And, further, that as the number of customers that are connected to the gas grid declines, the cost of maintaining that grid will then be spread over fewer and fewer customers, and that, again, is a regressive, a knock on effect of these bans.

So it is interesting. I mean, even the Public Advocates Office has been looking at this and recognizing the potential economic impacts of those bans.

Mr. OLSON. Thank you. I am out of time.

This is to you, Mr. Bryce, and Markwayne Mullin. Horns up and beat OU. Hook 'em, Horns. October 10. I yield back.

Mr. RUSH. The gentleman yields back.

The Chair understands that Mr. Sarbanes is presently not present, so the Chair now recognizes Mr. McNerney for 5 minutes.

Mr. MCNERNEY. Well, I thank the chairman, and I can't help but admire Mr. Olson's undying enthusiasm for Texas and that, but I get a little tired of hearing such bashing of California from all these folks.

In particular, criticisms of our energy policies and blaming rolling blackouts on those policies. But inaction on climate is already hurting low income communities more than any energy policies.

Blackouts are caused by extreme heat from climate change, and wildfires are related to that, impacting everyone, but especially low income communities.

Dr. Reames, thank you for your testimony this morning. I also hear Members from the other side claiming that clean energy will rise electricity rates. However, a recent study from UC Berkeley showed definitively that the cost of wind, solar, and storage are decreasing so quickly that the U.S. can reach 90 percent of clean energy by 2035 without raising customer cost and may actually decrease wholesale price by ten percent.

Please discuss the decreasing cost of clean energy, the relatively high cost of fossil fuel generation, and the expensive cost and consequences of climate change and the short-sighted claim that clean energy costs more.

Dr. REAMES. Thank you for your question.

I think it was mentioned by Chairman Rush in his opening statement that nearly half of the rooftop solar potential rests upon the rooftops of low and moderate income households when it comes to solar. And so this idea that solar is available, the potential is there, and the costs are going down makes it more economical to begin to think about strategies to expand rooftop solar access to low and moderate income households.

In addition, if we look at some of the inconsistencies or the burdens on the costs for residential electricity has raised substantially for the residential class customer going far beyond that for commercial and industrial customers over time. And so this idea of equity versus equality, the focus on equity would look at rates for residential customers.

It was mentioned that if we move away from natural gas that the cost of that infrastructure will be borne on residential customers. But if we actually focus on electrifying the residential sector, we could look at equity and pricing for the commercial and industrial sector.

We also know that poor communities who have high energy burdens are also bearing the cost of the pollution that is related to our fossil fuel energy generation.

And so, again, higher income households and communities that do not have generating plants are using more energy, but the cost of the energy and the pollution is borne by low and moderate income communities and communities of color.

Mr. MCNERNEY. Thank you, Dr. Reames.

Ms. Wyatt, as you noted in your testimony, one way Congress can address the economic impacts of the pandemic is through the expansion of job training and grant programs, particularly with those focused on clean energy, especially in low income and underserved communities. While the energy sector saw incredible job growth over the past decade, the distribution of that growth hasn't been equitable. Specifically, the inclusion of women and Black Americans remains a challenge.

Can you speak more to what can be done to ensure that those historically underrepresented groups are not overlooked as clean energy jobs are created?

Ms. WYATT. Absolutely. And thank you for your important question, Congressman.

Clean energy industries do need to look more like the country. And while they are making some worthwhile efforts on that front, we have several policy recommendations on how to boost inclusion in the industry.

Many clean energy industry jobs can be made to have particularly low barriers to entry and strong career paths if the barriers to employment are reduced and the career paths are targeted and made accessible to every community through policy actions and investments.

We also recommend, you know, support for clean energy entrepreneurship in communities of color as well. Most solar companies, for example, are quite small, and it is an industry that can and should have a lot more CEOs and executives of color, people at all levels and all rules.

So workforce development programs should emphasize clean energy, and clergy energy programs should emphasize workforce development, two sides of the same coin.

GRID has seen the success of this sort of approach. One example is our Solar Works DC program in the District of Columbia that gets local residents paid training for solar careers. Paid training is important to enable more participation. We also have women and solar in troops to solar program, SolarCorps.

There are lots of ways to reach out and be inclusive in workforce development training.

Mr. MCNERNEY. Well, thank you for that answer.

I thank all the witnesses today, and I thank the chairman.

I yield back.

Mr. RUSH. The gentleman yields back.

The Chair now recognizes Mr. McKinley of West Virginia.

Mr. McKinley, you are recognized for 5 minutes.

Mr. MCKINLEY. Thank you, my friend. I am going to direct my questions back to Mr. Bryce, but before I do that, Chairman Rush, I would like to ask you if I could get some help, maybe from your staff, because in some of your opening remarks in the preparation for this document that talked about the impact coal has had on low income families and communities of color.

And I respect that, but I am also saying this as an observation, that when I came here in 2010, over 52 percent of the power plants in America or the generating plants came from coal. There were 700 coal-fired power plants. Now we are down to 25, 25 percent, and we only have just over 200 coal-fired power plants.

But what I am not seeing is any measurable decrease whatsoever in asthma, in lung disease, cardiovascular disease. I am asking can someone show me that doing away with coal actually improves the health of all of these communities.

Now, one thing that actually has happened, Chairman Rush, has been in West Virginia. We have seen nearly a 70 percent increase in our utility bills, and we are the second lowest income in this country.

So when all of you are talking about concern about low income communities, what about low income States that you just impacted by doing this?

So I would like to hear from your staff if they will get back to me.

But let me go to Mr. Bryce, if I could, because I have got a series of math issues that I am concerned about, and that is one starting with the weatherization program. I have been very supportive of it and will continue to work with Peter Welch and others to continue this.

But I am looking at the numbers, that we are spending about \$300 million, Mr. Bryce, \$300 million into the weatherization program, and we are doing—just a couple years ago we were doing 60,000. Last year we did only 35,000 homes, but let's use that 60,000 homes as the number, 60,000 homes we are fixing.

The average savings, according to the Department of Energy, is around \$300. So as a result, we are spending \$18 million out of \$300 million. I wonder, maybe, is there sense in it because if we

just wrote them a check, these constituents, a \$300 check, wouldn't that be beneficial?

Or maybe what we could do is, Mr. Bryce, would you say, what if you gave more families? Because instead of just limiting it to 60—60,000, what if we went to 10 times that, to 600,000 families? We can afford to do that. Just write them a check for \$300 because that is the savings that we are spending.

So I am wondering. Or Mr. Bryce, would you say, should we do research into more weatherization so that the savings that we get is more than \$300. Should we save \$1,000? Should we save \$1,200? Would that be a better use of our money rather than doing the simple weatherization we are doing because we are only saving \$18 million out of \$300 million being spent.

Or should we switch to energy performance contracts and not have to spend any money because energy performance contracts across the country, there is no expense on that. The Federal Government doesn't have to put out anything. We don't have to put \$300,000 out. Individual companies would do that.

So I am just curious, Mr. Bryce, either one of those three: Give more families money, increase our research into weatherization, or what about switching to performance contracts? What say you on that?

Mr. BRYCE. Mr. McKinley, I am going to be honest with you. I don't know those programs, and I would be—it would not be my place to comment on them because I simply don't know those numbers, and I am not familiar with the program.

So I appreciate the question.

Mr. MCKINLEY. Well, I appreciate that, and I am jamming you a little bit on it, but what I am saying, Mr. Bryce, is that if we are only saving—if the energy savings is only \$18 million, but we are spending \$300 million to do that, what if we just wrote them a check? What if we just wrote a check, and then we don't—then we could save \$280 million.

Mr. BRYCE. Well, yes, sir. I understand your point, but I think those savings would accrue over many years, and so, you know, I am in favor of efficiency. I replaced my refrigerator this year, and it uses a third as much electricity as my old refrigerator. So I have seen personally the benefits of efficiency.

But, again, as far as the specific programs and the math that you are putting forward, I can't tell you any—I can't add anything to what you have said.

Mr. MCKINLEY. I am just wondering whether or not—I would love to see more efficiency with it. I agree with you on that.

But, again, at \$300 million to get 18, what if we gave more people that are hurting, that are struggling out there, the low income families, let's help more of them than just 30,000. What if we had 60, 100, or 200,000? Let's do something that has an impact, not this program. It needs to be updated significantly.

So I thank you, and Mr. Chairman, I do hope to hear back from your staff. Thank you.

Mr. RUSH. I want to thank the gentleman.

The gentleman yields back.

I just wanted to let the gentleman know, you know, it is not my intention, nor has it ever been, to engage in any kind of false di-

chotomy between poor people who reside in West Virginia and poor people who reside on the south side of Chicago.

I think that that feeds into an unfortunate narrative that has really created so many divisions in our Nation.

I am for and have been advocating for the poor people in West Virginia just as I am an advocate for the poor people on south side of Chicago.

And that said, I fully intend to engage the gentleman with staff and any other means in a meaningful, productive conversation in the future, and I thank the gentleman for his open invitation.

Mr. MCKINLEY. I look forward to it. Take care Mr. Chairman.

Mr. RUSH. And with that, I yield 5 minutes to the gentleman from Maryland, Mr. Sarbanes, who has returned.

You are recognized for 5 minutes.

Mr. SARBANES. Thank you very much, Chairman Rush, and thank you for the hearing today.

I wanted to speak to a project in Baltimore city that I am very proud of that is trying to lift up communities that have been under a lot of pressure, particularly recently. It is a program called the Baltimore Shines program. It helps increase access to solar energy by installing solar panels in underserved communities.

What the City of Baltimore does is it couples that work under the weatherization assistance program, the work that they do there, with the solar initiative, so they go in, and they do all these things at the same time.

It has a workforce component that trains local individuals for jobs in the solar sector which can be very good jobs, high quality of life there if you can get one of those jobs.

And I am glad to see the GRID Alternatives, one of the witnesses here today. They were an early partner in the Baltimore Shines project, the pilot project that then became Baltimore Shines along with the Department of Energy, the U.S. Department of Energy a few years back, Morgan State University, and others which provided over 30 homes in that area of Baltimore with solar systems.

Ms. Wyatt, I know that your testimony has touched on previous projects that GRID Alternatives implemented. You understand the value of decreasing barriers and increasing access to solar energy for low income and underserved communities, and you mentioned the need to build trust there with community members.

Can you explain some of the benefits of working with community leaders and local officials on these projects as GRID Alternatives did in the Baltimore solar initiative, and how can Federal programs help to foster and support these partnerships?

Ms. WYATT. Thank you for your questions and your kind remarks about GRID Alternatives' work in Baltimore, Congressman. We are very proud of the combination of solar savings, weatherization, and workforce development that has helped so many Baltimore families.

As you say, trust with community members is crucial. Honestly, sometimes the immense benefits of solar can seem too good to be true in some of the communities that, frankly, have been targeted for scams, low income communities and communities of color, have been exploited and are often on guard when they hear we can cut your energy bills in half. It sounds too good to be true.

There is also, you know, again, the barriers relating to just not seeing solar and clean energy as the sort of thing that is for me. Cultural barriers, educational barriers, language barriers, of course, in some communities.

And so working directly in partnership with community members and local officials could really bridge gaps and also, you know, help shape the program in ways that make it actually responsive to community needs so that you are not just dropping down in a top down manner and imposing solutions on communities.

Letting the communities, again, lead the solutions is very important, and, you know, giving them tools to hold officials and programs accountable for how well they are doing.

Some ways to, you know, try to accomplish that, you can enhance participation in the design phase through, you know, steps to recognize the barriers that communities face like even just needing childcare and working day jobs and participating in program design. You can give capacity-enhancing assistance to community-based organizations to help them interact with the decisionmakers and the program administrators.

The key is deliberate effort and deliberate outreach.

Mr. SARBANES. Thanks very much. I appreciate that response.

And I think what you are saying is all of these different initiatives that we are speaking about today have the opportunity to be empowering for the communities in which they are deployed. And building that partnership, creating the opportunity for input on the front end, I mean, obviously groups like yours bring expertise, but you don't have expertise about what a particular community's perspective has been, its history has been, the resources it can put together, the pipeline it can create.

So you have to be very—bring humility to that, and it seems like when that happens, you get the best results. Again, I want to thank you for your efforts in Baltimore. We are going to continue to try to be as innovative there as we possibly can.

With that, Mr. Chairman, I yield back.

Mr. RUSH. The gentleman yields back.

The Chair now recognizes the gentleman from the great State of Virginia, Mr. Griffith, for 5 minutes.

Mr. GRIFFITH. Well, Mr. Chairman, I want to take a little bit of time for a point of personal privilege, just as you did. I have served with you now for ten years on the Energy and Commerce Committee. This morning, Mr. Doyle was at another meeting where he said we have got to stop thinking just because we disagree that the other side is evil. I agree with that, and I can say as an affirmative to your comments to Mr. McKinley that in the entire time I have been here, we have not always agreed on how to accomplish it, but you have always advocated for poor people, whether they were from Appalachia or the south side of Chicago, and I appreciate that about you.

And even though we may disagree on how we solve these problems, I do greatly appreciate your leadership in that area and making it clear that this is not about one part of the country or another. It is about trying to help poor people across the board, and I thank you for that.

That being said, I will go to questioning Mr. Bryce, if I might. But thank you, Mr. Chairman, for that indulgence.

Mr. RUSH. Thank you.

Mr. GRIFFITH. Well, I do appreciate your leadership in that way.

Mr. Bryce, you point out in your testimony that between 2011 and 2019, California has seen the average price for electricity, industrial, commercial, and residential, increase by nearly 30 percent. That is more than seven times what we have seen throughout the rest of the country. I am particularly concerned with how California's renewable mandates have impacted consumers' electricity bills because the same public policies that have brought extremely high rates and rolling blackouts are now being pushed forward in Virginia.

In April, Virginia's governor signed the Virginia Clean Economy Act, requiring 100 percent carbon-free energy by 2050. Now, it is estimated by the largest provider in Virginia, Dominion Energy, that that will cause an increase—and they put this in their report to the State Corporation Commission of Virginia. That will cause—that mandate to build solar and wind generation capacity will increase rates for the average Virginia household roughly 45 percent or \$52.40 to \$55 per month or \$660 a year.

What advice do you have for the Commonwealth of Virginia if the priority is truly to provide affordable and reliable energy to all?

Mr. BRYCE. Well, thank you, Mr. Griffith. My policy, or you know, I don't come—I am not pushing any particular bill, particular policy. But for ten years or more now in my books and the things that I have written, I am an advocate for natural gas and nuclear. These are the sources of energy that are low carbon, affordable, scalable. I think what is happening, particularly with the closure of nuclear plants across the country, is exactly the wrong direction.

And I think that, you know, there is no question that renewable capacity and renewable generation is growing and growing fairly dramatically. But what I see, and I think is going to clearly be a problem in Virginia, it is already a problem in Maryland with the Dans Mountain Wind Project.

But across the country in essentially every State, we are seeing conflicts over the siting of wind projects, the siting of utility scale solar, the siting of high voltage transmission. And I think if Virginia is going to push ahead with this mandate, which it appears they are, that these land use conflicts are going to be very much in the news, especially lower income counties.

What I see, in fact, in New York where the State has overridden the power of local zoning for local communities. There is a major project, the Alle-Catt wind project, that is being pushed on the counties of Allegheny and Cattaraugus. These are the fourth and fifth or fifth and sixth poorest counties by median household income in the State.

So if what is happening in other States happens in Virginia, you can count on the lowest income counties in Virginia being targeted for these large scale projects because the local communities don't have the kind of resources to fight them in court.

Mr. GRIFFITH. Well, in representing a congressional district that ranks 422nd on median household income of the 435 in Congress,

that is of some concern, although we would welcome the jobs in many types of energy production. We currently have a lot of coal and natural gas, but we would—we welcome a lot of energy because it is a field that we know.

But I do think it is interesting. You also mentioned that you were in favor of efficiency, and I was curious about the California electric car situation because as I have interpreted that or listened to that, they are only going to ban the sale of new cars, new gas-powered cars.

And so I know exactly what happens in communities that don't have money, and that is they will continue to drive those gas-powered cars. They will figure out a way to keep them on the road, fix them up when they might otherwise trade them in. Doesn't that create for less efficiency instead of more efficiency?

Mr. BRYCE. Well, I certainly see your point, and I think you can clearly argue that. I think what is clear is that the automotive fleet is getting more efficient. That is a very positive thing, but you know, electric vehicle sales still account for a very small fraction of overall vehicle sales. And numerous studies have found that it is the very wealthy households are the ones that are buying these vehicles, not working class, and so I—and not working class households.

So I think there is definitely—as Dr. Reames has pointed out over and over, there are issues of equity here. And Assemblyman Jim Cooper wrote an open letter to the big environmental groups in California about this very issue of equity when it comes to subsidies and mandates around electric vehicles. Transportation is essential, especially for working class people.

