

CLEARING THE AIR: LEGISLATION TO PROMOTE CARBON CAPTURE, UTILIZATION, AND STORAGE

HEARING BEFORE THE SUBCOMMITTEE ON ENVIRONMENT AND CLIMATE CHANGE OF THE COMMITTEE ON ENERGY AND COMMERCE HOUSE OF REPRESENTATIVES ONE HUNDRED SIXTEENTH CONGRESS

SECOND SESSION

FEBRUARY 6, 2020

Serial No. 116–97



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

U.S. GOVERNMENT PUBLISHING OFFICE

50–302 PDF

WASHINGTON : 2024

COMMITTEE ON ENERGY AND COMMERCE

FRANK PALLONE, JR., New Jersey
Chairman

BOBBY L. RUSH, Illinois	GREG WALDEN, Oregon
ANNA G. ESHOO, California	<i>Ranking Member</i>
ELIOT L. ENGEL, New York	FRED UPTON, Michigan
DIANA DeGETTE, Colorado	JOHN SHIMKUS, Illinois
MIKE DOYLE, Pennsylvania	MICHAEL C. BURGESS, Texas
JAN SCHAKOWSKY, Illinois	STEVE SCALISE, Louisiana
G. K. BUTTERFIELD, North Carolina	ROBERT E. LATTA, Ohio
DORIS O. MATSUI, California	CATHY McMORRIS RODGERS, Washington
KATHY CASTOR, Florida	BRETT GUTHRIE, Kentucky
JOHN P. SARBANES, Maryland	PETE OLSON, Texas
JERRY McNERNEY, California	DAVID B. McKINLEY, West Virginia
PETER WELCH, Vermont	ADAM KINZINGER, Illinois
BEN RAY LUJAN, New Mexico	H. MORGAN GRIFFITH, Virginia
PAUL TONKO, New York	GUS M. BILIRAKIS, Florida
YVETTE D. CLARKE, New York, <i>Vice Chair</i>	BILL JOHNSON, Ohio
DAVID LOEBSACK, Iowa	BILLY LONG, Missouri
KURT SCHRADER, Oregon	LARRY BUCSHON, Indiana
JOSEPH P. KENNEDY III, Massachusetts	BILL FLORES, Texas
TONY CARDENAS, California	SUSAN W. BROOKS, Indiana
RAUL RUIZ, California	MARKWAYNE MULLIN, Oklahoma
SCOTT H. PETERS, California	RICHARD HUDSON, North Carolina
DEBBIE DINGELL, Michigan	TIM WALBERG, Michigan
MARC A. VEASEY, Texas	EARL L. "BUDDY" CARTER, Georgia
ANN M. KUSTER, New Hampshire	JEFF DUNCAN, South Carolina
ROBIN L. KELLY, Illinois	GREG GIANFORTE, Montana
NANETTE DIAZ BARRAGÁN, California	
A. DONALD McEACHIN, Virginia	
LISA BLUNT ROCHESTER, Delaware	
DARREN SOTO, Florida	
TOM O'HALLERAN, Arizona	

PROFESSIONAL STAFF

JEFFREY C. CARROLL, *Staff Director*
TIFFANY GUARASCIO, *Deputy Staff Director*
MIKE BLOOMQUIST, *Minority Staff Director*

SUBCOMMITTEE ON ENVIRONMENT AND CLIMATE CHANGE

PAUL TONKO, New York
Chairman

YVETTE D. CLARKE, New York
SCOTT H. PETERS, California
NANETTE DIAZ BARRAGAN, California
A. DONALD McEACHIN, Virginia
LISA BLUNT ROCHESTER, Delaware
DARREN SOTO, Florida
DIANA DeGETTE, Colorado
JAN SCHAKOWSKY, Illinois
DORIS O. MATSUI, California
JERRY McNERNEY, California
RAUL RUIZ, California, *Vice Chair*
DEBBIE DINGELL, Michigan
FRANK PALLONE, Jr., New Jersey (*ex officio*)

JOHN SHIMKUS, Illinois
Ranking Member
CATHY McMORRIS RODGERS, Washington
DAVID B. McKINLEY, West Virginia
BILL JOHNSON, Ohio
BILLY LONG, Missouri
BILL FLORES, Texas
MARKWAYNE MULLIN, Oklahoma
EARL L. "BUDDY" CARTER, Georgia
JEFF DUNCAN, South Carolina
GREG WALDEN, Oregon (*ex officio*)

C O N T E N T S

	Page
Hon. Paul Tonko, a Representative in Congress from the State of New York,	
opening statement	2
Prepared statement	3
Hon. John Shimkus, a Representative in Congress from the State of Illinois,	
opening statement	5
Prepared statement	6
Hon. Frank Pallone, Jr., a Representative in Congress from the State of	
New Jersey, opening statement	7
Prepared statement	9
Hon. Greg Walden, a Representative in Congress from the State of Oregon,	
opening statement	10
Prepared statement	11

WITNESSES

Mikael Sasha Mackler, Director of the Energy Project Bipartisan Policy Cen-	
ter	13
Prepared statement	15
Answers to submitted questions	140
John Noel, Senior Climate Campaigner With Greenpeace USA; Jason Begger,	
Executive Director of the Wyoming Infrastructure Authority	21
Prepared statement	23
Jason Begger, Executive Director of the Wyoming Infrastructure Authority	28
Prepared statement	30
Answers to submitted questions	142
Laurel Harmon, Ph.D., Vice President of Lanzatech, INC.	34
Prepared statement	36
Lee Anderson, Government Affairs Director of the Utility Workers Union	
of America, AFL–CIO	43
Prepared statement	45

SUBMITTED MATERIAL

H.R. 1166, the USE IT Act of 2019	76
Letter of February 5, 2019, from Andrew Grinberg National Campaigns Spe-	
cial Projects Manager Clean Water Action to Mr. Tonko, and Mr. Shimkus,	
submitted by Mr. Tonko	107
Letter of February 5, 2020, from Sean O'Neill Senior Vice-President, Govern-	
ment Affairs Portland Cement Association, to Mr. Tonko and Mr. Shimkus,	
submitted by Mr. Tonko	110
Letter of February 6, 2020, from Claude Letourneau, CEO, Svante to Mr.	
Tonko, and Mr. Shimkus, submitted by Mr. Tonko	112
Letter of February 4, 2020, from James D. Ogsbury, Executive Director,	
the Western Governors Association, to Mr. Tonko and Mr. Shimkus, sub-	
mitted by Mr. Tonko	115
Letter of February 5, 2020, by Our Children's Trust, to Mr. Tonko and	
Mr. Shimkus, submitted by Mr. Tonko ¹	
Letter of August 20, 2019, from Carbon Capture Coalition,nto Mr. Smith,	
et al., submitted by Mr. Tonko	126

¹ Letter has been retained in committee files and also is available at <https://docs.house.gov/meetings/IF/IF18/20200206/110482/HHRG-116-IF18-20200206-SD007.pdf>.

VI

	Page
Letter of February 27, 2019, from Jesse Walls, Senior Director of Government Affairs, National Audubon Society, to Mr. Barrasso and Mr. Carper, submitted by Mr. Tonko	131
Letter of February 27, 2019, from Lonnie R. Stephenson, President, International Brotherhood of Electrical Workers, to Mr. Barrasso and Mr. Carper, submitted by Mr. Tonko	132
Letter of February 26, 2019, from Jason Albritton, Director of Climate and Energy Policy, the Nature Conservancy, to Mr. Barrasso and Mr. Carper, submitted by Mr. Tonko	134
Letter of April 9, 2019, from Hal Quinn, National Mining Association, to Mr. Barrasso, submitted by Mr. Tonko	135
Letter of February 27, 2019, from Neil L. Bradley, Executive Vice President and Chief Policy Officer, U.S. Chamber of Commerce, to the Senate members, submitted by Mr. Tonko	136
Report from World Resources Institute “CarbonShot: Federal Policy Options for Carbon Removal in the United States”, submitted by Mr. Tonko ²	
Memo of March 20, 2018, from the Congressional Research Service regarding CCUS projects and CO ₂ pipelines as covered projects under FAST 41 guidance, to Mr. Goldner, submitted by Mr. Tonko	137

² Report has been retained in committee files and also is available at <https://docs.house.gov/meetings/IF/IF18/20200206/110482/HHRG-116-IF18-20200206-SD015.pdf>.

CLEARING THE AIR: LEGISLATION TO PROMOTE CARBON CAPTURE, UTILIZATION, AND STORAGE

THURSDAY, FEBRUARY 6, 2020

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

The subcommittee met, pursuant to call, at 10:00 a.m., in the John Dingell Room 2123, Rayburn House Office Building, Hon. Paul Tonko (chairman of the subcommittee) presiding.

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

Staff present: Jeffrey C. Carroll, Staff Director; Adam Fischer, Policy Analyst; Jean Fruci, Energy and Environment Policy Advisor; Waverly Gordon, Deputy Chief Counsel; Caitlin Haberman, Professional Staff Member; Rick Kessler, Senior Advisor and Staff Directory, Energy and Environment; Brendan Larkin, Policy Coordinator; Dustin Maghamfar, Air and Climate Counsel; Nikki Roy, Policy Coordinator; Mike Bloomquist, Minority Staff Director; Peter Kielty, Minority General Counsel; Ryan Long, Minority Deputy Staff Director; Mary Martin, Minority Chief Counsel, Energy and Environment and Climate Change; Brannon Rains, Minority Legislative Clerk; and Peter Spencer, Minority Senior Professional Staff Member, Environment and Climate Change.

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

I recognize myself for 5 minutes for the purpose of an opening statement but before we get started, I want to announce that Jason Albritton from the Nature Conservancy, who was a scheduled witness, will not be able to join us for today's hearing. We were told that his wife went into labor this morning, and we are wishing them a speedy and safe delivery, and we will include his statement for the record.

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

And let me please have the witnesses come to the table, please. OK, we will applaud the new delivery.
Thank you, everyone.

This morning, this subcommittee will examine H.R. 1166, the USE IT Act, which was introduced by Representatives Peters, McKinley, and Veasey last year.

There is a wide range of views on carbon capture on this subcommittee and I ask my colleagues to set aside any feelings you might have about carbon capture in the power sector for the next few hours.

If of you believe, as I do, that we need to achieve net zero emissions in the next 30 years or sooner, that means we need to develop solutions for difficult to decarbonize sectors and processes, along with deploying many more sources of negative emissions.

And if you believe, as I do, that we need major infrastructure investments as part of our climate response, then we will need low emissions in cement, steel, and other industrial products. In some cases, carbon capture is simply the best and most viable option for parts of the industrial sector.

The USE IT Act looks beyond traditional carbon capture. The bill amends the Clean Air Act to authorize a competitive prize for—of \$35 million for direct air capture, or DAC, and \$50 million for CO₂ utilization R&D.

Title 2 clarifies CO₂ pipelines as being eligible covered projects under the FAST Act. Estimates suggest that 5 and 15 gigatons of CO₂ emissions will need to be removed globally every year by 2050 to stay below 1.5 degrees Celsius of warming and we will need to achieve net negative emissions later in this century.

To date, we have offered minimal Federal R&D funding for negative emissions technologies, despite recent recommendations from the National Academies for a large and sustained commitment.

Let's be clear. Carbon removal is not a substitute for major and rapid emissions reductions but technological and natural solutions for carbon removal that stores CO₂ in plants, soils, oceans, geological formations, and products will be an important strategy in a comprehensive climate response.

Direct air capture is among the most exciting of these technological solutions. DAC has flexibility in where it can be sited and can even co-locate with a sequestration or utilization site to ensure DAC capacity is available at the scale necessary later in this century.

The Rhodium Group recently estimated that 9 million tons of removal capacity will need to be in operation in the year 2030. We are a long way from that target today and there are big hurdles to get this technology to scale. There is a need for low emissions, electrical and thermal energy, and viable storage options. And cost remains the biggest challenge, but the experience of the past decade with renewables, lithium-ion batteries, and other technology shows that R&D investments, coupled with smart deployment policies, can drastically reduce these costs. We are on the cusp of major breakthroughs but innovation requires a holistic approach. R&D for technology development is part of the equation but deployment incentives like the 45Q tax credit in California's Low Carbon Fuel Standard are important to monetize negative emissions practices. A Federal carbon pricing program could be structured with this in mind as well. Federal support can also help develop markets for carbon utilization, including fuels, chemicals, cement, and carbon

fibers. This is one of the goals of the buy clean proposal in our clean future draft.

While I support many of the concepts in this bill, I believe there are ways to improve it. Mr. Shimkus can attest that I am not usually one to deny new authorities to EPA but, in this case, I believe the Department of Energy is best suited to lead Federal CCUS R&D efforts. That is not to say EPA and other agencies will not have important roles to play, including monitoring and verification of storage sites to ensure carbon is staying permanently sequestered.

I am also interested in how the Federal Government can help standardize and verify the greenhouse gas life cycle assessment for utilization and sequestration practices. This could help foster a common understanding of the net impacts of different technologies and methods.

Finally, the largest current market for CO₂ utilization is enhanced oil recovery. This is concerning, as we need to be moving away from the use of petroleum. This makes it all the more important and urgent that we develop those new markets for alternative uses.

I look forward to today's discussion and I hope we can examine some of these potential issues and work together with the bill's sponsors moving forward.

With that, the Chair now recognizes Mr. Shimkus, our ranking member of the Subcommittee on Environment and Climate Change for 5 minutes, please, for his opening statement.

Mr. SHIMKUS. Thank you, Mr. Chairman. Before I start with my 5 minutes, I would like to ask unanimous consent to brag for a minute on my son.

Mr. TONKO. Yes.

Mr. SHIMKUS. My son has just left the Peace Corps. He is working his way back to the United States. I had a book made that, when I visited him in Tanzania over Christmas, and I want my colleagues to see and share. I am going to take it home after this week. So if they are looking through a photo album, a real small one, no disrespect to the panel. It is just that I want them to see what my son did and I am very proud of him. So—

Mr. TONKO. Well, proud dad, we wish your son well and a safe return. And thank you for sharing that. We appreciate his service.

Mr. SHIMKUS. And my Democratic friends can see it also, if they would like.