Mr. GRIFFITH. Let me claim back my time because I only have a couple seconds left.

Mr. BRYCE. Sure.

Mr. GRIFFITH. I do want to recognize the community housing partners that not only do weatherization. They are headquartered in my district, and they do a lot of great work training other people on how to weatherize homes, and that is something that is important. And I think that Mr. Rush and I would agree—Chairman Rush and I would agree, and I yield back.

Mr. RUSH. The Chair does agree. The gentleman yields back.

Now the chairman recognizes Mr. Tonko from New York for 5 minutes.

Mr. TONKO. Thank you.

Thank you to my friend, Chairman Rush, and just a couple of points for the record. While there was talk about incentives in the State of New York, let me also place on the record that my home State of New York has also passed significant incentives to keep our nuclear power plants in upstate continuing to operate.

And, also, when we talk about displacing some of these programs or replacing them with an outright check that would be drafted for consumers, we better be ready to pay that \$300 check each and every year because these are recurring benefits.

There is a tremendous need to center equity in our energy policy, and DOE's weatherization assistance program is an important part of this effort as the largest Federal program focused on delivering efficiency services to our low income households.

The weatherization program recognizes that low income Americans are paying much more of their paycheck for essential utility services, three times what higher income households pay as a percentage of their income. These families don't have the disposable income to make home improvements even when those cost-effective improvements pay back over time.

And we know the program works. Each weatherization program dollar delivers \$4.50 in benefits, including energy savings and improved health and safety. So homes that receive these services save on average \$283 every year, each and every year, on their utility bills.

So, Ms. Drehobl. We know it is difficult to get rental and multi-family housing units to participate in the weatherization program. Many landlords don't see a reason to improve the efficiency of their tenants' homes, but obviously, many of us have a strong interest in ensuring these services reach everyone. Do you have any suggestions for how to increase these types of homes in the program, or how else might we incentivize weatherization services for these homes beyond the DOE program?

Ms. DREHOBL. Sure. Thank you for your question. That is a major challenge. One of the recommendations that we included in our testimony is ways that the Federal Government can help target affordable multi-family housing which is a very large market of households. Right now, there are 1.1 million units of occupied public housing, and we estimate that deep retrofits to 1 million of these units would cost about \$4.5 billion and lead to many, many benefits for those households and lower bills that are being subsidized by the Federal Government.

There is ways to work with public housing authorities and housing finance agencies to address this issue. That is one way that this could be done.

Mr. TONKO. Thank you very much. And the reauthorization bill that recently passed the House establishes a small, competitive grant program for innovative practices which could include community-based strategies; for example, a community's solar project to complement the weatherization of multiple homes in a neighborhood might be an offer.

Dr. Reames, what do you think about expanding this program beyond traditional services of lighting, windows, caulking, and insulation? And how might incorporating new technologies and strategies be a good modernization of the weatherization assistance program?

Dr. REAMES. Thank you for your question, and I think you hit on a really important point. We noticed during our effort that there were some innovations in actually targeting weatherization to certain communities like I mentioned, the green impact zone in Kansas City. And that allowed for recognition that more than 50 percent of the homes are renter occupied, and so we realize that there needed to be a relationship with landlords, and that included some community-based social marketing, allowing landlords and renters to talk about the opportunity to weatherize the homes, and what that would mean for the tenant to be able to pay their rent and pay their utility bills.

And so this idea that homes are spatially located, built around the same time with the same building codes, really advocates or really pushes for this idea of community-based strategies that are place targeted.

Mr. TONKO. Thank you very much.

And, Ms. Drehoobl, this innovation program is also intended to support pre-weatherization, work like roof repairs and mold remediation, as well as other complimentary practices. How might this type of work be complimentary to traditional weatherization services? And should improving the health and safety of homes also be a priority of the program?

Ms. DREHOBL. Thank you for your question.

Yes, I would say that improving health and safety is really important to tie in with weatherization. There are a lot of additional benefits that come from improving indoor air quality and help with health conditions such as improving asthma, COPD, school attendance for children, et cetera, a lot of benefits that have been monetized by some States, as well such as the State of Massachusetts.

So I think being able to incorporate these estimates into the program is really important to access these additional benefits.

Mr. TONKO. Thank you very much.

Mr. Chair, I had a question for Ms. Wyatt, but I have run out of time and will get that to her so that she can respond within the given days after the hearing.

So thank you all for appearing before the subcommittee.

I yield back.

Mr. RUSH. The gentleman yields back.

The Chair now notices that Ms. McMorris Rodgers is available for questioning.

Ms. McMorris Rodgers, you are now recognized for 5 minutes.

Mrs. RODGERS. Thank you, Mr. Chairman.

I appreciate the subcommittee's focusing on increasing affordability and access to clean energy, a goal that we all share. I worry, though, that some of the proposals from the majority will have the opposite effect by raising cost on middle- and low-income families and decreasing access to reliable energy.

Recently, Governor Newsom said California is, quote, America fast forward, end quote. Even if unintentional, this is a warning about following California's failed policies. Nationalizing California's mandates for renewables, like wind and solar, at the expense of affordable reliable energy sources, like hydropower, nuclear, and natural gas, is a mistake. We have all seen the results of these mandates and sky high costs in California and recent rolling blackouts over the summer.

Wind and solar have a crucial role to play in our energy future, but we need to be realistic about their current limitations. And yet California is doubling down on costly regulations by mandating that cars sold in the State should be 100 percent electric by 2035. I am not sure how their grid will meet that demand when they can barely keep the lights on as it is.

Our goal should be to increase clean energy access and decrease energy costs for all Americans. But we can't do that by letting Governor Newsom's prediction come true.

Mr. Bryce, during California's energy shortage, they relied on imported energy sources to meet the demand that California's renewables were not able to make on their own. Specifically, they relied on 65,000 megawatt hours from BPA and the Federal Columbia River Power System.

Overall, despite being 16 percent of California's energy capacity, hydro was providing 33 percent of its energy at their peak. Hydro provides 70 percent of the power in my home State of Washington, which is why we have some of the lowest electricity rates in the world. It is clean. It is reliable. And it should also be recognized as a renewable source of energy.

How does California's energy crisis this summer illustrate the need for policymakers, both at the State and the Federal level, to provide more flexibility on energy source mixes, not less, and how sources like hydropower can play an even more important role in increasing access and decreasing costs?

Mr. BRYCE. Well, thank you, Ms. Rodgers.

I feel we are becoming the bash California show today, and that is not my purpose today. But I think to answer your question regarding hydropower directly, we are not building more dams in America, and the Northwest is blessed with enormous hydro resources, and that has been a great boon to the States in the Northwest.

I would answer your question by saying, again, that I think what—I am a longtime advocate of nuclear energy, and I have testified before the Senate on several occasions making these very points. Natural gas and nuclear, if we want to continue decarbonizing our grid, those are the ways to go. I am not saying renewables aren't going to grow. They are. But the problem that we are facing in States all across the country, including in Washington, where the Benton Public Utility District just a few months ago said they don't want any wind added to their mix in the State of Washington, are these latest conflicts. And to me this is not necessarily about belief. It is fundamental math and physics. The power density of wind and solar are low, one watt per square meter for wind, ten watts per square meter for solar. That is one reason why I think solar is going to continue to grow, the greater power density, but those don't even come close to the power densities of natural gas and nuclear, and that is key because land use matters, so—

Mrs. RODGERS. OK. Thank you. Well, I appreciate that. I would also highlight that only three percent of the dams in America actually produce electricity. So there is a huge amount of infrastructure that could be converted and utilized for new hydro moving forward, and hydro is still the largest renewable in America.

Mr. Bryce, on another topic, I wanted just to note in your testimony that you note that wealthy electric vehicle drivers in California have been directly subsidized through tax credits and other incentives at the expense of lower and middle income individuals. We have seen more indirect costs levied on American consumers by other policies, such as California's Zero Emission Vehicle Program, which forces manufacturers and dealers to sell EVs regardless of the demand.

And I see that I am out of time. I just think that this is also a very important point, and I will ask my question in a followup in a written question. But thank you for being here, and thanks for your insight.

Mr. BRYCE. Yes, ma'am. Thank you.

Mrs. RODGERS. You are welcome. OK.

Mr. RUSH. The gentlelady yields back.

Mrs. RODGERS. I yield back.

Mr. RUSH. The Chair now recognizes the gentleman from Iowa, Mr. Loeb sack, for 5 minutes.

Mr. LOEBSACK. Well, thank you, Chairman Rush, Ranking Member Upton, for holding this hearing today, and thank you to the witnesses who are joining us as well.

And I do want to acknowledge Mrs. McMorris Rodgers' emphasis on hydropower. I have enjoyed working with her on that while I have been on the committee. I think that is very important.

And as we are discussing today, the burden of energy costs is felt very differently by households across the country, and these disparities can depend on a number of factors, including income level, race, regional location, as well as whether households are located in an urban or rural setting.

A significant number of my constituents in my Southeast Iowa district reside in rural communities where they generally face a higher energy burden, especially compared to their more urban counterparts. For example, according to the Department of Energy, in the metropolitan area of Iowa City, the average energy cost per household is around \$1,500 per year whereas in the rural small town of Farmington, Iowa, way down in the southeast corner of the State, the same average cost per household is nearly three times higher at just under \$4,400 per year. In fact, many of the communities located in the most rural counties in my district spend around 5 to 7 percent of their income on energy, while our more urban and suburban counties are typically around 2 to 3 percent, which is more in line with the average for the State.

Considering the fact that much of the cost-effective renewable energy produced in Iowa, particularly from wind, is generated in our rural communities, this disparity and cost burden is particularly pronounced; I might even say maddening.

Ms. Drehobl, first to you, thank you for your testimony today. And can you expand on what specific and unique challenges rural communities face in accessing affordable energy?

Ms. DREHOBL. Yes. Thank you for your question.

I will say ACEEE previously published research in 2018 measuring rural energy burdens and did find they are higher. I would say rural households are often frontline communities facing significant climate impacts, economic shocks, and other major challenges to daily life, and they also have less flexibility to move or change how they get around or how they heat their homes, and energy can be more expensive, as you have said.

I think access to energy efficiency and renewable energy is an important piece for economic recovery right now in the midst of the COVID pandemic in these communities, both in terms of lowering people's monthly bills as well as providing training and good job opportunities for people living in rural communities.

Mr. LOEBSACK. Well, thank you.

And I want to move to Ms. Wyatt now. What is the potential for renewable distributed projects, including distributed wind—I have been a big champion of that—in rural low-income communities? And what benefits specifically related to energy burden would these communities see from increased access to clean energy, Ms. Wyatt?

Ms. WYATT. Thank you for your question, Congressman.

GRID Alternatives itself doesn't have direct experience with distributed wind, but we do work in rural communities, including agricultural communities and Tribal communities, like Navajo Nation, and distributed energy has immense benefit for these communities and the ability to cut their energy bills, as we have seen with a number of our projects, including, you know—energy burdens are particularly high, as you said, in a lot of rural areas around the country, especially Tribal areas that may even have energy poverty and lack of access to the full modern energy to meet their needs in the first place, where micro grids would be of a special help.

So, yes, as with, you know, other households in communities, rural households and communities have barriers that it is very much a worthwhile investment to enable them to overcome and receive the savings from energy sources like solar that can cut their energy bills.

Mr. LOEBSACK. And, additionally, we have seen much of this Iowa, but can you expand on the role of clean energy in stimulating local economies and creating jobs as well?

Ms. WYATT. Absolutely, yes. The energy transition is an enormous opportunity. The clean energy sector is many times the size right now, in terms of work force, of the fossil fuel energy sector. It employs many more workers, well over a million. Solar has hundreds of thousands of workers, and they are good jobs. They have—there are low-barrier-to-entry jobs that can really give opportunities to people who need the most, and there are a lot of skilled jobs. It is a whole range with diverse roles, as long as, you know, policies enable those kind of training programs and everything else to develop, but huge economic opportunity in stimulating local economic development through clean energy, especially distributed clean energy. Those jobs aren't going to be off shored. You can't install a solar rooftop system from China.

Mr. LOEBSACK. Well, thanks to all of the panelists.

And, Mr. Chair, I yield back my time.

Mr. RUSH. The gentleman yields back.

The Chair recognizes now the gentleman from Ohio, Mr. Johnson, for 5 minutes.

Mr. JOHNSON. Well, thank you, Chairman Rush and Ranking Member Upton.

And I, too, I want to associate myself with the comments made by my colleague from Virginia, Mr. Griffith. Mr. Chairman, I, too, have enjoyed working with you and appreciate your passion for the disadvantaged and poor people, regardless of where they live. So I appreciate that about you.

You know, the energy burden, quote/unquote, energy burden defined as the percentage of household income used for energy expenses that we are talking about today, it highlights the important

fact that low- and fixed-income families are much more vulnerable to energy price hikes. What is interesting, however, is that earlier in this Congress I recall the majority hosting hearing after hearing highlighting their plans for a zero-carbon recovery while warning about the dangers of fossil fuels and advanced nuclear energy.

So it begs the question, do my friends in the majority really support lowering energy costs? Because given their attack on fossil fuels in their Green New Deal agenda, specifically coal and natural gas that are so essential in powering America's energy grid, I think it is a bit disingenuous for them to claim that they are concerned about keeping energy prices low for consumers. You simply can't work to lower energy expenses for low- and fixed-income families while simultaneously conducting a full on assault at the local, State, and national levels against some of our primary proven sources of abundant, reliable, and affordable energy.

So, Mr. Bryce, as you have stated in your testimony, natural gas is commonly used directly by consumers for powering their stoves, dryers, water heaters, and furnaces, frequently at a lower energy cost than similar electric appliances.

In my home State of Ohio and across the country, we have seen a number of communities whose elected leaders inspired by this Green New Deal movement have floated future proposals that would actually shut the gas off to their citizens all in the name of combating climate change.

So my question to you: This doesn't sound like reducing the energy burden to me, but can you explain the effect on poor and disadvantaged families if they were forced to switch to electric-only energy to meet all of their household needs?

Mr. BRYCE. Well, thank you, sir.

As I pointed out in my presentation a moment ago and in my written remarks, by outlawing natural gas and forcing consumers to use electricity, on a BTU basis, electricity is four times as expensive. So I think, on the face of it, that is a problem.

Now, advocates for beneficial electrification would point out, well, heat pumps and some of these other new appliances are more efficient. Well, that may well be, but even if they are twice as efficient as the existing ones, you still have a basic cost of energy per joule or per BTU that is twice that of using natural gas directly.

So I think that the other risk here is that by pushing for electrification only, then the system, the grid would be using more natural gas indirectly. Instead of using the gas directly in the home to, say, heat my water or cook my dinner, I would be using an electric appliance that would be fueled by gas burned in the power plant, and then in that process, half to two-thirds of that heat energy is lost simply because of the conversion process.

So, if you look at it from a basic physics standpoint, that is problematic because there is no way to know that that electricity would be coming from renewable sources.

Mr. JOHNSON. Yes, I agree with you because we are talking about electric distribution, in your answer for the most part, where that electricity comes from. We don't even address the issue of the generation and how we are going to generate all that energy from renewable or alternative sources.

So how could this affect their bottom lines if these same low and fixed income families happen to be living in a State or locality with aggressive renewable energy electricity mandates?

Mr. BRYCE. Well, you know, as I said, I mean, it is going to vary by States and by the prices of electricity. But I think ultimately the banning of natural gas has a regressive effect.

Mr. JOHNSON. All right. Well, thank you very much.

I will yield back an entire five seconds, Mr. Chairman.

Mr. RUSH. The Chair appreciates the five seconds from the gentleman.

The Chair now recognizes Mr. Kennedy because I don't see Mr. Welch in attendance right now. Mr. Kennedy, you are recognized for 5 minutes.

Mr. KENNEDY. Mr. Chairman, thank you and thank you all. Thanks for calling this important hearing. I want to thank the witnesses for their testimony and their presence today and for the discussion.

This is an issue that is important to me, important to my constituents across Massachusetts, but across my district as well, where we have a variety of economically extraordinarily diverse tied into the northern part and high residential communities and life sciences sector, medical device sector, and a lot of small businesses and small manufacturers where energy costs end up being a driving aspect to their ability to run a sustainable business, but also folks that are very much tied into the economic inequities we are seeing across Massachusetts and around our country and the needs to address climate change.

So all of that compounds into a community that before, shortly before I was elected eight years ago, had two large coal-fired generation power projects, and that is now down to zero. And, again, enormous opportunities that come with the potential for offshore wind and offshore wind generation—electricity generation, but trying to make sure that we do that, as we catalyze towards that, do that in a way that empowers frontline communities like Fall River and helps build a new initiative that does not yet exist here in Massachusetts and in the country.

So, Dr. Reames, I wanted to start with you. And thank you for your testimony.