Mr. TONKO. Well, thank you for sharing that in a bipartisan way.

Mr. SHIMKUS. In a bipartisan way.

[The prepared statement of Mr. Tonko follows:]

PREPARED STATEMENT OF HON. PAUL TONKO

This morning the Subcommittee will examine H.R. 1166, the USE IT Act, which was introduced by Representatives Peters, McKinley, and Veasey last year.

There are a wide range of views on carbon capture on this Subcommittee. I ask my colleagues to set aside any feelings you might have about carbon capture in the power sector for the next few hours.

Because if you believe, as I do, that we need to achieve net-zero emissions in the next 30 years- or sooner- that means we need to develop solutions for difficult to decarbonize sectors and processes, along with deploying many more sources of negative emissions.

And if you believe, as I do, that we need major infrastructure investments as part of our climate response, then we will need low-emissions cement, steel, and other industrial products.

In some cases, carbon capture is simply the best and most viable option for parts of the industrial sector. The USE IT Act looks beyond traditional carbon capture.

The bill amends the Clean Air Act to authorize a competitive prize of \$35 million for Direct Air Capture, or DAC ("dack"), and \$50 million for CO₂ utilization R&D. Title II clarifies CO₂ pipelines as being eligible covered projects under the FAST Act.

Estimates suggest between 5 and 15 gigatons of CO₂ emissions will need to be removed globally every year by 2050 to stay below 1.5 degrees Celsius of warming, and we will need to achieve net-negative emissions later in the century.

To date, we have offered minimal federal R&D funding for negative emissions technologies, despite recent recommendations from the National Academies for a large and sustained commitment.

Let's be clear, carbon removal is not a substitute for major and rapid emissions reductions.

But technological and natural solutions for carbon removal that stores CO₂ in plants, soils, oceans, geological formations, and products will be an important strategy in a comprehensive climate response.

Direct Air Capture is among the most exciting of these technological solutions. DAC has flexibility in where it can be sited and can even co-located with a sequestration or utilization site.

To ensure DAC capacity is available at the scale necessary later in the century, the Rhodium Group recently estimated that 9 million tons of removal capacity will need to be in operation in 2030.

We are a long way from that target today, and there are big hurdles to get this technology to scale.

There is a need for low-emissions electrical and thermal energy and viable storage options. And cost remains the biggest challenge.

But the experience in the past decade with renewables, lithium-ion batteries, and other technologies shows that R&D investments, coupled with smart deployment policies, can drastically reduce these costs.

We are the cusp of major breakthroughs, but innovation requires a holistic approach. R&D for technology development is part of the equation, but deployment incentives, like the 45Q tax credit and California's Low Carbon Fuel Standard, are important to monetize negative emissions practices.

A federal carbon pricing program could be structured with this in mind as well.

Federal support can also help develop markets for carbon utilization, including fuels, chemicals, cement, and carbon fibers. This is one of the goals of the Buy Clean proposal in the CLEAN Future draft.

While I support many of the concepts in this bill, I believe there are ways to improve it.

Mr. Shimkus can attest that I am not usually one to deny new authorities to EPA, but in this case, I believe the Department of Energy is best suited to lead federal CCUS R&D efforts.

That is not to say EPA and other agencies will not have important roles to play, including monitoring and verification of storage sites to ensure carbon is staying permanently sequestered.

I am also interested in how the Federal Government can help standardize and verify the GHG lifecycle assessment for utilization and sequestration practices. This could help foster a common understanding of the net-impacts of different technologies and methods.

Finally, the largest current market for CO₂ utilization is enhanced oil recovery. This is concerning as we need to be moving away from the use of petroleum. This makes it all the more important and urgent that we develop those new markets for alternative uses.

I look forward to today's discussion. I hope we can examine some of these potential issues and work together with the bill's sponsors moving forward.

Mr. TONKO. OK, the Chair now recognizes the proud dad for 5 minutes.

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

Mr. SHIMKUS. Thank you, Mr. Chairman.

Carbon capture utilization and storage, or CCUS has been an important feature of Federal clean energy research and development policy for over 15 years. In fact, the DOE has been researching Decatur, Illinois, an ADM site. At least a decade, they have been doing research there.

This support has been driven by the plain fact that fossil energy, coal, oil, and natural gas, are and will remain central to our nation's economy for decades to come. Even accounting for accelerating growth of renewables, fossil energies will continue to fuel the majority of our nation's electricity production, our transportation, and remain absolutely essential in a wide range of industrial processes well into the mid-century and beyond, as last week's annual energy outlook shows.

And fossil energy will remain dominant throughout the developing world, as those nations grow, prosper, and seek the tremendous benefits of affordable energy, and industrial materials, and mobility, as we have discussed in previous hearings. Given this fact, policies that seek to reduce greenhouse gas emissions in a way that is economically beneficial must build upon our existing energy supply, infrastructure, and industrial systems. This is where CCUS can serve an essential role.

While there continue to be technical and economic challenges, we are fortunate that innovation and successful demonstrations in large-scale industrial capture and advances in the demonstration of power sector carbon capture have shown the viability of these technologies. In addition, given the economic value of carbon dioxide for enhanced oil recovery, there is growing demand for infrastructure in the energy sector, particularly pipeline infrastructure that can take CO₂ that has been captured and sequester it, and put it to beneficial use, which brings us to the topic of today's hearing.

H.R. 1166, or the USE IT Act introduced by Mr. Peters and Mr. McKinley, takes useful steps to accelerate the development and deployment of CCUS projects, including expressly direct air capture projects, and to help ensure more efficient timely permitting on CO₂ pipeline infrastructure.

The bill focuses on EPA's existing nonregulatory authority under the Clean Air Act to develop and support a 10-year program to award funds for direct air capture research and to develop the Federal expertise on this front with a Direct Capture Technology Advisory Board.

The bill also directs EPA to provide, in what will be a close collaboration with the Department of Energy, technical and additional financial support for carbon utilization technologies. And consistent with the agency's existing authorities, it directs the agency to report on risks and benefits associated with carbon storage in deep saline formations.

The assistance reporting and Federal collaboration that would grow out of this portion of the bill would help accelerate CCUS technologies, but it would be critical to enable the infrastructure for these technologies, which is why permitting provisions of the bill are so important. These provisions clarify current law by making it explicit that CCUS projects, including direct air capture projects, which we will hear about today, and carbon dioxide pipelines, can be considered, quote, unquote, covered projects under

Title 41 of the FAST Act. These provisions enhance coordination of permitting decisions with a goal of more rapid buildout of infrastructure.

Today, we will hear from several witnesses who can speak to climate policy, the innovation, and infrastructure benefits of the USE IT Act.

I would like to welcome the two witnesses in particular. Jason Burger from—Begger from Wyoming Infrastructure Authority offers a useful perspective on the energy-rich state that is seeking to develop energy resources and pipeline infrastructure with new cleaner technologies. And that actually, would be very applicable to southern Illinois with our margin oil wells and our coal formations.

And Lee Anderson of the Utility Workers Union of America can help remind us that behind our energy and electricity resources are American workers and their families who can be the first to bear the harsh economic impacts of expensive regulatory policies we would keep in mind, along with the American consumer, as we develop climate policies.

Mr. Chairman, as you know, this is a thoughtful, widely supported bill. It is the kind of bipartisan legislation that we know we can enact in law and make meaningful changes to our climate policies.

And with that, Mr. Chairman, I thank you for the time and I yield back.

[The prepared statement of Mr. Shimkus follows:]

PREPARED STATEMENT OF HON. JOHN SHIMKUS

Carbon capture, utilization, and storage or CCUS has been an important feature of federal clean energy R&D and policy support for over 15 years.

This support has been driven by the plain fact that fossil energy—coal, oil, and natural gas—is and will remain central to the nation's economy for decades to come.

Even accounting for accelerating growth of renewables, fossil energy will continue to fuel the majority of our nation's electricity production, our transportation, and remain absolutely essential in a wide array of industrial processes well into the mid-century and beyond, as last week's Annual Energy Outlook shows.

And fossil energy will remain dominant throughout the developing world as those nations grow, prosper, and seek the tremendous benefits of affordable energy and industrial materials, and mobility, as we've discussed in previous hearings.

Given this fact, policies that seek to reduce greenhouse gas emissions in a way that is economically beneficial must build upon our existing energy supply, infrastructure and industrial systems. This is where CCUS can serve an essential role.

While there continue to be technical and economic challenges, we are fortunate that innovations and successful demonstrations in large scale industrial carbon capture, and advances in the demonstration of power-sector carbon capture have shown the viability of these technologies.

In addition, giving the economic value of carbon dioxide for enhanced oil recovery, there is growing demand for infrastructure in the energy sector—particularly pipeline infrastructure that can take CO₂ that has been captured and sequester it or put it to beneficial use. Which brings us to the topic of today's hearing.

HR 1166 or the USE IT Act, introduced by Mr. Peters and Mr. McKinley, takes useful steps to (a) accelerate development and deployment of CCUS projects—including especially direct air capture projects—and (b) to help ensure more efficient, timely permitting on the CO₂ pipeline infrastructure.

The bill focuses on EPA's existing non-regulatory authority under the Clean Air Act to develop and support a ten-year program to award funds for direct air capture research and to develop the federal expertise on this front with a Direct Air Capture Technology Advisory Board.

The bill also directs EPA to provide—in what will be close collaboration with the Department of Energy—technical and additional financial support for carbon utilization technologies. And, consistent with the agency's existing authorities, it directs

the agency to report on risks and benefits associated with carbon storage in deep saline formations.

The assistance, reporting, and federal collaboration that would grow out of this portion of the bill should help accelerate CCUS technologies. But it will be critical to enable the infrastructure for these technologies, which is why the permitting provisions of the bill are so important.

These provisions clarify current law by making explicit that CCUS projects—including direct air capture projects, which we will hear about today—and carbon dioxide pipelines can be considered “covered projects” under Title 41 of the FAST Act. These provisions enhance coordination of permitting decisions with the goal of more rapid build out of infrastructure.

Today we will hear from several witnesses who can speak to the climate policy, the innovation, and the infrastructure benefits of the USE It Act.

I’d like to welcome two witnesses in particular: Jason Begger of the Wyoming Infrastructure Authority offers the useful perspective of an energy rich state that is seeking to develop its energy resources and pipeline infrastructure, with new, cleaner technologies. And Lee Anderson, of the Utility Workers Union of the American, can help remind us that, behind our energy and electricity resources are American workers and their families, who can be the first to bear the harsh economic impacts of expensive regulatory policies. We should keep them in mind, along with the American consumer as we develop climate policies.

Mr. Chairman, as you know, this is a thoughtful, widely supported bill. It is the kind of broad bi-partisan legislation that we know we can enact in law and make meaningful changes to our climate policies.

We have already missed opportunities to enact versions of the legislation. I am encouraged that the Majority wants to move this bill and will work with you to ensure that happens successfully.

Mr. TONKO. The gentleman yields back.

The Chair now recognizes Representative Pallone, chairman of the full committee, for 5 minutes for his opening statement, please.

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

The CHAIRMAN. Thank you, Mr. Chairman.

The pictures in that book with your son are beautiful. You took the pictures? Wow, they are really nice.

Mr. SHIMKUS. Shocking, yes?

The CHAIRMAN. No, no, it is really—it is nice.

I am pleased to be here this morning to discuss H.R. 1166, the Utilizing Significant Emissions with Innovative Technologies Act. This is a bipartisan bill introduced by Representatives Peters, McKinley, and Veasey. It is designed to advance carbon capture storage and utilization, important components of combating the climate crisis, as this committee works to reach a hundred percent clean economy.

In earlier hearings on the climate crisis, we consistently heard that we must develop and deploy technologies to capture and store carbon to prevent it from further elevating greenhouse gas pollution. And earlier this week, a group of carbon capture experts said that we may need as many as 2,000 carbon capture facilities by 2040 to reach the mid-century goals laid out in the Paris Agreement.

Clearly, we must find ways to remove carbon from waste streams and from the atmosphere and store it permanently and safely. We also need to develop new processes to convert carbon waste streams into durable products. Unfortunately, steel, cement, and other industrial manufacturing activities will likely continue to require fossil fuels and, therefore, for these industries, carbon capture and se-

questration are essential. They are needed to achieve the deep greenhouse gas pollution reductions that science says are required.

So there is a lot we must do to achieve these goals. We have to bring the cost of carbon capture down. We have to support research and development of new carbon-based products, and we must gain experience with carbon storage that is verified by monitoring and reporting programs to ensure carbon is being stored permanently and safely. And we also need policies that mandate the control of carbon pollution directly or indirectly.

The bill H.R. 1166 addresses some of these important goals and I commend the bill's sponsors for their efforts. At the same time, I believe the bill could be strengthened to more effectively reduce emissions.

First, I believe that the Department of Energy, which has pursued research, development, and demonstration of carbon capture and sequestration for many years, should play a larger role.

Second, while enhanced oil recovery is still the most profitable use for captured carbon, we will not make real progress in reducing climate pollution unless there is significant net storage associated with it.

And I am concerned, or I should say; third I am concerned that the bill focuses too heavily on streamlining pipeline construction. I would like to see it provide a lot more direction on medium- to long-term planning for a time when enhanced oil recovery will not be the dominant use of captured carbon.

I also want to work with the sponsors to ensure the bill does more to ensure that captured carbon is safely and permanently sequestered. I have concerns about the EPA's track record of enforcing the requirements for companies claiming the sovereign sequestration tax credit. We must also strengthen EPA's underground injection control program to ensure that it protects underground sources of drinking water. This is particularly important as climate change stresses those sources in new ways.

H.R. 1166 makes a significant down payment on crucial innovation in carbon dioxide removal and CCS technologies. And that is important. I also think we must do far more to effectively tackle the climbing prices.

And I commend the bill's sponsors for their leadership on this issue. I hope we can continue to work together to strengthen it and gain additional support from members on both sides.

We have excellent witnesses today. I am looking forward to their testimony but I want to yield my remaining time to Representative Peters, who is the sponsor of the bill.

Mr. PETERS. Thank you very much, Mr. Chairman. I am pleased to be here today to talk about the USE IT Act, which we proudly introduced with Representatives McKinley, Veasey, Schweikert, and Bustos, and Senators Whitehouse and Barrasso in the Senate.