In your statement, you discuss environmental justice, communities, and energy burden, and I wanted to see if you could talk about the overlapping effects of a high energy burden and what we have seen with the effect of COVID-19 particularly on environmental justice communities.

Dr. REAMES. Thank you for that question, Representative Kennedy.

What you do see is that communities that are reeling from COVID-19 are definitely the same communities that have high energy burdens. They are hosting the generation pollution from the energy sector, and they also have, you know, inefficient housing. So you have this kind of combination of disadvantaged, where people live in inefficient housing, so they are wasting energy. They are hosting the pollution from that energy, and the surrounding areas are consuming more energy at a cheaper rate. And so this idea that

the equity versus equality argument really plays into, you know, where these things kind of come together.

Mr. KENNEDY. 100 percent. And thank you for articulating that and walking us through it.

And, Ms. Wyatt, I wanted to go to you for the next one here, building off that. In your testimony, you talked about the impact of traditional generation on environmental justice communities. I was hoping that you might be able to expand on that a bit, the potential for renewable energy to address some of those impacts.

Ms. WYATT. Thank you Congressman.

You know, there has just been a lot of recent conflicting science on the detrimental impact on air pollution in particular but the water pollution from fossil fuel generating sources across the—you know, the fence lines, right outside the fence lines of these facilities, the communities. They are disproportionately likely to be low income and communities of color, and so they face higher rates of asthma, cancer, birth defects. It also contributes to COVID mortality.

And the way—you know, clean energy can remedy this, of course, directly by displacing the need for dirty fossil fuel energy generation directly one for one. It also, you know, empowers the communities to have their own energy that meets their needs and is more affordable. As we have said, clean energy from the sun and wind is more affordable in the short and long run.

So, by reducing pollutants and increasing access to affordable clean energy at the same time, you are really reducing racial disparities in a way that our country, you know, desperately needs.

Mr. KENNEDY. So I want to build on something you said there just really briefly.

But pollution is a subsidy, right? It is a cost to society that those that generate it don't bear. We all do. There is a common critique here that clean energy is just too expensive to be competitive that, in my mind anyway, doesn't take into account, one, the subsidies that many of those existing fossil—energy generation infrastructure one receives to the pollution, the contamination that comes with it and how we all bear that cost.

You have got about 20 seconds, Ms. Wyatt, but to the extent that you can explain all of this in 20 seconds as to why—the economic piece of it here. I would love to have you go. Twelve seconds, go.

Ms. WYATT. Sure. The current—we don't have a free market right now. The subsidies of the ability to pollute our atmosphere and people's lungs are in the trillions. They are not accounted for in energy bills or otherwise, but policy needs to account for them as a matter of justice.

Mr. KENNEDY. Well done.

Thank you. I appreciate it.

Ms. WYATT. Thank you, Congressman.

Mr. KENNEDY. Thank you. I yield back.

Mr. RUSH. The gentleman yields back.

The Chair understands that Mr. Bucshon is unavailable at the moment, so the Chair now recognizes Mr. Hudson for 5 minutes.

Mr. HUDSON. Thank you, Mr. Chairman. Thank you for holding this important hearing, and thank you to our panelists for being

here today as we examine an issue our most economically vulnerable constituents face, which affordability of energy.

Before the coronavirus shut down our energy economy, all Americans were benefiting from an energy renaissance. We had become the number one producer of oil and natural gas in the world, which has lowered to millions of Americans. President Donald Trump's aggressive energy initiatives have cut regulatory burdens on our energy sector and have saved Americans over \$200 billion annually through lower energy bills.

At the same time, the United States has cut our emissions the last 20 years more than the next 12 countries combined, and that is through innovation and private sector technology. However, Joe Biden, the Democratic nominee for President, who described himself the other night as, quote, he is the Democrat Party, if you look at his web site to figure out what the Democrats' energy plan is, it says he supports the Green New Deal.

The Green New Deal is estimated to raise Americans' energy bills by as much as 286 percent. So I find it ironic this hearing is about examining ways to lower energy costs for people, but the other side's energy plan would dramatically increase energy costs for Americans. And as our panelists have eloquently explained, that impacts lower income families the most.

I am an all-of-the-above energy supporter. Just this week, Duke Energy in North Carolina, announced plans for a 1.1 megawatt floating solar facility at Fort Bragg, which would be the largest floating solar plant in the Southeast. This will bring more clean energy to North Carolina, enhance our grid, and increase Fort Bragg's energy defense resiliency.

We can build a cleaner energy economy effectively and affordably through innovation and technology. I am proud to have worked to lower energy costs and to give my constituents more money in their pockets.

Now, Mr. Bryce, you mentioned in your testimony that policy-makers must have a frank and transparent discussion about how to lighten the energy burden, not increase it. When renewable energy policies are proposed, do you think there should be more public analysis to estimate what the full cost would be? Is that something we should use to better inform our own decisions on any plans to decarbonize the economy?

Mr. Bryce.

Mr. BRYCE. Yes, sir, I think absolutely. But let me be clear, this is not an easy assignment. As I mentioned earlier, the American electric grid is balkanized. We have State regulators. We have the regional transmission operators. We have Federal regulators that all have a say in what local communities do and what they—how they treat generation resources.

What I think is the other big challenge here is that electric—overall electricity demand in the United States has been flat for years. Roughly the last ten years electricity demand has not grown at all. That is due to greater efficiency, which is a very worthy goal, but what we see now is an increased effort—or really competition among different generators for the remaining—for the share of the pie and who gets priority access or distribution on the grid.

So these are complicated challenges, and I don't have the perfect answer to say this is how we should do these price analyses. But, yes, these kinds of analyses and knock-on effects on ratepayers that would include all of the costs, for transmission, for high-voltage transmission, for new transformers, poles, wires, synchronous generation, all of these things that are needed to augment and offset the generation that is being added to the grid.

So there is no simple answer here, sir. But, yes, getting a better handle on these price impacts is essential.

Mr. HUDSON. Well, I appreciate that, and I agree with you. You know, I think Republicans and Democrats agree we have got to find ways to reduce emissions, and I think we all care about our consumers, particularly the most vulnerable.

Mr. Chairman, I agree with my colleagues that we recognize that you have been a champion for those folks all around the country. But I think the difference is Republicans want to continue to reduce the emissions through innovation, through private sector technology, developments and advancements. And we have a role to play in that, but we don't have to cripple our society. We don't have to double or triple the costs on our lowest income families to achieve these goals.

So I look forward to working with you, Mr. Chairman, on that. And, with that, I will yield back.

Mr. RUSH. The gentleman yields back.

The Chair now recognizes the gentlelady from New Hampshire, Ms. Kuster, for 5 minutes.

Ms. KUSTER. Thank you, Mr. Chairman, for convening this important hearing.

This committee has worked tirelessly to address the public health and economic consequences of the COVID-19 pandemic, and I appreciate today's hearing, which touches on the affordability of energy and electricity, a topic that is top of mind in New Hampshire as we head into another winter season.

While our economic recovery has begun and businesses begin to navigate this new normal, we cannot lose sight of the reality that millions of Americans and tens of thousands of Granite Staters are still out of work. As a result of the pandemic, New Hampshire's August 2020 unemployment rate was triple that of August 2019, and it has caused more Granite Staters to struggle with their energy bills.

According to data from Eversource, one of the largest utility companies in my State, the number of individuals and small business ratepayers who are more than \$125 behind on their energy bills has nearly doubled, from 21,000 in September of 2019 to 38,000 in September of 2020. The New Hampshire Electric Co-op reported that the number of customers who were more than 90 days in arrears on their bills have tripled from August 2019 to August 2020.

And with the expiration of the pandemic unemployment compensation and lost wage assistance program, I fear that more Americans will soon fall behind on their energy bills. Thankfully, in New Hampshire, individuals who are struggling with utility bills will not have their service cut until at least April of 2021 if they certify that they are experiencing financial hardship. But after that point, I fear that Granite Staters who already were paying too

much for their energy bills might not be able to pay off larger bills that have accrued during the pandemic even with good-faith efforts by utility companies to put ratepayers into gradual repayment plans.

Dr. Reames and Ms. Drehobl, do you think Congress should consider setting aside dedicated funds to help Americans pay off unaffordable energy bills that accrued during the pandemic?

Dr. REAMES. Thank you for your question, Congresswoman.

I do think that the increased funds for LIHEAP is a perfect way to use those funds to pay off accrued debt. There was a pilot in Michigan that did direct payments, so working with the utility company to identify households that were behind on their utility bills and actually made those direct payments on those customers' behalf.

So I think this is an opportunity for utilities, regulators, and the Congress to work together.

Ms. KUSTER. Thank you.

Ms. Drehobl, anything to add?

Ms. DREHOBL. I agree with Professor Reames, and I think utilizing LIHEAP would be a good suggestion.

Ms. KUSTER. Great.

So let me switch gears and touch on the importance of the Weatherization Assistance Program that provides funding to local governments and nonprofits to help low-income families make their homes more energy efficient.

Again, for the two of you, should Congress increase funding for the Weatherization Assistance Program? And what would be an ideal funding level?

Dr. REAMES. I will comment really quickly. If you look at funding for LIHEAP and weatherization, we spend about seven times the amount on LIHEAP, which I view as a temporary solution. So we should increase the funding for weatherization. If we think 35 million households qualify and we have only weatherized about seven million, like Ms. Drehobl has said, it would take, you know, several decades to weatherize all of the homes that qualify.

Ms. KUSTER. Anything, Ms. Drehobl, before my time is up?

Ms. DREHOBL. Sure. Yes, I would add that ACEEE supports increasing funding for LIHEAP at a consistent rate to move towards the funding levels that we had during the ARRA time, and that could help weatherize many more homes than we are currently weatherizing. So I think ramping up this program would be helpful.

Ms. KUSTER. Great. Thank you so much for your testimony.

And, with that, Mr. Chair, I yield back.

Mr. RUSH. The gentlelady yields back.

The Chair now recognizes the gentleman from Michigan, Mr. Walberg for 5 minutes. If you can turn on your—unmute, Mr. Walberg.

Mr. WALBERG. Thank you. Thanks for reminding me. And, Chairman Rush, it is much appreciated that you have this hearing today. Having been born and started my raising life in your district, I know exactly where you are coming from and appreciate your commitment.

Also, it is good to have the representative from the University of Michigan here today, Dr. Reames. I started out at that little university on the banks of the Red Cedar just the beginning this week as we dedicated the facility for radioactive isotope beams, which was exciting, and so it is good to end the week here as well discussing the issue of energy as it touches people's lives. So thank you for being with us.

On the issue of energy affordability in colder climates like my home State of Michigan, 75 percent of our residents rely on natural gas for home heating because it is efficient, it is dependable, and it is affordable. In fact, the Michigan Public Service Commission has found that natural gas saves the average Michigander over \$1,000 annually compared to an all-electric home.

And so, Mr. Bryce, could I ask you to elaborate on what your research has found about the role natural gas can play in keeping customer bills affordable, especially in the climates like we have in Michigan, the northern climes where significant cold weather remains and we have a very, very plentiful source of natural gas?

Mr. BRYCE. Sure. Thank you, sir.

Yes, just one quick comment, which is that the effort to electrify all residential use sounds good, but particularly in colder States like Michigan—my wife is from Ann Arbor. My father-in-law taught at the University of Michigan. It gets cold there, really cold, and heat pumps don't work in very cold weather. You need resistance heaters, which then adds more demand to the electric grid, which then has knock-on effects in terms of the cost of upgrading the grid to accommodate all of that energy use that was being provided by natural gas.

So I think particularly the effort to take gas out of residential use and out of commercial and industrial use, for heating in particular, heat bumps simply are not a solution, a viable economic solution in colder climates.

Mr. WALBERG. Mr. Bryce, going on from that, our Governor, Governor Whitmer, recently issued an executive order making Michigan carbon-neutral by 2050. Many energy companies in my State were already undertaking aggressive steps to install more renewables. I know that full well having the energy district of the State of Michigan where over 35 percent of all the energy is produced right in the Seventh District with DTE and Consumers Energy headquartered in my district.

Their aggressive steps with renewables has, like wind and solar, may require substantial new transmission build out, and it already is. However, energy providers must also ensure the grid is reliable and can meet demand on days when the wind isn't blowing or the sun isn't shining, and we have a lot of those days in Michigan. Natural gas, as well as nuclear, are 24/7 power sources to help provide certainty to the grid. Having a nuclear plant in my district as well, we recognize the value of that, and yet we are moving away.

How should we think about the future of our energy mix and the role natural gas and nuclear can play in generating electricity most cost-effectively for consumers?

Mr. BRYCE. Well, thank you, sir. That is a very good question.

And let me be clear that the challenges facing the nuclear plants across the country are formidable. The low price natural gas is un-

dercutting the wholesale price—or is lowering the wholesale price and, in some cases, making these big nuclear plants, which have high fixed costs, very low fuel costs but high fixed costs, particularly in terms of labor, so the utilities are saying, well, we will shut them down unless we get some—effectively some kind of consideration; call it a subsidy because that is what it is.

But I am in favor of a diverse portfolio. And what I fear—I am adamantly pro-natural gas, but what I fear is happening in the United States is that, with the shuttering of all of these coal plants and the shuttering of these nuclear plants, the U.S. grid is going to be too reliant on a single fuel, which is natural gas. And I think that potentially is a liability, particularly during—as we have seen during the—what was it, not the cold bomb or the—you know, the Arctic cold fronts that we have had where natural gas supplies are strained, and those are just-in-time deliveries through pipelines.

So I think this issue has to be looked at in the entirety around the country because I do fear that we are becoming too reliant on gas on the grid as a whole.

Mr. WALBERG. Thank you.

Mr. Chairman, I yield back.

Mr. RUSH. The gentleman yields back.

The gentleman, Mr. Walberg, is the last member on the minority side that is present right now. So we will go straight through the members on the majority side.

Ms. Barragán, you are recognized for 5 minutes.

Ms. BARRAGÁN. Well, thank you, Chair Rush, for holding this hearing on energy equity.

Whether it is cost, pollution, or jobs, our energy system's dependence on fossil fuels doesn't work for communities of color. Our transition to a clean energy economy offers a unique opportunity to reverse the injustices in the current system. It is critical that we don't leave behind Black, Latino, and indigenous communities behind in these efforts.

I want to start by responding to the ad by a group, United Latinos Vote, that Ranking Member Walden filed for the record to imply that Latinos in California are concerned about moving from fossil fuels to clean energy.

United Latinos Vote is an industry front group, funded in part by a \$15,000 donation by Pacific Gas and Electric. One recent campaign they were involved in was in response to a gas ban proposed by the small city of San Luis Obispo. There hasn't—there wasn't opposition from local minority groups, so the fossil fuel industry manufactured opposition through United Latinos Vote, which is based 230 miles away from San Luis Obispo in Oakland.

California Environmental Justice Alliance, an environmental justice group representing communities of color, called the actions by United Latinos Vote, quote, gas lighting aimed to manipulate the public and decisionmakers on a just transition away from fossil fuel based economy that most hurts people of color, end quote.

I think it is an important principle of equity and energy justice that we allow communities of color to speak for themselves, make their own decisions without this outside political influence and money into the community.

And so, with that, Ms. Wyatt, I want to start with you first. I want to thank you for all of the work that you have done. GRID Alternatives has done amazing work, especially in my district in South Los Angeles. With communities in my district, they have gone out and done the work on the rooftops. Now, recently, you installed solar and battery storage in Wilmington's Harbor City Community Job Center and individual homeowners' solar systems in Watts.

Now, these projects create green jobs while reducing energy costs and pollution. Many of these clean energy projects are supported by grants from California's climate programs. I want to see more of these community-led projects in my district and in Black, Latino, and indigenous communities across the country.

What climate programs can Congress enact to help achieve this?

Ms. WYATT. Thank you very much for your question, Congresswoman, and your kind words about the great work that our construction teams and others are doing in California.

California has pioneered a lot of great programs, and a lot of them have had a lot of success and could be scaled up. The combination of subsidies that get the—just bridge the gap to enable institutions serving low-income people and low-income households themselves directly on their own rooftops to get the benefits of clean energy. Those could come from the Federal Government, as well as the State government. They could go through State and local governments or other institutions, and we have made a number of recommendations in our written comments on some suggestions for how to do that. There have been a number of legislative proposals in recent years. These could be coordinated, in addition, through weatherization assistance and energy assistance. Again, we don't want to set up clean energy to compete with those very important programs, but by fully funding those and, in addition, including renewable energy, low-income renewable energy with those programs, you could really multiply the beneficial impacts.

You know, we also leverage the investment tax credit wherever we can, making that directly accessible to low-income communities and Tribes, and nonprofits would really enhance its utility and level the playing field for investments in renewable systems for those beneficiaries.

Congress has a lot of room for creativity to get clean energy to where it is going to have the most benefit.

Ms. BARRAGÁN. Great. Thank you so much.

Dr. Reames, in the short time I have left, in 2017, you released a study on energy efficiency investments by Michigan's utilities which showed that most of the dollars and energy savings went to wealthier ratepayers.

Can you talk about how State laws led to this inequity and whether this is a problem in other States?

Dr. REAMES. Thank you for your question, Congresswoman.

I think we need to look at how we promote and push equity investments, particularly focusing on what partnerships are made between utilities and State regulators to reduce the cost of energy-efficient technology, how we market to low-income communities, how we allow community groups as trusted members in that community to promote these programs as well. So there are knowledge

gaps, there are cost gaps, and participation gaps that lead to those disparities.

Ms. BARRAGÁN. Great. Thank you.

With my time expired, I yield back.

Mr. RUSH. The gentlelady yields back.

The Chair now recognizes the gentleman from Indiana, Mr. Bucshon, for 5 minutes.

Mr. BUCSHON. Thank you, Mr. Chairman.

I will be brief, a couple of questions real quickly.

Ms. Wyatt, do we have a national plan for recycling solar panels?

Ms. WYATT. We do not have a national mandate. There is a lot of work being done in the industry regarding recycling and reuse of solar panels after multiple decade lifetimes.

Mr. BUCSHON. Yes, because, I mean, you are looking at, what, 20- to 30-year life expectancy.

What do we do with the ones that are end of lifecycle right now?

Ms. WYATT. Some of the early solar systems are approaching the end of their lifecycle, not GRIDs, and so I will get back to you with some additional information.

Mr. BUCSHON. Yes, sure. I will tell you what we do with them. First of all, I am an all-of-the-above energy supporter, so I support solar energy. But I am concerned about we are not looking at the entire lifecycle of that form of energy source. What we do now is put them in landfills. So, you know, as we expand our solar energy and the solar energy space, 20, 25 years from now, we are going to have landfills full of these things, which have heavy metals, all kinds of other things. So we need to work on that, which I am.

So I do find it frustrating sometimes when we talk about different forms of energy, we don't talk about the entire lifecycle of an energy source, and that is one of the big ones there.

Ms. WYATT. I agree. We also don't talk about the full impacts of the fossil fuel energy sources and their life cycle impacts the climate.

Mr. BUCSHON. Fair enough, fair enough.

Dr. Reames, have you studied rural America with the issues that you have been talking about? Because I represent southwest Indiana. It is all rural. And I can tell you some of the challenges that rural America faces are very similar to urban challenges, with low-income individuals, with problems with accessing affordable energy. And also, you know, a lot of their homes and businesses lack, what I would say, improvements and weatherization and other things. Have you studied rural America?

Dr. REAMES. Thank you for your question, Congressman.

I have not studied rural America as much as I have studied urban America.

Mr. BUCSHON. Sure.

Dr. REAMES. But I think a lot of those studies I do, particularly like food insecurities studies, when we did the lightbulb study, we did find that there were replicate studies in rural areas that found the same challenges of lack of access to LED lightbulbs or more expensive LED lightbulbs.

Mr. BUCSHON. Yes, I mean, I think it would be good to expand out, you know, to look at the challenges we face in rural America as also the ones that we face in urban America.

So, with that, Mr. Chairman—go ahead. Do you have another comment, Mr. Reames?

Dr. REAMES. No, sir, I agree with you.

Mr. BUCSHON. OK. Great.

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

Mr. RUSH. The gentleman yields back.

The Chair now recognizes the gentleman from Arizona, Mr. O'Halleran, for 5 minutes.

Mr. O'HALLERAN. Thank you, Mr. Chairman and Ranking Member Upton, for holding today's hearing, and thank you to the panelists for being here.

As we enter into the final weeks of the 116th Congress, I would like to briefly summarize some of the key actions the House has voted on, passed, and sent to the Senate to promote clean energy for Americans: the Climate Action Now Act, to reenter the United States into the first climate accord; the Moving Forward, H.R. 2, to revitalize our Nation's crumbling infrastructure and invest in the renewable energy and storage projects; and the Clean Energy Jobs and Innovation Act just recently to modernize our Nation's energy and environment and address some of the climate change issues.

While there are many more decisive actions to highlight, including many taken by the Energy and Commerce Committee this Congress, as lawmakers, we must ensure clean, affordable, and reliable energy is truly available to everyone as the energy economy continues to evolve.

As many of you know, I am proud to represent 12 Native American Tribes in my district, including the Navajo Nation. Since today's discussion is focused on the energy burdens many Americans face, I would like to highlight an energy burden many may not be aware of. Arizona's First Congressional District has a high level of seniors who are on fixed incomes and below the poverty line. Additionally, many people in our work force have not seen a wage hike that has kept them up with inflation for some time. On top of that, my district has a tremendous amount, on a per capita basis, of people on Medicare and Medicaid, that are on those types of fixed incomes.

Every winter, thousands of Navajos drive miles from their homes to load up their trucks from community coal heaps. For many Navajo, these coal heaps are the only source of light and heating for their homes.

For many thousands of families, including members of the Navajo Nation and the Hopi Tribe throughout Northern Arizona, energy burdens are compounded by unemployment rates between 50 and 80 percent, and that was pre-virus I will say, following the recent closure of the Navajo Generating Station, which provided many of the good-paying jobs to provide for their families. In addition to the policy incentives for promoting energy efficiency and renewable energy, I believe the strength of the work force plays a factor in the energy burdens a family may face.

I look forward to assisting communities in my district, help them navigate the energy transition, and lessen their burden on energy.

Ms. Drehabl, I got that right, I hope, and, Ms. Wyatt, for communities disconnected from the electric grid or on the front lines of the

energy transition, how can employment opportunities in the renewable energy sector, which requires specialized skills and training, be made more available for low-income and minority households?

Ms. WYATT. If you don't mind me jumping in first. GRID Alternatives and our Tribal program have pioneered a lot of programs to train Tribal members. Recently we just had a Tribal training program for some members, and they were trained at a centralized location, and they are taking that knowledge and that on-the-ground experience back to their Tribes with them, that technical training. So it is really invaluable.

Again, it just takes deliberate programmatic support to combine the benefits of work force training with establishing the clean energy availability where it is needed on Tribal areas.

Mr. O'HALLERAN. And, Ms. Wyatt—

Ms. DREHOBL. Sure. I will add to that.

From an energy-efficiency perspective, there is also major job opportunities for training of work force in rural areas in similar ways.

Mr. O'HALLERAN. Oh, I am sorry. I got the names mixed up here with the faces. Thank you.

Ms. WYATT. That is quite all right. Thank you.

Mr. O'HALLERAN. Dr. Reames, I am sure you know the energy transition may lead to excess transmission line capacity in communities where previous power generation has been retired. I have three more coal generation plants in my area that will eventually be closed.

Could you comment on whether your research has examined how rural and remote communities replace retired power generation with renewable energy?

Dr. REAMES. Just really quickly, I have not studied it intently, but I have looked at how rural communities—just a couple of pilot studies in Michigan are looking at adding community solar for rural communities and partnering with weatherization to ensure that the homes are more efficient and that they have equitable access to renewable energy.

Mr. O'HALLERAN. Does somebody else want to speak?

Mr. RUSH. No. The gentleman's time has ended. The gentlemen yields back his time.

The Chair now recognizes the gentleman, Mr. Duncan, for 5 minutes.

Mr. DUNCAN. Thank you, Mr. Chairman.

First of all, I want to thank the panelists for being here. I want to thank especially Robert Bryce for being here. I have read your book "Power Hungry." You can see we have read it quite a bit and referenced it. I recommend it for everyone on the committee, but I don't think my colleagues on the other side of the aisle will like it too much because you clearly point out the true costs of green energy and show what works. I want to thank you especially for your sections on how the American energy renaissance has created an opportunity for us to export energy sources, like clean-burning natural gas, to other parts of the world to improve the quality of lives of so many people so that they have better air in their homes, the ability to keep food fresh, the ability to heat and cool, keep

mosquitos out, all of the other things that are quality-of-life issues that you point out in this book that are really good.

I would like to switch gears to talk about nuclear for just a minute. My State of South Carolina, we get 56 percent of all of our electricity from nuclear power. That is 95 percent of at all of our clean carbon-free electricity. Renewables, hydro, wind, and solar, make up less than five percent of the carbon-free sources in our State.

As you know, wind and solar require huge swaths of land, and their power density is weak compared to nuclear. You mentioned that earlier just briefly. To match the power produced by one nuclear reactor would require 2,077 megawatt wind turbines. So, you know, you have mentioned California's climate goals would be better served by keeping the Diablo Canyon Nuclear Power Plant online and by encouraging the deployment of next generation reactors. That is something I agree with.

Could you talk about what it would mean to replace closing nuclear units with wind and solar, especially in a State like South Carolina? And would it be even possible in the terms of land use and economics?

Mr. Bryce.

Mr. BRYCE. Well, thank you, Mr. Duncan.

I have done the calculations in both my new documentary "Juice"—you didn't plug this one, so I am going to plug it. "Juice: How Electricity Explains the World" came out in June. We visited the Indian Point nuclear plant in New York, and the calculations are very straightforward. That plant covers 1 square kilometer, produces about 16 terawatt hours of electricity per year. To produce that volume of electricity, that quantity of energy with wind turbines would require a land area of 1,300 square kilometers. So roughly 1,300 times more land would be required to replace that one nuclear plant. And, unfortunately, that plant, which provides about 25 percent of New York City's electricity, is being shuttered prematurely. That plant could run for many more decades, but there was no political support for it, so it is, unfortunately, being closed.

One other point is that the land use conflicts in New York State, as I mentioned earlier, are as pitched as in any other State in America. You have numerous small towns and counties who have declared themselves saying, "We don't want more wind capacity in our counties," and has led to the Governor now essentially saying, "Well, we are going to override local zoning," which is really unprecedented, the overruling of home rule because the State is in a rush to build more renewables.

So these kinds of land use conflicts are going to become much more common and, as I already mentioned, over 280 rejections or restrictions already in the United States since 2015.

Mr. DUNCAN. No doubt, no doubt. Is that an Ohio State Buckeye on your lapel pen there?

Mr. BRYCE. Oh, well, no. Since we are talking about electricity, this is ready kilowatts.

Mr. DUNCAN. I don't care. I just wanted to make sure because I am a Clemson guy.

Real quickly, the fact is that exporting oil and gas to energy poor nations will help save thousands, if not hundreds of thousands of lives. I want to give you an opportunity to talk to you about how America can play a role in the geopolitical arena to improve the quality of lives of so many people around the world.

Mr. BRYCE. I think it is obvious, in terms of geopolitics, the U.S. becoming an LNG exporter has had significant ramifications in Europe. Poland signed a long-term LNG supply deal with Cheniere Energy about two years ago because Poland doesn't want to rely on Russia for their gas. They have a long history with Russia. It is all bad.

But I think—you didn't ask this question, but it is clear to me that in terms of geopolitics, natural gas is becoming the energy form that is driving a lot of changes in geopolitics, with Israel sending gas to Egypt, the Egyptians and the—now supplying on a 30-year deal through the Power of Siberia Pipeline gas to China. These are significant and long-term deals that are going to affect geopolitics for decades to come.

Mr. DUNCAN. Absolutely. I think you are spot on with that. Again, I will recommend your book, if folks want to really see a true picture of energy.

With that, Mr. Chairman, I will yield back the remaining ten seconds. Thanks.

Mr. DUNCAN. Thank you, sir.

Mr. RUSH. The gentleman yields back.

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

Ms. BLUNT ROCHESTER. I join my colleagues, Mr. Chairman, in thanking you for calling this important and timely hearing, and I thank all of the witnesses for testifying today.

In my State of Delaware, we are suburban, urban, and rural. And as is the case throughout our country, we are seeing families fall farther behind on their electricity bills. With winter approaching, this is a daunting reality for many folks. The COVID-19 pandemic has magnified the health, economic, and environmental racial disparities in our society. Black and Brown communities are seeing higher infection and death rates from this disease. Black and Brown communities are more likely to spend a larger percentage of their household income on energy bills. And Black and Brown communities are being hit the hardest with the economic recession we are facing.

The economic upheaval we are experiencing from this pandemic has presented us with an opportunity to correct these injustices and rebuild a cleaner and more equitable country.

One of my passions is the future of work, which is why I created a bipartisan caucus to look at solutions for the myriad challenges facing our companies and workers, not least of which is this pandemic. With clean energy, we have an opportunity to accelerate into the jobs of tomorrow.

The impact of COVID-19 pandemic has caused—has forced us to face the future work sooner than we thought, and while this certainly feels daunting, I also see it as an opportunity. We need high-paying jobs that not only minimize environmental impacts and help

us fight climate change but ensure that all Americans have access to clean and affordable energy.

So my first question is for Ms. Wyatt. Following up on Mr. McNerney's questions about how to increase women and people of color in the clean energy industry, I would like you to give—I would like to give you some more time to expand on some of the programs that you mentioned, how we can in the Federal Government continue to incentivize and invest in programs like these so that clean energy jobs are accessible to all.

Ms. WYATT. Thank you, Congressman.

Congress can start by expanding existing Federal job training programs like the HUD Jobs Plus program and adding an emphasis on the clean energy jobs that, as you said, are the jobs of the future as well as the jobs of the present. These are large and growing industries.

Congress can also expand existing grants that provide solar and renewable energy training, especially focused on low income and underserved communities and workers who are displaced from fossil fuel industries. GRID particularly supports funding for the SolarCorps program supported through Americorps VISTA, one of the programs that we benefit from greatly because career choices are shaped by experiences and education prior to entering the workforce.

Congress should incentivise resources for HBCUs, travel colleges, minority serving institutions, programs for women, high schools, and technical schools to really ensure that we are being as inclusive as possible.

And there is ample opportunity to create new renewable energy, storage, and electric vehicle infrastructure-focused training programs that provide living wages and benefits during training which is very important for ensuring that people who otherwise can't afford to just take off time from work to train into these new careers are able to access those.

Again, the SolarWorks DC program is an example of a program that combines clean energy access with workforce development training, real world experience, and wrap-around services, and it is had a lot of great success.

Ms. BLUNT ROCHESTER. You know, just to follow up on that, with our high unemployment rates right now, we know that we are going to have to create new, high-paying jobs with varying training requirements. Why is the clean energy industry ideal for creating these types of jobs?

Ms. WYATT. The clean energy industry has a lot of facets. There are low barrier to entry jobs such as solar installation that can really form the basis for entire, very rewarding career paths.

Average wages for even entry level jobs of that type are higher than the national average, and they allow people to support their families while they are growing in these careers and learning on the job.

Again, the different facets of the clean energy revolution are interrelated, so people who are exposed to solar installation can also be exposed to weatherization and efficiency services and really just take advantage of the best opportunities where they are and for where they are in their lives to be part of this transition.

Ms. BLUNT ROCHESTER. Thank you. And I have 20 seconds left. Ms. Drehobl, as we are transitioning our society to telework and distance learning, and telehealth, can you talk about what low income communities and communities of color can do to not be left behind, what we can do as a society?

Ms. DREHOBL. That is a great question. I think more investment in efficiency weatherization to help people use less energy while they are spending more time at home is really needed right now.

Ms. BLUNT ROCHESTER. Thank you so much.

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

Mr. RUSH. The gentlelady yields back.

The Chair now recognizes Ms. Schakowsky who has waived on this subcommittee for the purposes of asking questions of our witnesses.

Ms. Schakowsky of Illinois, you have 5 minutes.

Please unmute.

Ms. Schakowsky.

Ms. Schakowsky, unmute.

Ms. Schakowsky.

Ms. SCHAKOWSKY. OK. There we go. I am so sorry. I really apologize.

Mr. RUSH. Quite all right.

Ms. SCHAKOWSKY. And thank you, Mr. Chairman, for letting me waive onto this subcommittee.

I have to tell you. There are times that I get so frustrated about this issue about the challenge between and the discussion between whether or not it is about jobs or it is about the environment because it seems to me that there is no contradiction whatsoever.

And we are hearing about communities that are facing higher energy costs around the country. And while I know that is true, there are also low income communities, communities of color are facing also higher health risks in their communities, and we cannot have this kind of division between saving our environment and jobs.

There is, in my view, no contradiction. But it is a contradiction to me to find that the permanent tax breaks to the fossil fuel industry are seven times larger than those in the renewable energy sector.

And so I did want to ask Ms. Drehobl—is that correct? I know I have been listening all day how to say it, and I still didn't—probably didn't say it right.

But how do we reconcile these things? I think this is the existential issue of our world right now, that we get a grip on carbon emissions in the atmosphere but also that we make sure that we address the inequities among communities and the disparities that are faced.

I wonder if you could just talk a little bit more, and I know you have talked quite a bit about it already today, about that and the frustration I feel in the debates that are going on right now, including by the President during whatever you call that, the debate.