Although the global carbon budget projected U.S. emissions to fall 1.7 percent in 2019, we are still running a huge emissions deficit by any accounting standards. And to reach net zero by 2050, scientists tell us that emissions must fall by about eight percent every year over the next decade.

The Democrats on this committee have released draft legislation proposing how to close the emissions gap by investing in clean en-

ergy and efficiency, retrofitting buildings, decarbonizing cement, steel, and plastics, increasing public transportation, and even planning—reducing deforestation, even planting new trees to increase carbon storage.

In the words of Chairman Tonko, our committee has, quote, harvested the low-hanging fruit, energy efficiency, conservation weatherization research, and grid modernization but we have to be more ambitious, as I think the chairman explained.

Experts before this committee have testified that we can't reach net zero by 2050, unless we figure out a way to decarbonize cement, steel, and plastics in the industrial sector, and aviation, and shipping in the transportation sector.

Today we are going to hear why USE IT is as important to a small company like LanzaTech, a bio startup—a biotech startup figuring out how to scale up technologies that convert CO₂ into fuel and other valuable projects, as it is to the State of Wyoming's infrastructure authority, which has been working with DOE for years to develop large scale integrated CCS projects. USE IT is a stand-alone bill but it is a vital complement to this committee's climate priorities and I look forward to the testimony today. I thank the witnesses and I yield back.

[The prepared statement of Mr. Pallone follows:]

PREPARED STATEMENT OF HON. FRANK PALLONE, JR.

I'm pleased to be here this morning to discuss H.R. 1166, the Utilizing Significant Emissions with Innovative Technologies Act. This is a bipartisan bill introduced by Representatives Peters, McKinley and Veasey. It is designed to advance carbon capture, storage and utilization—important components of combatting the climate crisis as this committee works to reach a 100 percent clean economy.

In our earlier hearings on the climate crisis we consistently heard that we must develop and deploy technologies to capture and store carbon to prevent it from further elevating greenhouse gas pollution. Earlier this week, a group of carbon capture experts said that we may need as many as 2,000 carbon capture facilities by 2040 to reach the mid-century goals laid out in the Paris Agreement.

Clearly, we must find ways to remove carbon from waste streams and from the atmosphere and store it permanently and safely. We also need to develop new processes to convert carbon waste streams into durable products. Unfortunately, steel, cement and other industrial manufacturing activities will likely continue to require fossil fuels, and therefore, for these industries, carbon capture and sequestration are essential. They are needed to achieve the deep greenhouse gas pollution reductions that science says is required.

There is a lot we must do to achieve these goals. We must bring the costs of carbon capture down. We must support research and development of new carbon-based products. And, we must gain experience with carbon storage that is verified by monitoring and reporting programs to ensure carbon is being stored permanently and safely. We also need policies that mandate the control of carbon pollution directly or indirectly.

H.R. 1166 addresses some of these important goals, and I commend the bill's sponsors for their efforts. At the same time, I believe the bill could be strengthened to more effectively reduce emissions.

First, I believe that the Department of Energy, which has pursued research, development and demonstration of carbon capture and sequestration (CCS) for many years, should play a larger role.

Second, while enhanced oil recovery is still the most profitable use for captured carbon, we will not make real progress in reducing climate pollution unless there is significant net storage associated with it.

Third, the bill also focuses heavily on streamlining pipeline construction. I would like to see it provide more direction on medium to long-term planning for a time when enhanced oil recovery will not be the dominant use of captured carbon.

I also want to work with the sponsors to ensure the bill does more to ensure that captured carbon is safely and permanently sequestered. I have concerns about the

Environmental Protection Agency's (EPA) track record of enforcing the requirements for companies claiming the carbon sequestration tax credit. We must also strengthen EPA's Underground Injection Control Program to ensure that it protects underground sources of drinking water. This is, particularly important as climate change stresses those sources in new ways.

H.R. 1166 makes a significant down payment on crucial innovation in carbon dioxide removal and CCS technologies -and that's very important. I also think we must do far more to effectively tackle the climate crisis. I commend the bill sponsors for their leadership on this issue. I hope we can continue to work together to strengthen it and gain additional support from members on both sides of the aisle.

We have an excellent panel of witnesses here today. I look forward to hearing their testimony and recommendations for improving this legislation.

Thank you, I yield my remaining time to Rep. Peters, the sponsor of the bill.

Mr. TONKO. The gentleman yields back. The Chair now recognizes Representative Walden, ranking member of the full committee for 5 minutes for his opening statement.

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

Mr. WALDEN. Good morning, Mr. Chairman. It is Thursday. It is OK.

H.R. 1166, the USE IT Act, sponsored by Mr. Peters and Mr. McKinley, is a practical, it is a widely supported, and it is a bipartisan piece of climate legislation. Versions of this legislation were passed out of the Senate last year. We included it in the Republican 12 and 20 packages, 12 bipartisan bills with the USE IT Act at the top we can enact into law. It is a bill that we know can make a meaningful difference for our economy and for addressing climate risks.

The USE IT Act provides the Environmental Protection Agency direction under existing authorities and in coordination with the Department of Energy to foster innovations in carbon capture technologies and improve scientific understanding of carbon sequestration. The bill addresses permitting delays and it will ensure more timely deployment of these technologies and pipeline infrastructure essential to these innovative technologies to succeed economically.

This important bill is not complicated. It authorizes targeted financial support and it will generate useful information to assess technological deployment. Furthermore, it builds upon the bipartisan work of past Congresses, like reforms to our tax code to encourage more investment in carbon capture and storage.

There will be additional practical and achievable steps the administration and Congress will have to take to clear paths for these innovative technologies to assist with cleaner energy systems, but this is exactly how we implement workable climate policies.

And what results can we expect to see from implementing workable climate policies? Well, a recent report from the National Petroleum Council on carbon capture technologies points out that, over the next two decades, global GDP is expected to double. With this tremendous growth in prosperity, billions of people will be lifted out of poverty and the increases in prosperity will be enabled by a 25 percent, a 30 percent increase in energy demands. So energy demand is going to go up 25 to 30 percent, as a result of growth in the worldwide economy.

This demand, as we have examined in past hearings, will depend upon affordable, reliable energy and this is a growth that will drive the bulk of future greenhouse gas emissions in the world going forward. So by developing American energy resources, by exploring the fruits of our energy revolution, by developing advanced technologies like CCUS and perfecting their deployment, we can enjoy the economic and environmental benefits of exporting our innovations to these developing nations. Practical policies that promote competitive development of our own resources, not through top-down regulation and taxation but through American ingenuity and innovation is how we can best address global emissions.

Our witnesses this morning will be able to talk about the importance of these bills for expanding our existing resources and infrastructure. It is a good start, Mr. Chairman, and I look forward to continuing to work with you to move this legislation forward.

And let me say I agree with the majority. We need climate action. That is why we cannot let another opportunity slip by. You see we have already missed two opportunities to get the USE IT Act enacted.

There was a three-corners agreement on a version of this legislation in the Defense Authorization Act. We were at the table to negotiate but, unfortunately, the majority pulled the plug.