Ms. DREHOBL. Sure. Thank you for your question.

I agree with you that I don't think these are separate things. I think investing in clean energy leads to more jobs being created. It leads to a healthier environment. It leads to reduced emissions of greenhouse gases, and all of these things can also benefit low in-

come communities if there is an environmental justice lens set with these policies as we move forward.

I think it is important to note too that when it comes to energy prices and costs that just because prices are low also doesn't mean that people are going to have affordable energy. If your home is inefficient, then you might need to use a lot more energy to keep it at a comfortable level. So I think, you know, discussions around prices also need to tie in with the reality of the bills that people are paying as well.

Ms. SCHAKOWSKY. So we have what we call the LIHEAP program to help people pay their energy bills. I am wondering if you know much about that, or if anyone does, whether or not we are building into that when we help make homes more energy efficient if we are using energy efficiency. Anybody know about that?

Ms. DREHOBL. Well, the LIHEAP program does allow for States to spend some of that portion of money for weatherization. They can have a waiver of 15 to 25 percent.

So that program not only helps with the immediate need that people have to pay their energy bills but also can be leveraged for that long-term solution of weatherization.

Ms. SCHAKOWSKY. Let me also ask about the importance, because I think there is one, of making sure that communities are involved in the solutions that they have—that are offered to them and making decisions for their own communities and if you think that there is enough of that.

Ms. DREHOBL. Yes. I think that is vitally important. I think a lot of policies and programs have been designed without the involvement of communities. And I have seen, you know, different practices from utilities in States and the Federal Government working more directly with communities in the process of designing policies and programs. And I think that really is key to make sure that we have a just energy system.

Ms. SCHAKOWSKY. Well, thank you so much. And, again, thank you, Mr. Chairman.

Sorry about my inability to promptly unmute myself, but it has all been worth it for me, anyway.

So thank you very, very much, and I yield back.

Mr. RUSH. The gentlelady yields back, and that concludes the witnesses' questions.

And I want to again thank the witnesses for participation in our hearing today. And, again, I want to repeat my apologies for the shaky start of this hearing, the technical glitches that we were confronted with.

And I want to remind members that pursuant to committee rules, they have ten business days to submit additional questions for the record to be answered by the witnesses who have appeared. I ask each witness to respond promptly to any such questions that you may receive.

Now, I don't know if we have any unanimous consent requests.

I don't see any, so—we have unanimous consent requests, and where are they? Let me see.

All right. Unanimous consent requests are the January 2019 Nature and Sustainability article entitled Disparities in Rooftop

photovoltaics deployment in the United States by Race and Ethnicity.

Also, a letter from the New York Technology Forum. Additionally, a letter from the National Energy Assistance Directions Association and an Ad in the L.A. Times from the Sierra Club, and lastly, an Ad in the L.A. Times from the United Latinos Vote.

Without any objections, the documents are entered into the record.

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

Mr. RUSH. And without any further objection, at this time, the subcommittee stands adjourned.

[Whereupon, at 1:21 p.m., the subcommittee was adjourned.]

## Disparities in rooftop photovoltaics deployment in the United States by race and ethnicity

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**The rooftop solar industry in the United States has experienced dramatic growth—roughly 50% per year since 2012, along with steadily falling prices. Although the opportunities this affords for clean, reliable power are transformative, the benefits might not accrue to all individuals and communities. Combining the location of existing and potential sites for rooftop photovoltaics (PV) from Google’s Project Sunroof and demographic information from the American Community Survey, the relative adoption of rooftop PV is compared across census tracts grouped by racial and ethnic majority. Black- and Hispanic-majority census tracts show on average significantly less rooftop PV installed. This disparity is often attributed to racial and ethnic differences in household income and home ownership. In this study, significant racial disparity remains even after we account for these differences. For the same median household income, black- and Hispanic-majority census tracts have installed less rooftop PV compared with no majority tracts by 69 and 30%, respectively, while white-majority census tracts have installed 21% more. When correcting for home ownership, black- and Hispanic-majority census tracts have installed less rooftop PV compared with no majority tracts by 61 and 45%, respectively, while white-majority census tracts have installed 37% more. The social dispersion effect is also considered. This Analysis reveals the racial and ethnic injustice in rooftop solar participation.**

As prices of solar photovoltaics (PV) continue to decline<sup>1</sup>, accelerated adoption of solar PV is expected among utilities, businesses and communities<sup>2</sup>. In fact, techno-economic analyses project that PV total annual installed capacity in the United States will amount to 16 GW within the next 5 years given the attractive economic value proposition<sup>3</sup>.

Growth to date can be attributed in part to top-down approaches, such as enacted public policies and alternative financing mechanisms, that have gradually led to customers understanding the benefits of solar PV<sup>4</sup>. In a similar vein, bottom-up approaches, such as the social diffusion effect, have been identified as significant drivers in catalysing solar PV adoption<sup>5</sup>. An example of the diffusion effect takes place when a ‘seed’ customer installs rooftop PV and, by consequence, influences their neighbours to also install solar, creating an adoption chain within a radius of influence<sup>6,7</sup>.

However, this expected growth contrasts with current deceleration reports by many distributed solar PV companies across the United States<sup>8</sup>, despite historically low PV installation prices<sup>9</sup>. Studies suggest that this can be explained by multiple factors<sup>10</sup>, including a potential saturation of medium-to-high-income customers having already adopted rooftop PV<sup>11</sup>, and in some instances, a wide disparity in willingness to acquire PV given electric grid price competitiveness<sup>12</sup>. Although reports have elucidated the income distribution of owners<sup>13</sup>, sample sizes have been limited, and details on the customer demographics are not reported.

In response, there have been federal and state efforts to encourage low-income participation in rooftop PV. The Renew300 Initiative aims to install 300 MW of solar PV (enough to power 50,000 homes) on federally assisted housing in programmes such as the US Department of Housing and Urban Development’s rental housing portfolio, US Department of Agriculture’s Office of Rural

Development Multi-Family Housing Programs, and rental housing supported by the Low-Income Housing Tax Credit<sup>14</sup>. The US Department of Housing and Urban Development also broadened the applicability of Section 108 Community Development Block Grants to support renewable energy<sup>15</sup>. Several states have developed policies to further include low-income individuals. California has the Solar on Multifamily Affordable Housing Program<sup>14</sup> and New Solar Homes Partnership<sup>16</sup>. Massachusetts’ Solar Carve-Out II programme and the Solar Massachusetts Renewable Target programme provide tiered benefits based on income<sup>16</sup>. New York offers Affordable Solar Initiatives and Affordable Solar Predevelopment and Technical Assistance<sup>17</sup>. California, Colorado, New York and Oregon have incorporated low-income carve-outs into their community solar policies<sup>17</sup>. Many states have integrated rooftop solar into their low-income weatherization assistance programmes<sup>18</sup>. Despite the efforts in the United States to encourage participation from low-income communities, those specifically targeting racial and ethnic minorities are still missing.

Distributional energy justice considers both the physically unequal allocation of energy access and associated environment benefits and burdens, as well as the uneven distribution of their associated financial and economic responsibilities. In an international context, distributional energy justice concerns, such as the siting of energy infrastructure and access to low-cost energy services, have been raised. Large-scale, centralized renewable energy projects have been documented in some instances to displace populations or alter ecosystems<sup>19–22</sup>. On the other side of the spectrum, policies aimed at increasing small-scale distributed energy access, such as the ones in Germany through their *Energiewende*, have resulted in financial burden on lower-income communities, where these are reported to have been paying higher relative shares of their

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**Fig. 1 | Census tracts analysed in the United States for solar rooftop adoption, median household income, home ownership and racial composition.** The analysed region (yellow) contains 58% of the national technical potential for rooftop PV annual energy generation.

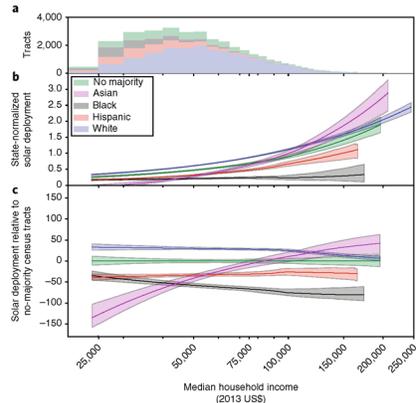
total income for energy costs<sup>20</sup>. Similar examples of solar rooftop PV economic benefits disproportionately advantaging higher-income communities can be found in several locations around the world<sup>20,21</sup>.

Furthermore, in instances where societal sectors perceive climate change threats and recognize the importance of low carbon approaches in everyday life activities (for example, clean energy sources, as we posit), the lack of economic resources and property ownership have been stated as main contributors for inaction<sup>21</sup>. These factors therefore constitute an uneven equity scenario for some segments of the population, commonly only grouped by income.

The aim of our study is to understand the energy justice landscape from a distributional perspective (that is, the distribution of access to benefits, such as access to lower-cost electricity, income from feed-in tariffs and avoided costs from tax credits) in small-scale distributed renewable energy systems by evaluating the installation of solar rooftop PV. We hypothesize that PV adoption is not hindered by economic resources nor property ownership only. To test this hypothesis, we analyse solar rooftop PV deployment, correcting for both median household income and property ownership, to elucidate the role of racial and ethnic compositions in detail—a variable that gains relevance in a multi-racial and multi-ethnic society that aims to aggressively deploy clean energy technologies.

To gain insight into the disparity in solar rooftop PV adoption, we combined high-resolution PV rooftop georeferenced maps with census demographics data. We used information on the existence and potential of rooftop PV on more than 60 million buildings across all 50 US states from Google's Project Sunroof (<https://www.google.com/get/sunroof/data-explorer/>) to quantify the relative rooftop PV deployment. Variations across states, such as available solar resources<sup>22</sup>, incentive programmes and policies (<http://www.dsireusa.org/>), electricity prices<sup>26</sup> and state racial compositions<sup>27</sup>, were mitigated by normalizing the rooftop PV adoption by the average solar adoption of all census tracts in each state. To evaluate the social demographic characteristics at the census tract level, median household income and racial composition from the 2009–2013 5-year American Community Survey (ACS)<sup>27</sup> were merged with the Project Sunroof data. Figure 1 shows the geographic coverage of this analysis. We categorized census tracts as majority and strong majority, corresponding to any census tract in which more than 50 or 75%, respectively, of the population self-identified as the same race or ethnicity. Tracts where no single racial or ethnic group comprises more than 50 or 75% of the population are categorized as no majority and no strong majority, respectively. To investigate the role of race and ethnicity, we used the locally weighted scatterplot smoothing (LOWESS) method to fit local relationships between household income and home ownership to rooftop PV adoption for each racial and ethnic majority group.

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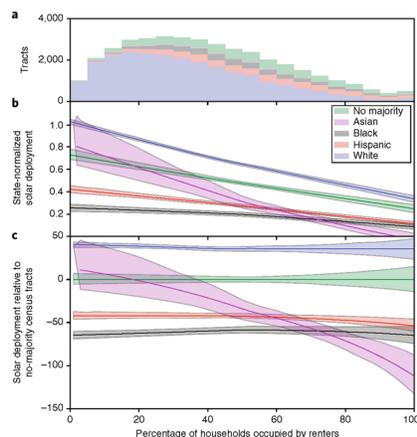
**Fig. 2 | Relationship between household income and rooftop PV installation by race and ethnicity.** **a**, Histogram of the distribution of census tracts analysed at intervals of US\$5,000. **b, c**, Rooftop PV installations relative to the available rooftop PV potential and normalized by state as a function of the median household income for majority census tracts in absolute values (**b**), and normalized relative to the rooftop PV adoption of no majority census tracts (**c**). Each colour represents a majority race or ethnicity in the census tract. Dark continuous curves represent the results of the LOWESS method applied to all data in each racial and ethnic majority group. Lighter shading represents the 90% CIs based on 1,000 bootstrap replications of each racial and ethnic majority group. Note that the x axes are plotted on a base 10 logarithmic scale.

Of all the challenges in terawatt-scale PV<sup>2</sup>, a critical and largely understudied one is that of equity and inclusivity. We posit that additional demographic variables, such as racial composition, can provide social insights into adoption patterns for rooftop PV, and can be used to better target top-down approaches to increase solar deployment and improve energy justice conditions.

#### Evaluation of racial bias in rooftop PV installations

**Household income.** The differences in the fitted LOWESS curves denote disparity in the deployment of rooftop PV based on racial composition across different income levels (Fig. 2). Overall, black- and Hispanic-majority census tracts have deployed less rooftop solar than the other census tracts in their state (Fig. 2b), and are disadvantaged on average 69 and 30%, respectively, compared with no majority tracts (Fig. 2c). In contrast, white-majority census tracts show an advantage over no majority census tracts with an increase in rooftop PV adoption of 21% on average. While on average Asian-majority census tracts show a disadvantage of 2%, it is interesting to note that low-income Asian-majority census tracts exhibit a relative disadvantage in rooftop PV adoption, whereas high-income Asian-majority census tracts show a relative advantage compared with no majority tracts. Similar results were found for strong majority communities (Supplementary Fig. 1).

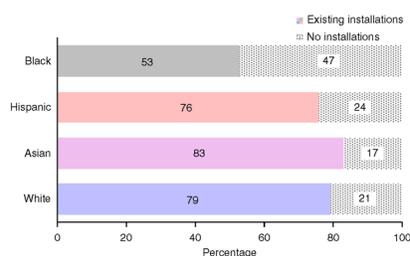
The value of one's income is related to the local cost of living. Using county-level cost-of-living estimates from the Living Wage Calculator<sup>28</sup>, we subtracted the local cost of living from the census tract median household income to calculate the local surplus



**Fig. 3 | Relationship between home ownership and rooftop PV installation by race and ethnicity.** **a**, Histogram of the distribution of census tracts analysed at intervals of 5%. **b**, **c**, Rooftop PV installations relative to the available rooftop PV potential and normalized by state as a function of renter-occupied households for majority census tracts in absolute values (**b**), and normalized relative to the rooftop PV adoption of no-majority census tracts (**c**). Each colour represents a majority race or ethnicity in the census tract. Dark continuous curves represent the results of the LOWESS method applied to all data in each racial and ethnic majority group. Lighter shading represents the 90% CIs based on 1,000 bootstrap replications of each racial and ethnic majority group.

income. The analysis was repeated using the surplus income, and comparable results were found (Supplementary Fig. 2). While this analysis cannot address one's willingness to pay to install rooftop PV, it provides a proxy for one's ability to pay to install rooftop PV.

**Home ownership.** People who identify as belonging to a racial or ethnic minority group are disproportionately more likely to rent their home. In 2016, 58% of black and 54% of Hispanic household heads rented their home, compared with only 28% of white household heads<sup>29</sup>. The split-incentive problem for rooftop PV occurs in landlord-tenant relationships<sup>30</sup>. The landlord accepts the risk and up-front cost of rooftop solar, yet the benefits of energy cost savings are reaped by the tenants, often hindering adoption. To determine whether the racial bias seen in Fig. 2 was the result of racial biases in home ownership, we repeated the analysis with the median household income replaced by the percentage of renter-occupied households. Figure 3b shows the expected trend of decreased solar deployment as the percentage of renter-occupied households increases. However, when we considered the solar deployment of each racial and ethnic majority group relative to no-majority census tracts, we found uniform racial bias across all percentages of renter occupancy, except for Asian-majority census tracts, as seen in Fig. 3c. Once again, black- and Hispanic-majority census tracts have deployed less rooftop PV than the other census tracts in their state, and are disadvantaged on average 61 and 45%, respectively, compared with



**Fig. 4 | Percentages of each census tract with and without existing rooftop photovoltaic installations.** In the census tracts listed, at least 50% of the population self-identified as a single race or ethnicity.

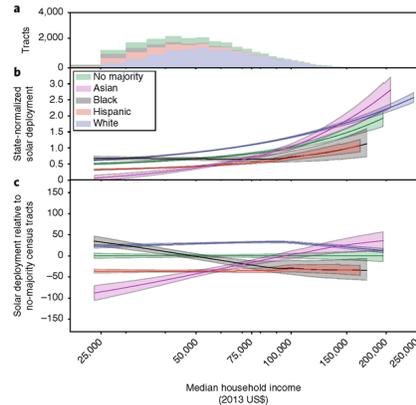
no-majority tracts (Fig. 3c). White-majority census tracts show an average advantage over no-majority census tracts of 37% on average (Fig. 3c).

**Social diffusion effect.** Communities that lack any rooftop PV installations (also known as 'seed' rooftop PV customers) are prone to a delayed future solar adoption'. We found that 47% of black-majority census tracts do not have any existing solar installations, representing in some cases more than double that for the corresponding white-, Asian- and Hispanic- majority census tracts (Fig. 4). The trend was consistent when disaggregated by income decile for both majority and strong majority black census tracts (Supplementary Figs. 3 and 4).

After excluding census tracts without existing rooftop PV installations, we repeated the analysis and found that the rooftop PV deployment for black-majority census tracts increased substantially for those tracts with a median household income below the 2013 national median (US\$52,250; ref. <sup>31</sup>). In fact, the 90% confidence interval (CI) for the black-majority census tracts shows greater installation of rooftop PV than the 90% CI for the no-majority communities for median household incomes below the national average (Fig. 5c). Within a small portion of the household income range, the 90% CI for the black-majority census tracts shows greater installation of rooftop PV compared with the 90% CI for the white-majority census tracts. In contrast, the Hispanic-majority census tracts showed disparity comparable to that in Fig. 2. Negligible difference can be seen in the results for the Hispanic-majority census tracts regardless of whether the analysis included (Fig. 2b,c) or excluded (Fig. 5b,c) census tracts without existing rooftop PV installations. The trend was similar for strong majority census tracts (Supplementary Fig. 5).

## Conclusions

We found racial/ethnic differences in the adoption of rooftop PV, even after accounting for median household income and household ownership. When correcting for median household income, majority black, Hispanic and Asian census tracts showed on average significantly less rooftop PV installation relative to no-majority census tracts by 69, 30 and 2%, respectively. In contrast, white-majority census tracts showed on average 21% more rooftop PV deployment across all income levels compared with no-majority census tracts. When correcting for household ownership, black- and Hispanic-majority census tracts have installed less rooftop PV compared with no-majority tracts by 61 and 45%, respectively, while white-majority census tracts have installed 37% more.



**Fig. 5 | Relationship between household income and rooftop PV installation after excluding census tracts without existing rooftop PV installations by race and ethnicity.** **a**, Histogram of the distribution of census tracts analysed at intervals of US\$5,000. **b**, **c**, Rooftop PV installations relative to the available rooftop PV potential and normalized by state as a function of the median household income for majority census tracts with existing rooftop PV in absolute values (**b**), and normalized relative to the rooftop adoption of no majority census tracts (**c**). Each colour represents a majority race or ethnicity in the census tract. Dark continuous curves represent the results of the LOWESS method applied to all data in each racial and ethnic majority group. Lighter shading represents the 90% CIs based on 1,000 bootstrap replications of each racial and ethnic majority group. Note that the x axes are plotted on a base 10 logarithmic scale.

Additionally, black-majority communities suffer from a disproportional lack of initial deployment, or 'seeding'. In contrast, Hispanic-majority census tracts have more similar seeding patterns to white- and Asian-majority census tracts (Fig. 4), yet deploy significantly less rooftop PV than those census tracts (Figs. 2 and 5). Since rooftop PV adoption is significantly influenced by spatial neighbouring effects, we hypothesize that the Hispanic-majority census tracts may have been undergoing a delayed seeding process, presumably resulting in their observed lower state-normalized rooftop PV deployment levels. Time, social interactions and population group similarities have been found to be intrinsically related in epidemiology studies<sup>31</sup>, and propagation behaviours from initial 'seed' groups could similarly apply to rooftop PV propagation. Ultimately, extended time-series rooftop PV adoption data could strengthen an analysis to elucidate the evolution of adoption rates.

In addition, potential low diversity in the renewable energy workforce in terms of race<sup>32</sup> could be hindering proper PV technology diffusion to black and Hispanic communities. The lack of racial diversity is particularly pronounced in management and senior executive positions in solar firms, where in the United States over 80% of these positions are held by white people<sup>33</sup>. While this paper focuses on distributional injustices, the cause for this uneven deployment might be more complex and point to procedural (inclusion of citizens in the decision-making process of accessing energy) injustices, too<sup>33</sup>.

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The root causes of the differences between black- and Hispanic-majority census tracts (Figs. 2 and 5) are difficult to predict and fully explain, and can also have social-psychological attributions<sup>34</sup> that require further validation. Interestingly, when communities of colour are initially seeded—or have first-hand access to rooftop PV technologies—the deployment significantly increases compared with other racial/ethnic groups for median household income below the national average. These results suggest that appropriately 'seeding' racial and ethnic minority communities may mitigate energy injustice in rooftop PV adoption.

As the rooftop PV industry grows, and states discuss next steps for their energy policies<sup>35</sup>, it is important for this development to be inclusive to maximize its potential, and provide equal and just access to the economic benefits of rooftop PV. While the benefits of rooftop PV vary regionally, examples of these benefits include lower cost of electricity, tax credits, feed-in tariffs and rebates. Delayed participation by a community can exacerbate disparity gaps relative to other communities that may increase with time. While this paper provides evidence of the already apparent racial disparity in rooftop PV adoption, without intervention, the disparity gap would probably increase. Our results highlight a more profound adoption characteristic that might shift the focus to more specialized government interventions and adaptive business models to fully achieve the national rooftop PV potential. How well we understand and address the barriers to participation in rooftop PV will determine whether or not the solar industry can achieve racial inclusivity and maximize adoption.

#### Methods

To gain insight into the disparity in solar rooftop PV adoption, we merged the Project Sunroof data (<https://www.google.com/get/sunroof/data-explorer/>) and the 2009–2013 5-year ACS<sup>36</sup> by matching census tracts between the two datasets. We used the highly spatially resolved dataset from Project Sunroof (<https://www.google.com/get/sunroof/data-explorer/>), which contains more than 60 million buildings across all 50 US states and over a range of approximately 4 years starting in 2012, to quantify the number of buildings with existing rooftop PV systems relative to the total number of buildings that could support rooftop PV, according to Project Sunroof's methodology<sup>36</sup>, in each census tract. To evaluate the social demographic characteristics, we used tract-level data on the median household income and the percentage of the population that self-identifies as: (1) Asian (no Hispanic origin); (2) black (no Hispanic origin); (3) Hispanic; and (4) white (no Hispanic origin). Other races and ethnicities included in the 2009–2013 ACS were excluded from this analysis given their low percentages. While there is both uncertainty in the reported tract-level values in the 2009–2013 5-year ACS data and variation within the census tract<sup>37</sup>, national high-resolution information at the individual household level is not currently available.

Census tracts where (1) Project Sunroof data do not cover at least 95% of the buildings, (2) there are invalid data entries or (3) the median annual household income is below the 2013 poverty threshold of \$23,834 for a 4-person household<sup>38</sup> were excluded, leading to a total of 34,156 census tracts used (Fig. 1). Project Sunroof estimates the annual energy generation potential for rooftop PV in these census tracts to be 829 TWh yr<sup>-1</sup> (<https://www.google.com/get/sunroof/data-explorer/>). The National Renewable Energy Laboratory estimates the total nationwide technical potential for rooftop PV to be 1,432 TWh yr<sup>-1</sup> (ref. <sup>39</sup>). Therefore, the region considered in this analysis contains 58% of the national technical potential for rooftop PV.

Census tracts (CTs) were categorized by how well they reach their rooftop PV potential. The number of buildings with installed PV systems in each census tract ( $N_{\text{existingRooftopPV}}$ ) was divided by the total number of buildings in that tract ( $N_{\text{CT}}$ ), as shown in equation (1):

$$\text{SolarDeployment}_{\text{CT}} = \frac{N_{\text{existingRooftopPV}}}{N_{\text{CT}}} \quad (1)$$

where both the numerator and denominator entries were obtained from the Project Sunroof dataset (<https://www.google.com/get/sunroof/data-explorer/>), following their detection algorithm and criteria to identify appropriate potential rooftop space for PV deployment<sup>36</sup>.

Variations across states, such as available solar resources<sup>40</sup>, incentive programmes and policies (<http://www.dsireusa.org/>), electricity prices<sup>41</sup> and state racial compositions<sup>42</sup>, were mitigated by normalizing the census tract solar deployment performance by the population ( $P$ )-weighted census tract solar deployment performance average in each state, as shown in equation (2). Hence,

any value greater than 1 indicates that the census tract has installed more rooftop PV relative to the state average installation, and the opposite is the case for values less than one:

$$\text{StateNormalizedSolarDeployment}_{CT} = \frac{\text{SolarDeployment}_{CT}}{\sum_{CT_{State}} \frac{\text{PV}_{CT}}{\text{State}} \text{SolarDeployment}_{CT}} \quad (2)$$

To investigate the role of race and ethnicity, we categorized census tracts as majority and strong majority, corresponding to any census tract in which more than 50 or 75%, respectively, of the population self-identified as the same race or ethnicity. Each census tract was grouped by the race or ethnicity that the population most self-identified as.

To correct for variations due to income, the median annual household income was plotted against the state-normalized solar deployment for all majority and strong majority census tracts. High variability and a large number of outliers made it difficult to directly observe and compare a relationship between income and solar adoption. To more easily compare the results across different groups, we applied the LOWESS (locally-weighted scatterplot smoothing) method to fit local linear relationships between household income and rooftop PV adoption. The primary advantage of the LOWESS method is that it does not require a specification of a global function that would fit all of the data. The LOWESS method was implemented using the Python package statsmodels<sup>41</sup>. The smoothing parameter,  $f$ , was varied between 0.2 and 0.8 and then chosen based on the value of  $f$  that minimized the sum of the residuals squared. The selected values of  $f$  can be found in Supplementary Tables 1–3. The bootstrap method was applied with 1,000 bootstrap replications for each racial and ethnic group, to establish 90% CIs of the LOWESS method<sup>41</sup>. At increments of US\$50 on the median annual household income, the bootstrap replications in both the 5th and 95th percentile were selected and plotted.

Variations due to home ownership and the social diffusion effect were analysed following a similar method. To evaluate the influence of home ownership, we applied the bootstrapped LOWESS method to the fraction of households occupied by renters<sup>42</sup> plotted against the state-normalized census tract solar deployment for each racial and ethnic group (Fig. 3). To explore the influence of the social diffusion effect, the fraction of census tracts with no existing rooftop PV installations was calculated for each racial and ethnic group, both overall (Fig. 4) and by income decile (Supplementary Figs. 3 and 4). We repeated the bootstrapped LOWESS method excluding census tracts without existing rooftop PV installations (Fig. 5 and Supplementary Fig. 5).

#### Data availability

The data that support the findings of this study are available from Google Project Sunroof (<https://www.google.com/get/sunroof/data-explorer/>) and the 2009–2013 5-year ACS<sup>43</sup>. The computer codes used for this study are available online at <https://github.com/DeborahSunter/Rooftop-PV-Deployment-Disparities>.

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**Author contributions**

D.A.S. and S.C. designed and performed the research, analysed the data and wrote the paper. D.M.K. supervised the research, guided the study and edited the paper.

**Competing interests**

The authors declare no competing interests.

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September 30, 2020

The Hon. Bobby Rush  
 Chairman  
 Subcommittee on Energy  
 Committee on Energy and Commerce  
 2125 Rayburn House Office Building  
 Washington, DC 20515

The Hon. Fred Upton  
 Ranking Member  
 Subcommittee on Energy  
 Committee on Energy and Commerce  
 2322 Rayburn House Office Building  
 Washington, DC 20515

In RE: October 1, 2020 Hearing: "Creating Equity: Improving Clean Energy Access and Affordability"

Dear Chairman Rush and Ranking Member Upton:

As your hearing addresses strategies to deliver renewable sources of electric power while reducing emissions for sensitive communities, we wanted to provide two perspectives:

- Microgrid solutions that can provide new local electric power options that are based on renewable sources, and
- Sensitive community concerns over emissions from freight movement in the transportation sector.

In summary:

- Microgrids offer sensitive communities new options based on renewable sources of electricity (wind, solar) coupled with battery storage capacity and integrated with back-up diesel or natural gas generators. These sustainable microgrids maintain reliability of power supply to communities irrespective of the grid, and take advantage of renewable energy sources due to weather conditions. These new systems offer communities the best of both worlds; renewable energy that is desired, with reliability that is needed.
- Significant steps have been taken and new measures adopted to further lessen the impact of the goods movement sector on air quality in sensitive or frontline communities. More can be done now to advance air quality for these communities and new regulations are in place or anticipated in the next few months. Congress can act to accelerate the transition to newer and lower-emitting vehicles through a one year suspension of the Federal Excise Tax (FET) on the purchase of new trucks and boost funding for the Diesel Emission Reduction Act program.

By way of background, the Diesel Technology Forum is an educational not-for-profit organization whose members include leaders in diesel engines and equipment, vehicle manufacturers and fuel producers. Our organization serves a primary role of education along with the collection and commission of research to raise awareness of the environmental performance of the newest generation of diesel technology, including those that power commercial vehicles, off-road equipment and engines.

**I. Microgrids Offer Sensitive Communities New Options for Sustainable Power Generation.**

As the Committee considers strategies to transition away from traditional fossil fuel sources of power generation while providing service to customers and air quality benefits to sensitive communities, we encourage the Committee to consider the important role played by diesel technology. Sustainable microgrids are a popular consideration for communities looking to couple renewable sources of power generation with investments in resiliency. These solutions may provide prime power to communities or larger users like health centers. While many pride these microgrids for their adoption of sustainable sources of power like wind, solar and battery backup, many also rely on proven backup technologies to provide mission critical power when solar and wind are off line and battery capacity is exhausted. Diesel is a proven and reliable technology that is capable of backstopping renewables when they are off-line. While diesel may not provide prime power to these sustainable microgrids, diesel may play an outsized role in providing mission critical power at critical moments.

**II. Significant Progress Is Achieved in Reducing Emissions from the Goods Movement Sector and More Immediate Term Progress is Achievable.**

Today, diesel powers most of the nation's fleet of diesel trucks, buses and equipment. There are ready-to-go solutions that reduce emissions of ozone forming compounds, NOx, and fine particles, PM, to near-zero levels. Getting more of these solutions adopted by the fleet of trucks and equipment are highly cost effective and can generate substantial clean air benefits immediately. Manufacturers are hard at work to take the current near zero-emissions capabilities closer to zero as they work with U.S. Environmental Protection Agency (EPA) and other stakeholders in support of the Cleaner Trucks Initiative.

Incentive programs like the Diesel Emission Reduction Act have proven successful in deploying these zero-emissions solutions to every state in the nation and we encourage robust and continued funding for the program. The 12 percent federal excise tax on truck purchases may be one of the leading financial barriers that explain slow turnover of older trucks in the truck fleet. A temporary tax holiday on truck purchases by suspending the excise tax through 2021 may likely provide significant reduction in emissions, particularly for sensitive communities located near freight facilities, as owners of older trucks replace higher emitting technology with new near-zero emissions options today.

As you consider strategies to reduce emissions to improve air quality for communities located near these facilities, we encourage you and the Committee to consider the goods movement sector and the progress to date and opportunities to do more. When it comes to mobile source emissions, we recognize that there are frontline communities located near ports, railyards, warehouse and distribution centers and other facilities across the country, that have been promised emission reductions from the

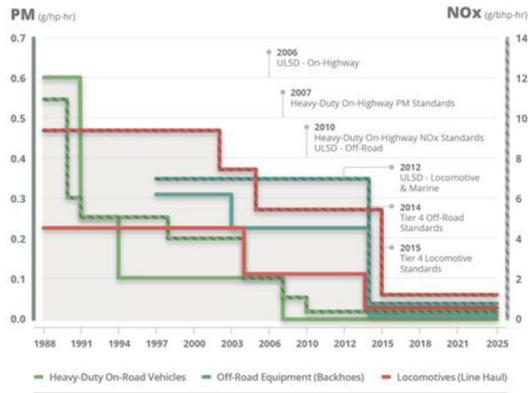
many heavy-duty trucks and equipment in operation in these facilities. Communities like the Ironbound district that surround New Jersey marine terminals and residents in Wilmington and Carson in Southern California that encompass railyards in that region, just to name a few, have been promised air quality improvements from the many large conveyances that keep the economy moving for more than a decade. Thankfully, there are ready-to-go solutions available today to provide needed improvements in air quality to these frontline communities and we encourage you and the Committee to consider strategies to deploy these solutions quickly including the federal excise tax holiday on truck purchases and robust funding for the Diesel Emission Reduction Act program.

**Near-Zero Emissions Performance of Trucks & Off-Road Equipment**

Today, diesel technology powers three out of every four commercial vehicles on the road, 97 percent of the larger Class 8 trucks and a nearly all of the larger off-road equipment including the large engines that power marine vessels and locomotives. Thanks to decades of investment and innovation, every diesel truck and piece of equipment sold must today meet a stringent tailpipe standard established by EPA for NOx and PM emissions. For trucks, those standards were first required for engines for model year 2010 and for off-road equipment, the near-zero Tier 4 engine emissions standards were required for 2014 and for much larger equipment including locomotives and marine vessels in 2015.