There was another opportunity in the year-end spending bill. Unfortunately, the majority again said no.

So, let's not let another opportunity slip by and I hope we can look at other practical measures that we can enact into law. There are other bipartisan measures we can and should move.

Just last week, we held an informative hearing on wildfires and I appreciate the committee doing that, the upshot of which was there was wide agreement that implementing active forest management will help reduce risks of fire and increase opportunities for resilient, sustainable forests. And by the way, healthy green forests sequester carbon. There is a bill for that and there is a bill to restore burned forests to plant trees to increase carbon sinks and provide for a healthier economy as well.

So there are more bills like this to consider, Mr. Chairman, where I think we can find common ground. I am hopeful we can start working on the measures we agree upon and get them into law. These are the types of concrete legislative steps we can take right now to make progress.

And so, I do look forward to working with you, Mr. Chairman, and I yield back a full minute and seven seconds.

[The prepared statement of Mr. Walden follows:]

PREPARED STATEMENT OF HON. GREG WALDEN

H.R. 1166, the USE IT Act, sponsored by Mr. Peters and Mr. McKinley is a practical, widely supported, bipartisan bill. Versions of this legislation were passed out of the Senate last year and we included it in our 12 in '20 package. Twelve bipartisan bills—with the USE IT Act at the top—that we can enact into law. It is the kind of bill we know can make a meaningful difference for our economy and for addressing climate risks.

The USE IT Act provides the Environmental Protection Agency direction, under existing authorities and in coordination with the Department of Energy, to foster innovations in carbon capture technologies and improve scientific understanding of carbon sequestration.

The bill addresses permitting delays and it will ensure more timely deployment of these technologies and pipeline infrastructure-essential for these innovative technologies to succeed economically.

This important bill is not complicated. It authorizes targeted financial support and it will generate useful information to assist technological deployment. Furthermore, it builds upon the bipartisan work of past Congresses, like reforms to our tax code to encourage more investment in carbon capture and storage.

There will be additional practical and achievable steps the Administration and Congress will have to take to clear the path for these innovative technologies, to assist with cleaner energy systems. But this is exactly how we implement workable climate policies.

And what results can we expect to see from implementing workable climate policies?

A recent report from the National Petroleum Council on carbon capture technologies points out that, over the next two decades, global GDP is expected to double. With this tremendous growth in prosperity, billions of people will be lifted out of poverty. And the increase in prosperity will be enabled by a 25% to 30% increase in energy demand.

This demand, as we've examined in past hearings, will depend on affordable, reliable energy - and this is the growth that will drive the bulk of future greenhouse gas emissions in the world.

By developing our American energy resources, by exporting the fruits of our energy revolution, by developing advanced technologies like CCUS and perfecting their deployment, we can enjoy the economic and environmental benefits of exporting our innovations to these developing nations.

Practical policies that promote competitive development of our own resources, not through top-down regulation and taxation, but through American ingenuity and innovation is how we can best address global emissions.

Our witnesses this morning will be able to talk about the importance of bills like this, for expanding our existing resources and infrastructure. This is a good start, Mr. Chairman. I look forward to working with you to move this legislation.

And, let me say, I agree with the majority - we need climate action. That's why we cannot let another opportunity slip by. You see, we've already missed two opportunities to get the USE IT Act enacted; there was a three corners agreement on a version of this legislation in the Defense Authorization Act. We were at the table to negotiate, but the Majority pulled the plug. There was another opportunity in the year end spending deal, but the Majority again said no.

We should not let more opportunities slip by.

And I hope we can look at other practical measures that we can enact into law. There are other bi-partisan measures we can move.

Just last week we held an informative hearing on wildfires, the upshot of which was that there was wide agreement that implementing active forest management will reduce fire risks and increase the opportunity for more resilient, sustainable forests; there's a bill for that. There's a bill to restore burned forests, to plant trees to increase carbon sinks and provide for a healthier economy.

There are many more bills like this to consider. So, I am hopeful we can start working on the measures we can agree upon. These are the types of concrete legislative steps we can take—right now—to make progress. I am looking forward to working with you.

Mr. TONKO. Thank you very much. The gentleman yields back.

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

We now introduce the witnesses for today's hearing. And again, thank you, one and all, for joining us and sharing your thoughts and solutions with us.

First, we begin with Mr. Sasha Mackler, Director of the Energy Project Bipartisan Policy Center; next, we have Mr. John Noel, Senior Climate Campaigner with Greenpeace USA; then, Mr. Jason Begger, Executive Director of the Wyoming Infrastructure Authority; then, Dr. Laurel Harmon, Vice President of LanzaTech, Inc.; and finally, Mr. Lee Anderson, Government Affairs Director of the Utility Workers Union of America, AFL-CIO.

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

At this time, the Chair now recognizes Mr. Mackler for 5 minutes, please, to provide your opening statement.

STATEMENTS OF MIKAEL SASHA MACKLER, DIRECTOR OF THE ENERGY PROJECT BIPARTISAN POLICY CENTER; JOHN NOEL, SENIOR CLIMATE CAMPAIGNER WITH GREENPEACE USA; JASON BEGGER, EXECUTIVE DIRECTOR OF THE WYOMING INFRASTRUCTURE AUTHORITY; LAUREL HARMON, PhD., VICE PRESIDENT OF LANZATECH, INC.; AND LEE ANDERSON, GOVERNMENT AFFAIRS DIRECTOR OF THE UTILITY WORKERS UNION OF AMERICA, AFL-CIO

STATEMENT OF MIKAEL SASHA MACKLER

Mr. MACKLER. Thanks and good morning. As you said, I am Sasha Mackler and I direct the Energy Project at the Bipartisan Policy Center.

I am delighted to be here this morning on behalf of the BPC to express support for the USE IT Act. BPC believes that the only way to confront the climate challenge is to dramatically accelerate the development and deployment of carbon-free energy systems that are cost-competitive with traditional options and the USE IT Act is a critical step and a bipartisan step in this direction for carbon capture.

I should also note at the outset that in addition to my work on Energy Policy at the BPC, I spent a number of years recently working in the private sector as a developer of carbon capture projects. Through this experience, I can offer a firsthand account of the challenges facing CCUS development and I can attest to the need for more targeted Federal support, if we are serious about bringing carbon capture into the marketplace in a meaningful timeframe.

BPC is enthusiastic to support the USE IT Act. It focuses on a set of technologies that will be critical to achieving our twin goals of mitigating climate change and keeping America's economy strong for this century and beyond.

My testimony this morning will focus on four main points: first, the importance of innovation; second, the critical role that carbon capture utilization and storage must play in decarbonizing our energy system; third, the unique role that direct air capture, or DAC, could play in managing climate risks; and finally, the significance of utilization in the trajectory of scaling carbon capture systems.

At the outset, I think it is useful to step back and remind ourselves of the role of technology innovation and how it has always played a key role the success of our nation. The Federal Government's willingness to invest in key technologies at key junctures from the space race to the IT revolution has been crucial to navigating past eras of economic transformation. Today, we face another such transformation and it is every bit as challenging as the ones that defined previous eras, the transformation to a net zero economy by mid-century.