## PROGRESS TO NEAR-ZERO PM & NOx EMISSIONS



Source: U.S. EPA Office of Transportation and Air Quality (OTAQ)

After nearly a decade since these near-zero emissions requirements were required for commercial vehicles, less than half of the fleet of diesel trucks come with technologies to meet these standards. Of those that meet the standard, these new technology diesel trucks generate significant benefits. Since 2011, this fleet of diesel trucks have:

- Eliminated 18 million tons of NOx emissions that is equivalent to taking all cars and light trucks of the road for 6 years, and
- Eliminated over 1 million tons of fine particle emissions that is equivalent to taking all car and light trucks off the road for 33 years.

### Heavy-Duty Trucks and Equipment are Long Lived and Slow to Turn Over to New Technologies

Unlike passenger vehicles, commercial trucks have longer service lives while off-road equipment may last even longer. A typical commercial vehicle may be on the road between 15 and 20 years while engines may last upwards of 1 million miles and may be rebuilt many times over. Recent studies

suggest that off-road equipment and machines are much longer lived and may have services lives twice as long lived as EPA assumes.<sup>1,2</sup>

Frontline communities located near freight facilities can realize substantial benefits if more of the older generation of truck and equipment are replaced faster with these near-zero emissions diesel solutions widely available today. Replacing these trucks and off-road equipment faster than would occur under normal business conditions may generate substantial benefits. For commercial trucks, we can expect another 55 million tons of NOx emissions to be eliminated as more of the fleet transitions to near-zero emissions technology by 2030. These substantial benefits can be realized much sooner if more of the older and higher emitting trucks are replaced quickly

For even larger off-road machines, including engines that power marine vessels, the benefits of transitioning to existing near-zero emissions technology may generate substantial immediate term benefits for near-port communities. According to research commissioned jointly by the Diesel Technology Forum and the Environmental Defense Fund, replacing engines that power the large fleet of marine workboats in the New York-New Jersey Harbor twice as quickly as occur under normal business conditions can generate an estimated 8 tons per day of NOx emission reductions.<sup>3</sup> These are substantial and immediate term benefits that accrue to frontline communities including residents in the Ironbound district near Newark, NJ.

#### **Policy Options to Speed the Deployment of Near-Zero Emissions Technology**

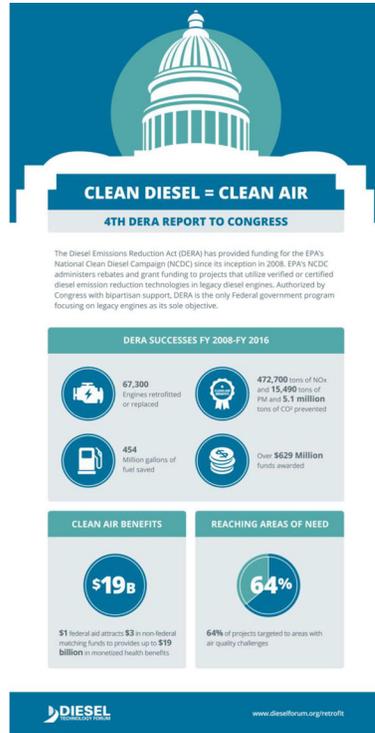
Incentive funding programs have been demonstrated to be an effective tool to encourage the owners of older and higher emitting trucks and equipment to scrap and replace with new and cleaner solutions. Diesel technology is a prime technology to deliver cost effective and significant emissions reductions. The Diesel Emission Reduction Act, managed by EPA, is one of the most highly effective programs that provides older vehicle and equipment owners with just enough funding to encourage the replacement of old technologies with new clean solutions. Despite the fact that higher funding is provided for the replacement with a zero-emission solution including battery-electric technology, the overwhelming majority of awards have incentivized the introduction of near-zero emissions diesel technology.

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<sup>1</sup> <https://www.dieselforum.org/largeengineupgrades>;

<sup>2</sup> <https://www.oregon.gov/deq/qa/Documents/orNonroadDieselRep.pdf>

<sup>3</sup> <https://www.dieselforum.org/largeengineupgrades>



Increased multi-year funding for the Diesel Emission Reduction Act can go a long way to replace older and higher emitting heavy-duty trucks and equipment with cleaner technologies to generate needed air quality improvements for frontline communities. Maintaining the existing funding formula, that allows all clean technology types to compete for funding, will allow much greater emission reductions for more communities than if the program were altered to exclusively fund only one solution. While battery-electric and natural gas options exist today, they may not be easily adopted by all users. Those that may adopt these solutions are encouraged to do so, and in the case of battery-electric options they are

awarded greater funding, while others may choose to replace older vehicles and equipment with new near-zero emissions solutions.

Temporarily suspending the Federal Excise Tax on truck purchases is another powerful policy change that may generate substantial and immediate term environmental benefits for frontline communities. One of the leading variables that helps explain the longevity of commercial trucks is the 12 percent federal excise tax on new truck purchases. As the average price of a new truck comes in at about \$150,000, the FET adds an additional \$18,000 to the final acquisition price of a new truck. FET helps explain long service lives of trucks and a relatively robust market for used trucks that are not subject to the FET.

According to the latest data published by the U.S. Census, the trucking industry relies on 3.5 million drivers while the overwhelming majority of trucking firms are small businesses and independent owner-operators. These smaller owner-operators, including the many businesses moving international freight through maritime and airport gateways, may not have the financial wherewithal to pay the tax on top of the purchase of a new truck. According to survey results published by the American Trucking Associations, over 60 percent of trucking companies stated their intention to purchase a new truck if a tax holiday were granted to the FET cleaner and more efficient trucks.<sup>4</sup> These new more efficient trucks will help businesses remain more competitive as the economy rebounds while delivering substantial air quality improvements to the communities where they operate.

#### **Faster Replacement of Older Trucks and Off-Road Equipment Can Generate Immediate Climate Benefits**

Mobile sources are the leading category of greenhouse gas emissions just edging out power generation over the last several years. While the fleet of cars and light trucks is responsible for most mobile source greenhouse gas emissions, commercial trucks make up roughly 24 percent of mobile source emissions and the larger Class 7 and 8 trucks are responsible for 60 percent of these emissions. The fleet of off-road equipment including construction, locomotives and marine vessels comprise another 9 percent of mobile source emissions.

Replacing older heavy-duty trucks and equipment with new diesel solutions today can contribute to immediate term climate benefits. Unlike passenger vehicles, where there are growing zero-emissions options in the marketplace today, there are very few zero-emission options for the larger Class 7 and 8 trucks that meet the demanding duty cycle of these trucks nor is there a nationwide or regional network of charging infrastructure today to support these zero-emissions over-the-road trucks. For off-road equipment including marine vessels and locomotives, there are no zero-emissions solutions available.

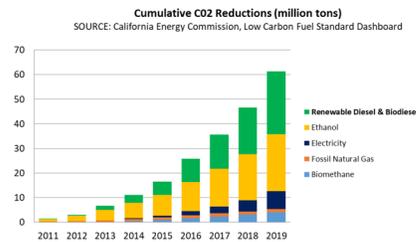
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<sup>4</sup> <https://www.nada.org/WorkArea/DownloadAsset.aspx?id=21474861331>

Replacing the fleet of older Class 7 and 8 trucks today with new diesel options can generate substantial climate benefits. Like passenger vehicles, commercial trucks are now subject to stringent fuel economy and greenhouse gas reduction standards. According to EPA, Phase 1 and Phase 2 standards will eliminate over 1 billion tons of greenhouse gas emissions between 2014 and 2027 as more older and less efficient trucks will be replaced with more efficient trucks. While zero-emissions solutions may become available in the future, research suggests that the overwhelming majority of these benefits will be delivered by more efficient diesel trucks.<sup>5</sup> Replacing an older truck with a new diesel truck today, generates immediate term climate benefits that contributes to attaining climate goals.

The use of advanced biofuels, including renewable diesel fuel and high quality blends of biodiesel, also yield substantial and immediate term climate benefits. These are benefits that may only be generated by the use of a diesel engine. The original diesel engine patented by Rudolph Diesel was intended to operate on biofuels. Today, nothing has changed. Diesel engines, old and new, may operate on these advanced biofuels that deliver at least a 50 percent reduction in greenhouse gas emissions. In the case of renewable diesel fuel, upwards of 80 percent of greenhouse gas emissions may be eliminated.

Nowhere has the benefits of immediate term greenhouse gas emissions reduction been achieved through the use of these fuels than in California. Through the state’s Low Carbon Fuel Standard, that requires the gradual reduction of the carbon content of transportation fuels sold in the state, renewable diesel fuel and biodiesel have eliminated the most greenhouse gas emissions in the transportation sector in California, beating electrification of cars, trucks and buses by almost 4-to-1.



Other states and regions are adopting these fuels and realizing significant, immediate and cost effective climate benefits. The City of New York is now fueling its large fleet of non-emergency heavy-duty vehicles and equipment with renewable diesel fuel to substantially reduce greenhouse gas emissions

<sup>5</sup> <https://ihsmarkit.com/products/reinventing-the-truck.html>;  
<https://www.fuelsinstitute.org/Research/Reports/Tomorrows-Vehicles>

while commuter rail operators in Florida are using biodiesel in rail applications to generate immediate term benefits.<sup>6,7</sup>

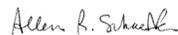
We recognize that zero-emissions technology will be part of the future suite of climate solutions. The climate crisis requires both a response today and a solution in the future. More can be done today to generate immediate term benefits by relying on more efficient diesel options and supporting the greater uptake of advanced biofuels like biodiesel and renewable diesel fuel while we wait for zero-emissions technology for the future.

In conclusion, as the Committee considers strategies to move away from fossil fuels as sources of power generation, we highlight the expanding role of sustainable microgrids that couple renewable sources of power with resiliency. These solutions, while proving popular, typically rely on a trusted and proven source of backup power to provide mission critical service when renewable are off-line. Diesel technology is one of these proven technologies.

We encourage you and the Committee to consider strategies to generate immediate term air quality benefits for the many frontline communities located near freight activity. Replacing older trucks and equipment, including much larger marine workboats and locomotives, with near-zero emissions diesel options today can go a long way to reduce emissions for these communities that have been promised air quality benefits. We recognize that zero-emissions options will be part of the future, many of these frontline communities should not be asked to continue to wait for promised benefits when there are existing solutions today to help achieve clean air goals. Robust and continued funding for the Diesel Emission Reduction Act and a tax holiday for the Federal Excise Tax on truck purchases can go a long way to generate these immediate term benefits. We can also make significant progress to achieve climate goals as more older, higher emitting and less efficient commercial vehicles and equipment is replaced with new near-zero emissions diesel solutions.

We thank you for your consideration of these comments. Please feel free to contact me with any questions or concerns at (301) 514-9046.

Sincerely,



Allen R. Schaeffer  
Executive Director

<sup>6</sup> [https://www1.nvc.gov/site/dcas/news/007\\_18/dcas-expand-use-99-petroleum-free-renewable-diesel-city-vehicles](https://www1.nvc.gov/site/dcas/news/007_18/dcas-expand-use-99-petroleum-free-renewable-diesel-city-vehicles)

<sup>7</sup> <https://www.palmbeachpost.com/business/all-aboard-florida-brightline-trains-use-fpl-made-biodiesel-fuel/8M7iMebSXumZJyBtvKRNpN/>



October 1, 2020

House Energy and Commerce Committee  
Chairman Frank Pallone, Jr.  
Ranking Member Greg Walden

Dear Chairman Pallone and Ranking Member Walden:

On behalf of the National Energy Assistance Directors Association (NEADA) representing the state directors of the Low Income Home Energy Assistance Program (LIHEAP) we would like to thank you and the Subcommittee members for holding this important hearing: *Generating Equity: Improving Clean Energy Access and Affordability*.

The COVID-19 crisis continues to have an unprecedented effect on the American economy and the well-being of families. The updated version of the Health and Economic Recovery Omnibus Emergency Solutions Act (HEROES Act) in the U.S. House of Representatives would add \$4.5 billion in emergency funding for the Low Income Home Energy Assistance Program (LIHEAP). This funding would go a long way towards ensuring struggling families can keep their lights on and their heat running while they work and study from home this winter.

**If Additional Federal Funding is Not Provided Electric and Natural Gas Arrearages Could Reach \$32 Billion by the End of the Year:** Reflecting the rapidly changing conditions, we estimate between 15 to 20 percent of residential customers are at least 60 days behind on their electric and natural gas bills. As of July 31, 2020, the estimated resulting electric arrearages are between \$8.0 billion and \$9.9 billion and natural gas arrearages are between \$975 million and \$1.3 billion.

By the end of the year, we are estimating an additional \$11 billion to \$15.9 billion in electric arrearages and for natural gas, an additional \$3.5 billion to \$4.7 billion. That would bring the total in arrearages by the end of the year for electricity, between \$19 billion and \$25.8 billion, and for natural gas, between \$4.5 billion and \$6 billion.

The Senate and Trump Administration need to follow the lead in the House and support \$4.5 billion in supplemental funding for LIHEAP.

The [Coronavirus Aid, Relief, and Economic Security \(CARES\) Act](#), the first stimulus bill, provided an additional \$900 million for LIHEAP to help low-income households pay their utility bills during the crisis. States are using these funds now to help families sign-up for energy assistance as well as help address crisis needs. These funds are expected to run out by the end of October.

**Use of Additional Funds:** The state LIHEAP directors are estimating that the \$4.5 billion included in the House bill will allow states to help about 9 million households with current bill payment and outstanding arrearages. NEADA estimates about 50% of these households – 4.5 million – will be newly laid off workers with the 50% being current LIHEAP recipients.

**Increase in Eligible Households as a Result of COVID-19 Layoffs:** As a result of COVID-19, NEADA projects a significant increase in low income households eligible for energy assistance. Prior to the impact of the COVID-19 virus, approximately 33.8 million households were eligible for energy assistance, but in fiscal year 2020 only had enough funding to reach about one in six of these households. NEADA projects that an additional 5 million households will be eligible for energy assistance this year as a direct result of layoffs as a result of the virus.

While this funding will provide a substantial contribution towards addressing the need for energy assistance, due to the depth of the crisis, the \$4.5 billion will only cover a portion of what families will need to stay afloat. The Bureau of Labor Statistics reported on September 4 that there were 13.6 million unemployed workers in August. This is in addition to the millions of underemployed, disabled, and elderly Americans who were struggling to make ends meet before the crisis began. These families will rely on LIHEAP to help pay the bills until they get back on their feet.

**Shut-off Moratoriums are Expiring:** Utility shut-off moratoriums are beginning to expire. Currently only 21 states and DC have shut-off moratoriums in place and nine are expected to expire in October. Only 45.4 percent of the population of the United States is now covered by a moratorium and the percentage is expected to decline rapidly in the next month. If additional federal funds is not provided, millions of families could be at risk of shut-off of vital electric and natural gas services.

The following is a summary of the status of statewide moratoriums:

**Statewide suspensions (21 states & D.C.):**

- *State-ordered Suspensions of Gas, Electric, and Water (21 states & DC):* Alaska, Arkansas, California, Colorado, Connecticut, Delaware, District of Columbia, Indiana, Hawaii, Kentucky, Maine, Maryland, Massachusetts, New Hampshire, New Mexico, New York, Pennsylvania, Vermont, Virginia, Washington, Wisconsin, Wyoming

**States without suspensions/with voluntary suspensions (29 states):**

- *Expired State-ordered Suspensions of Gas, Electric, and Water (14 states):* Illinois, Iowa, Kansas, Louisiana, Michigan, Mississippi, Montana, Nebraska, New Jersey, North Carolina, Rhode Island, South Carolina, Tennessee, Texas
- *States Without Mandatory Suspensions (15 states):* Alabama, Arizona, Florida, Georgia, Idaho, Minnesota, Missouri, Nevada, North Dakota, Ohio, Oklahoma, Oregon, South Dakota, Utah, West Virginia

- Note: All 15 states with no mandatory shutoff moratorium have some form of voluntary moratoriums which varies depending on the state and the specific utility provider.

Thank you for the opportunity to submit this letter for the record.

Sincerely,

A handwritten signature in blue ink that reads "Mark Wolfe". The signature is written in a cursive style with a large, stylized "M" and "W".

Mark Wolfe  
Executive Director

## AN OPEN LETTER TO THE PEOPLE OF CALIFORNIA

Dear Californians,

The climate crisis is escalating, and it is devastating.

As another round of record-breaking wildfires tears through our state, choking our lungs, destroying homes, and forcing tens of thousands to evacuate, **we are running out of time.**

We've known for years of the deadly consequences of inaction, but our elected representatives have failed to meet the crisis. Without transformative action right now, the communities and ecosystems our lives depend on will be devastated—and those hit first and hardest will continue to be communities of color, low-income communities, and frontline workers. We cannot allow these calamities to continue.

And we don't have to. We have the solutions to create a safer, more equitable future. **It is not too late.** It's time we rise together to protect our families and our future.