And time is not on our side. We need to reduce global emissions to net zero by 2050. That is only three short decades from now. To achieve our climate goals, we need more and better tools than we have now and that is where carbon capture comes in.

We need these technologies because we simply don't have non-fossil fuel alternatives for all the energy-using sectors of our economy, including applications such as long-haul air travel or some industrial processes.

How can carbon capture help? Carbon capture from industrial sources offers a way to capture CO₂ from smokestacks and prevent it from going into the atmosphere. Another class of carbon capture technologies, often called direct air capture or DAC, offers a way to remove CO₂ from the ambient air.

And DAC is worth focusing on for a minute because it has gotten less attention in the past but that is changing really quickly, as many are increasingly seeing the advantages of adding DAC to our climate toolkit. The key virtue of DAC is that it can be used to remove CO₂ already in the atmosphere and if we can make work at reasonable cost, it will give us a tool for reversing past emissions and, in effect, canceling out new emissions that have no practical way to be avoided.

But the only way that DAC will be ready to play a significant role is if the Government helps to jumpstart it. USE IT does this by creating incentives for technology development and by enabling permitting improvements for projects and their supporting infrastructure. So this is the feature of the legislation that we are particularly enthusiastic about.

Another feature of the USE IT Act I want to draw attention to is its focus on CO₂ utilization. This is critical because it can help make the economics of DAC or carbon capture work in the near-term. Potential uses for CO₂ are actually not too hard to think up. CO₂ can be used as a feedstock for cement or synthetic fuels but the biggest immediate market for large quantities of CO₂ today is in the oil industry for enhanced oil recovery.

On balance, we at BPC have concluded that carbon capture with enhanced oil recovery is worth pursuing, both because it offers immediate benefits in terms of reducing the net emissions associated with oil production and because of the synergies it affords in terms of engaging a major industrial partner, accessing potentially large sources of private capital for technology development and infrastructure buildout, and developing the needed regulatory frameworks for carbon storage. And we are not alone in reaching this conclusion. A number of prominent environmentalists also agree.

So in closing, I want to thank the subcommittee again for this opportunity to testify and explain some of the reasons why we at the BPC support the USE IT Act. Technology innovation has always been America's superpower and it remains our best bet today.

Thank you.

[The prepared statement of Mr. Mackler follows:]



Written Testimony

Sasha Mackler

Director of the Energy Project, Bipartisan Policy Center

**Before the United States House of Representatives Committee on Energy and Commerce
Subcommittee on Environment and Climate Change**

February 6, 2020

Chairman Tonko, Ranking Member Shimkus, and members of the subcommittee, thank you for the opportunity to discuss the crucial topic of carbon capture, utilization, and storage (CCUS) and H.R. 1166, the Utilizing Significant Emissions with Innovative Technologies (USE IT) Act. Thank you as well to Reps. Peters, McKinley, Veasey, and Schweikert for your bipartisan leadership on this legislation, which has already garnered 57 co-sponsors, from both parties.

I appreciate the chance to share some specific thoughts on the importance of CCUS – both in terms of our nation’s ability to address the climate challenges we face in the decades ahead, and in terms of strengthening the economy and preserving American leadership in energy innovation. We strongly support the USE IT Act because of its potential to accelerate the development and deployment of technologies for capturing, transporting, utilizing, and sequestering carbon dioxide, a key contributor to climate change. This includes both technologies that can capture and remove carbon dioxide from the exhaust gases of large emissions sources, such as power plants and factories, as well as technologies that can capture and remove carbon dioxide from the ambient air. Investment in multiple types of carbon capture technology will be critical to achieve climate goals, reduce the costs of climate mitigation, and enable U.S. companies to maintain and improve their economic competitiveness.

My testimony can be summarized in four main points:

- 1) Past federal investments in innovation, particularly energy innovation, have delivered significant benefits in terms of sustained U.S. economic growth and international competitiveness. Legislation that supports energy innovation R&D, such as the USE IT Act, will be especially crucial to U.S. economic and technological leadership as the world transitions to a net-zero-carbon future.
- 2) CCUS technologies and infrastructure, and R&D for carbon utilization, can ensure that we have the tools to address emissions from difficult-to-decarbonize sectors, such as energy-intensive industry and long-haul aviation. With access to these tools, companies in these sectors will have cost-effective options for reducing their emissions profiles.
- 3) Among emerging carbon dioxide removal technologies, direct air capture, which removes carbon dioxide from the ambient air, could play a potentially important role in America’s climate change mitigation portfolio because of the specific advantages it offers in terms of scalability and siting flexibility.
- 4) Leveraging opportunities to utilize carbon dioxide, as the USE IT Act proposes, is important as a way to create pathways to commercialization for new carbon capture technologies. Among these opportunities, enhanced oil recovery (EOR) presents the largest near-term market for carbon dioxide and offers other



potential synergies in terms of engaging a major industry partner, accessing capital to develop supporting infrastructure, and developing the regulatory frameworks required for broad CCUS deployment.

Introduction

The Bipartisan Policy Center (BPC) is a Washington, DC-based think tank that actively fosters bipartisan solutions to critical public policy challenges by combining the best ideas from both parties. BPC's Energy Project is focused on advancing policies and technology innovations that will facilitate America's transition to a competitive, net-zero-carbon economy. In 2019, BPC established the Advisory Council on Direct Air Capture of Carbon Dioxide because we recognized that direct air capture and other CCUS technologies have a critical role to play in achieving our energy and climate goals, alongside other key technologies such as renewables, low-carbon fuels, advanced nuclear, and energy efficiency.

Given that CCUS technologies have historically received less attention than other climate mitigation options, we welcome the introduction of the USE IT Act as an important addition to the nation's energy innovation investment portfolio. The economic and environmental rationales for supporting this legislation are compelling in light of the findings of multiple international and domestic expert scientific organizations, including the Intergovernmental Panel on Climate Change (IPCC) and our own National Academy of Sciences, which have concluded that CCUS will be integral to achieving ambitious climate mitigation goals¹ and in light of expected growth in the global market for low-carbon technologies. The remainder of this testimony details the benefits CCUS technologies could provide and the need for greater federal investment in R&D to maintain a leadership position in this critical domain.

Innovation

An effective, efficient strategy for decarbonization requires a combination of ambitious clean energy innovation programs and complementary deployment policies that systematically drive markets for low-carbon energy technologies across the economy. Innovation is absolutely required to achieve net-zero emissions by mid-century given that global energy demand is projected to increase 25% to 30% by 2040.

For decades, the U.S. has been a global leader in innovative and disruptive technologies—and has reaped considerable economic benefits as a result. Researchers have estimated that at least 50% of U.S. annual GDP growth can be traced back to investments in innovation.² Despite these positive impacts, however, U.S. investments in energy research have not kept pace with economic growth in recent years. As a result, U.S. overall research intensity (measured as the ratio of investments in R&D relative to overall GDP) has stagnated.³ Meanwhile, China's overall research intensity tripled between 1995 and 2019 and is still

¹ IPCC, 2018: Summary for Policymakers. In: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)]. In Press. Available at: [https://www.ipcc.ch/sr15/ and https://www.nap.edu/resource/25259/Negative%20Emissions%20Technologies.pdf](https://www.ipcc.ch/sr15/andhttps://www.nap.edu/resource/25259/Negative%20Emissions%20Technologies.pdf).