Governor Newsom said last week that he is committed to taking greater steps to address climate change. Yet our state is *fueling* this crisis by maintaining the very thing causing it—vast fossil fuel operations. **Half-measures are a form of climate denial.** Californians must urge him to take the bold action we need now. Key state actions include:

- 1 End fossil fuel infrastructure:**  
Stop permitting new oil and gas drilling, pipelines and infrastructure, and accelerate a managed decline to phase out oil production and refining in California, starting with operations near homes and schools. Provide proper support and resources to ensure a fair transition for fossil fuel workers.
- 2 Increase the use of clean electricity:**  
Accelerate the building of solar, storage, wind and other clean technologies so that all our electricity is 100% zero-carbon by 2030, prioritizing communities at the frontlines of fossil fuel operations.
- 3 Phase out dirty fuels in our homes:**  
Require all-electric new buildings by 2022, ensure 100% of appliances sold in California are electric starting in 2025, and invest to ensure low-income families can affordably upgrade their homes.
- 4 Phase out polluting cars and trucks:**  
Move to 100% zero-emission vehicle sales by 2030 and accelerate public transportation solutions.
- 5 Appoint strong climate leaders** to regulatory agencies, like the Air Resources Board, who will champion bold solutions that simultaneously address climate change and other air pollution.

These solutions can and must secure our futures and be designed to support workers, protect communities most harmed by pollution, and help us rebuild a new safe, thriving way of life.

California alone cannot solve the climate crisis, but the Governor has the power to lead with a transformative vision and direct state agencies to make powerful, era-defining change.

**CALL GOVERNOR NEWSOM TODAY** and demand he take the bold actions this moment requires: 1-202-684-2465.

In solidarity, and with love—



# An Open Letter to the Sierra Club

September 24, 2020

Dear Sierra Club,

Your advertisement "Open Letter to the People of California" (Sept 18, 2020, in the Los Angeles Times) felt offensive and manipulative. The goals are admirable – in fact, they are already embodied in California law and policy. But the path you want the Governor to take could hurt the real people and the communities we represent.

## Your world is not our world.

We are from rural and urban communities, with our livelihoods being in agriculture, small businesses, and personal services. We keep the "real" economic engine running and risk our health and lives during this pandemic. We are people who make tough daily choices about how to drive to work, feed our kids, share a video screen for school, and take our parents to the doctor. All these things are hard. Your world would make them only harder.

Let's be particular on your five actions:

- 1 You want to phase out our "polluting" cars, the ones we drive to work and take our kids to the park in. It would require us to write hefty checks for those expensive EVs you like so much, and then pay higher energy bill so we can afford to drive them.
- 2 You want to phase out our "dirty" stoves, water heaters and furnaces. Here again, it would require us, or our landlords, to make investments we can't afford so our residences can be rewired for these new HVACs and appliances. We are committed to making homes more affordable so Californians can own their homes, not take them farther out of reach. We don't understand how this works.

3 Your ideas could allow our rich neighbors in the next town to charge their Teslas and run their air conditioners on hot days, but make it unaffordable to use ours. Your plan sounds like you want us to foot the energy bill for the "green" buildings where you rent office space, while our little businesses go broke with higher energy costs?

4 Let's not wink and nod here: **You know perfectly well** that the tens of millions of drivers in California who drove HUNDREDS OF BILLIONS of miles in 2018 – mostly just to get to work – are not able to suddenly stop driving. So, we're instead going to IMPORT all that fuel from Iran, Iraq, Venezuela, Saudi Arabia, Russia? And transfer our high-wage energy jobs overseas, while more Californians become unemployed? And that's more humane and "equitable"?

5 When your funders from San Francisco and Hollywood call, your "strong climate leaders" pick up the phone. When we call, we are encouraged to "talk to our legislator." We know the drill. It seems to us like those with lifestyles only a few can afford are more important than people who work hard, pay taxes, build small businesses, school their children, and make hard choices about whether their kids can afford to go to college.

Your world is not our world. Yours feels hypocritical and socially divisive and would disproportionately burden those who you claim to support the most – low-income and ethnic minority populations.

We are advocates for sensible, fact-based, and equitable energy policies. We come to the discussion in good faith with ideas to help ALL Californians. We hope you will join us with ideas that help ALL Californians as well.

We are advocates for sensible, fact-based, equitable energy policies.

Mr. Robert Bryce  
Page 1

**Subcommittee on Energy  
Hearing on  
“Generating Equity: Improving Clean Energy Access and Affordability”  
October 1, 2020**

**Robert Bryce  
Visiting Fellow  
The Foundation for Research on Equal Opportunity**

**The Honorable Bill Flores (R-TX):**

1. In testimony before the Senate Energy and Natural Resources Committee in April 2019, you asserted that:
  - Electricity is the world’s most important and fastest-growing source of energy.
  - Electricity production accounts for the biggest single share of global carbon dioxide emissions: about 25 percent.
  - Third, regardless of what happens in the future –whether the global climate gets hotter, cooler, or more extreme – we are going to need vastly more electricity than what is currently being consumed around the globe.

In that same testimony you also assert that (1) “renewables are not enough;” and (2) “natural gas and nuclear offer the best “no-regrets strategy.”

- a. Would you elaborate on those two points, paying particular attention to the costs and resources required for each?

**RESPONSE:**

Mr. Robert Bryce  
Page 2

### **Renewables are not enough.**

Numerous analyses have found that renewable energy sources cannot, will not, be able to provide the vast scale of energy required by the American economy at prices consumers can afford.

The fundamental, incurable problem with wind and solar energy is that they require too much land and too many other resources, including steel, concrete, copper, and other minerals. Thus, trying to deploy wind and solar at the terawatt scale (one trillion watts) will require more land and minerals than can possibly be set aside for them. Add in the problem of intermittency and the challenge becomes more obvious.

I will focus on two issues: Land-use and cost.

Over the past few years, numerous papers have been published by academic and environmental groups that claim the United States can run its entire economy solely on renewables. However, all of these analyses rely on the vacant-land myth – the faulty notion that there is an endless amounts of unused, uncared-for land out there in flyover county that’s ready and waiting to be covered with forests of renewable-energy stuff. The truth is quite different. Rural communities – even entire states – are resisting or rejecting wind, solar, and high-voltage transmission projects and that opposition is already slowing the growth of new renewable capacity in the US, Canada, and Europe.

Since 2015, I have been tracking rural opposition to wind energy projects. By my count, more than 280 government entities from Maine to California have moved to restrict or reject wind projects.

This can easily be seen in California, which has a 60-percent renewable electricity mandate by 2030.<sup>1</sup> But wind energy is so unpopular in California that the wind industry has nearly given up trying to site any new turbines in the state. In 2019, California’s wind energy capacity was about 5,973 megawatts. That’s essentially the same amount as the state had in 2013.<sup>2</sup>

In 2019, San Bernadino County banned large-scale renewable projects. San

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<sup>1</sup> <https://www.npr.org/2018/09/10/646373423/california-sets-goal-of-100-percent-renewable-electric-power-by-2045>

<sup>2</sup> [http://www.energy.ca.gov/almanac/electricity\\_data/electric\\_generation\\_capacity.html](http://www.energy.ca.gov/almanac/electricity_data/electric_generation_capacity.html)

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Bernadino County is the largest county, by land area, in the country. It covers more than 20,000 square miles.<sup>3</sup> It's already home to two big thermal-solar projects, including Ivanpah and Abengoa Mojave.<sup>4</sup> The county's new regulations prohibit new renewable projects if more than half of the energy produced from them is to be exported out of the county.<sup>5</sup> In other words, San Bernadino County doesn't want to be an energy plantation for people who live in other places. Furthermore, In March, the Santa Barbara County Board of Supervisors rejected plans that called for 29 wind turbines to be built near the town of Lompoc.<sup>6</sup>

Or look at New York, where Gov. Andrew Cuomo has mandated that the state be obtaining 50 percent of its electricity from renewables by 2030.<sup>7</sup> But wind energy in New York is so unpopular the state has implemented a regulation that allows state officials to override objections from local communities and effectively force them to accept large wind projects.<sup>8</sup> Opponents of this regulation recently wrote that the new measure shifts "approval power away from the local government where the project will be built, giving that power to Albany and the developers, eroding home rule... we are concerned about the impacts of centralized energy project siting and the erosion of local control over the use of our land."<sup>9</sup>

Now let's consider the cost of attempting to rely solely on renewables. Last year, the energy consultancy Wood Mackenzie estimated that "full decarbonization of the U.S. power grid" would cost about \$4.5 trillion. The firm said that "From a budgetary perspective, the cost is staggering at US\$35,000 per household – nearly US\$2,000 per year if assuming a 20-year plan."<sup>10</sup>

Recall that Wood Mackenzie's \$4.5 trillion figure only accounts for eliminating carbon dioxide emissions from electricity generation, and does not include the untold trillions that would have to be spent decarbonizing industry and

<sup>3</sup> <https://pv-magazine-usa.com/2019/03/01/san-bernardino-county-bans-large-scale-solar-wind-in-some-areas/>

<sup>4</sup> [https://www.drecp.org/counties/factsheets/San\\_Bernardino\\_county.pdf](https://www.drecp.org/counties/factsheets/San_Bernardino_county.pdf)

<sup>5</sup> <http://cob-sire.sbcounty.gov/sirepub/cache/2/ptc1qzvuo3i5mrxzm02tmst/234561403062019051717204.PDF>

<sup>6</sup> [https://syvnews.com/news/local/govt-and-politics/santa-barbara-county-supervisors-deny-appeal-of-lompoc-area-wind-project-design/article\\_989f95c3-0ca4-59ba-b40f-d410c78040ab.html](https://syvnews.com/news/local/govt-and-politics/santa-barbara-county-supervisors-deny-appeal-of-lompoc-area-wind-project-design/article_989f95c3-0ca4-59ba-b40f-d410c78040ab.html)

<sup>7</sup> Kit Kennedy, "New York Adopts Historic '50 by 30' Renewables Goal," NRDC.org, August 1, 2016, <https://www.nrdc.org/experts/kit-kennedy/new-york-adopts-historic-50-30-renewables-goal>

<sup>8</sup> <https://www.governor.ny.gov/news/governor-cuomo-announces-new-proposed-regulations-part-accelerated-renewable-energy-growth-and>

<sup>9</sup> [https://buffalonews.com/opinion/another-voice-home-rule-s-under-siege-in-state-s-energy-siting-act/article\\_21952caa-1994-11eb-89ad-13e232c8d5e4.html](https://buffalonews.com/opinion/another-voice-home-rule-s-under-siege-in-state-s-energy-siting-act/article_21952caa-1994-11eb-89ad-13e232c8d5e4.html)

<sup>10</sup> [https://www.woodmac.com/news/feature/deep-decarbonisation-the-multi-trillion-dollar-question/?utm\\_source=gtmarticle&utm\\_medium=web&utm\\_campaign=wmp\\_r\\_griddecarb](https://www.woodmac.com/news/feature/deep-decarbonisation-the-multi-trillion-dollar-question/?utm_source=gtmarticle&utm_medium=web&utm_campaign=wmp_r_griddecarb)

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transportation.

In short, whenever policymakers are considering climate-related measures that require changes in the energy and power mix, they must be attentive to the issue of cost as any major increases in the cost of electricity, natural gas, or motor fuel will hurt low- and middle-income consumers.

**Natural gas and nuclear offer the best no-regrets strategy.**

Any effort to reduce the carbon intensity of the American economy must acknowledge the need for energy sources that are scalable, low-carbon, and affordable. Natural gas and nuclear fit those criteria.

Natural gas is the cleanest of the hydrocarbons. Its use can help reduce the growth of carbon dioxide emissions. The reasons for this are obvious: gas is scalable, relatively low-carbon, and it can be used to replace coal in the electricity sector and oil in the transportation sector. Substituting gas for those fuels helps reduce air pollution and greenhouse gas emissions. During combustion, gas emits almost zero sulfur dioxide and it produces about half as much carbon dioxide as coal and about 30 percent less than diesel fuel or fuel oil.<sup>11</sup>

Thanks to the shale revolution, which combines innovations in horizontal drilling, hydraulic fracturing, and related technologies, the US has become the world's biggest and most important gas producer. Indeed, the growth in domestic gas production has been nothing short of astonishing. Since 2005, US gas production has roughly doubled and the United States has become a major exporter of the fuel. Continuing to utilize natural gas here at home will help further reduce domestic emissions. In addition, the export of American LNG will help other countries reduce their emissions.

We also need more nuclear energy. There is no credible pathway toward decarbonization that doesn't include nuclear. That is the consensus among the world's top climate scientists and energy analysts.

In 2013, James Hansen and three other climate scientists wrote an open letter to environmental groups encouraging them to support nuclear. They wrote that

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<sup>11</sup> NaturalGas.org, "Natural Gas and the Environment," undated, <http://naturalgas.org/environment/naturalgas/>

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“continued opposition to nuclear power threatens humanity’s ability to avoid dangerous climate change...Renewables like wind and solar and biomass will certainly play roles in a future energy economy, but those energy sources cannot scale up fast enough to deliver cheap and reliable power at the scale the global economy requires.”<sup>12</sup>

In 2015, the International Energy Agency declared that “Nuclear power is a critical element in limiting greenhouse gas emissions.”<sup>13</sup> It went on, saying that global nuclear generation capacity, which in 2018 totaled about 375 gigawatts, must more than double by 2050 if the countries of the world are to have any hope of limiting temperature increases to the 2-degree scenario that is widely agreed as the acceptable limit.<sup>14</sup>

Despite these facts, the domestic nuclear sector continues to shrink as more plants are prematurely shuttered in several states, including New York and California. Earlier this year, one of the two operating reactors at the Indian Point Energy Center in New York was prematurely shuttered. The remaining reactor is slated for closure next April.<sup>15</sup> More plants in Illinois and elsewhere are also slated for premature closure.<sup>16</sup>

Nuclear reactors are emissions-free. They emit no carbon dioxide, no air pollutants such as sulfur dioxide, oxides of nitrogen, and no particulates, all of which are linked to adverse health and environmental impacts.<sup>17</sup>

In addition, nuclear energy has very high power density, meaning it doesn’t need much land.<sup>18</sup> For example, the Indian Power Energy Center in Buchanan, New York, sits on about one square kilometer of land. Prior to the closure of Unit 2, the plant could generate 2,060 megawatts of electricity. Thus, the power density of the nuclear plant was about 2,100 watts per square meter (W/m<sup>2</sup>). For comparison, the

<sup>12</sup> Ken Caldeira et al. November 3, 2013, <https://plus.google.com/104173268819779064135/posts/Vs6Csiw1xYr>

<sup>13</sup> IEA, “Taking a fresh look at the future of nuclear power,” January 29, 2015.

<http://www.iaea.org/newsroomandevents/news/2015/january/taking-a-fresh-look-at-the-future-of-nuclear-power.html>

<sup>14</sup> World Nuclear Association data: <http://www.world-nuclear.org/info/current-and-future-generation/nuclear-power-in-the-world-today/>

<sup>15</sup> <https://nypost.com/2020/04/29/indian-point-nuclear-reactor-shutdown-a-huge-blow-to-nys-environment/>

<sup>16</sup> <https://www.forbes.com/sites/robertbryce/2020/08/31/nuclear-plants-in-illinois-are-slated-for-closure-will-the-states-democratic-politicians-save-them/?sh=74cfa4d811ef>

<sup>17</sup> U.S. EPA, “Health and Environmental Effects of Particulate Matter.” <https://www.epa.gov/pm-pollution/health-and-environmental-effects-particulate-matter-pm>

<sup>18</sup> For an exhaustive discussion, see Vaclav Smil, *Power Density* (Cambridge, MA: MIT Press 2015).

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power density of wind energy is about 0.5 and 1.5 W/m<sup>2</sup>.<sup>19</sup> That paltry power density means generating large amounts of energy from wind turbines will require enormous quantities of land. That was made clear by author Vaclav Smil in his 2010 book, *Energy Myths and Realities: Bringing Science to the Energy Policy Debate*. Smil wrote that relying on wind turbines to supply all US electricity would “require installing about 1.8 terawatts of new generating capacity,” which he explained, “would require 900,000 square kilometers of land.”<sup>20</sup> For perspective, that’s a land area twice the size of the state of California.

Finally, nuclear energy provides baseload energy. Unlike renewable sources, which must be backed up with other fuels, and in particular, natural gas-fired generators, nuclear units provide stable, always-on power. That always-on power helps assure grid stability and assures that electricity is always available in large cities and industrial facilities.

In summary, the US leads the world in natural gas production. It also produces more nuclear energy than any other country. If the US wants to reduce its emissions while keeping energy prices low, it should prioritize the use of natural gas and nuclear.

**END**

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<sup>19</sup> Vaclav Smil, *Energy Myths and Realities: Bringing Science to the Energy Policy Debate*, (Washington, DC; The American Enterprise Institute for Public Policy Research, 2010), 64-68.

<sup>20</sup> *Ibid.*, 125.