² U.S. Chamber of Commerce Foundation. "Enterprising States 2015 - Executive Summary." 2015. Available at: <https://www.uschamberfoundation.org/enterprising-states-and-cities>

³ National Science Foundation. 2018 Science and Engineering Indicators. 2018. Available at: <https://www.nsf.gov/statistics/2018/nsb20181/assets/nsb20181.pdf>



growing at a faster pace than U.S. research intensity. In addition to increasing their overall research intensity, other nations, particularly China, Germany, Japan, and South Korea, have maintained or increased their support for energy R&D and innovation specifically.

Since 2010, BPC's American Energy Innovation Council, which is composed of prominent business leaders, has pushed for increased investment in energy innovation—not only as a way to maintain U.S. competitiveness but also as a way to help fight climate change. One of the Council's specific recommendations has been to triple the federal government's investments in energy innovation.

Innovation-related legislation introduced this Congress has consistently reaffirmed members' support for energy R&D and signaled a strong willingness to support innovative and environmentally impactful energy technologies. The USE IT Act continues this trend and makes a valuable contribution by specifically authorizing new R&D funding to advance climate-friendly technologies that are currently less developed, but that have enormous upside potential and future market value.

Carbon Capture, Utilization, and Storage

CCUS is an essential complement to other strategies for reducing and avoiding carbon dioxide emissions for the simple reason that we are unlikely to have practical, cost-effective options for zeroing out all anthropogenic sources of greenhouse gases within the mid-century timeframe that scientists have identified as critical for averting major climate risks. Certain industrial processes, for example, such as steel or cement production, are very difficult to decarbonize. Similarly, non-fossil fuel alternatives don't yet exist or remain prohibitively expensive in some transportation applications, such as long-haul air travel and marine shipping. And lastly, there are anthropogenic sources of greenhouse gases, from chemical reactions, agriculture, and land-use practices, to name a few, that lie outside the energy sector altogether.

Given this diversity of sources, achieving net zero carbon emissions by 2050 will necessitate the use of CCUS to compensate for remaining emissions that can't be avoided in the mid-century timeframe. This is true, *even with* very rapid progress to implement those low- and zero-carbon options that are already available—itsself no small challenge. And CCUS may prove even more indispensable later in the century, when, according to several expert organizations, net emissions will likely need to be driven *below* zero (in other words, the quantity of carbon dioxide being removed from the atmosphere each year will have to exceed the quantity being added from anthropogenic sources).⁴ Meanwhile, besides achieving broader climate goals, CCUS will be important as a way to allow companies that would otherwise have few options for improving their emissions profile to either avoid adding new carbon dioxide to the atmosphere (in the case of carbon capture technology) or to effectively “cancel out” their emissions by removing carbon dioxide from the atmosphere (in the case of direct air capture technology). This could become increasingly important as other nations begin considering policies that favor companies with lower emissions profiles.

Critically, CCUS technologies can also reduce the cost of achieving climate targets by offering a larger and more diverse set of mitigation options. In fact, the IPCC concluded that meeting current international climate targets could be more than twice as expensive without these technologies. Similarly, a 2017 report

⁴ Technologies that remove carbon dioxide from the atmosphere are sometimes called “negative emissions technologies.”



from the International Energy Agency concluded that CCUS is a necessary part of a clean energy plan that mitigates climate change while protecting U.S. energy security.

Meanwhile, as a business opportunity, captured carbon dioxide can be expected to become increasingly valuable as climate policies create growing domestic and international demand for low-carbon technologies and emissions reductions in the coming decades. In 2018, the global market for carbon dioxide was estimated to be \$7.4 billion and growing.⁵ The USE IT Act's carbon utilization provisions represent an important step toward positioning the United States for competitive advantage in that market.

To seize these opportunities, and to position U.S. companies to continue to thrive in a carbon-constrained global economy, investment is needed now to develop CCUS technologies. (It is worth noting that additional R&D is also needed to develop and deploy cost-effective low-carbon fuels and process innovations that would enable large-scale emissions reductions in the industrial sector. That sector is a particular point of focus because a January 2019 study from the Rhodium Group found that increased emissions from the industrial sector were the largest contributor to U.S. emissions growth in 2018.⁶)

Direct Air Capture

A particularly important feature of the USE IT Act is that it sets up a competition, with a prize, to spur efforts to develop and demonstrate cost-effective direct air capture (DAC) technology. Working DAC systems have already been demonstrated at a handful of small plants in the United States, Canada, and Europe. But a targeted RD&D push is needed to jump this nascent technology to the next stage of commercialization and to address remaining cost barriers and other design challenges (energy and sorbent use, for example, are areas for further improvement).

DAC is worthy of focused incentives because it offers a way to address emissions from small, dispersed emissions sources that can't be individually retrofitted with carbon capture technology, and a way to eventually achieve net negative emissions by removing more carbon from the atmosphere than is being added in from anthropogenic sources. There are other ways to remove carbon dioxide that is already present in the atmosphere, of course—notably through increased soil and biomass sequestration (growing trees is the most familiar example). But most land and forestry-based strategies face important constraints, including competition with food crops and biodiversity concerns, at very large scales of deployment. By contrast, DAC offers virtually unlimited carbon dioxide removal potential if cost and other barriers can be overcome, and it also has important advantages in terms of siting flexibility and scalability. DAC plants can be large or small and need not be located near emissions sources; indeed, the fact that they can be located in a range of geographic settings reduces the potential for conflicts with other land uses and opens the door to synergistic siting opportunities—for example, placing a DAC plant near a suitable geologic repository for storing captured carbon dioxide or where a low-cost, low-carbon energy source is available. Finally, the ability to add DAC capacity in increments would allow for flexible expansion as the need or opportunity arises—a potentially important feature given uncertainty about future mitigation costs and needs.

⁵ Grand View Research. Market Research Report. Carbon Dioxide Market Size, Share & Trends Analysis Report by Source (Hydrogen, Ethyl Alcohol, Ethylene Oxide, Substitute Natural Gas), by Application (Food & Beverages, Oil & Gas, Medical), and Segment Forecasts, 2019-2025. July 2019. Available at: <https://www.grandviewresearch.com/industry-analysis/carbon-dioxide-market>

⁶ Energy & Climate Staff. "Preliminary US Emissions Estimates for 2018." Rhodium Group. Jan. 8, 2019. Available at: <https://rhg.com/research/preliminary-us-emissions-estimates-for-2018/>



Enhanced Oil Recovery

As we noted at the outset, the focus on carbon dioxide *utilization* in the USE IT Act is an important feature, given the challenge of commercializing carbon capture technologies absent a market for the carbon dioxide they produce. Although a number of potential markets could emerge in the future, for synthetic fuels production or concrete manufacture, for example, the main near-term opportunity is in enhanced oil recovery (EOR). The oil industry already uses carbon dioxide to flush additional oil from mature wells, but this carbon dioxide is typically sourced from natural underground reservoirs so the practice provides little climate benefit. Since the carbon dioxide remains sealed underground after EOR operations are complete, using carbon dioxide that has been taken out of the atmosphere—or captured from industrial sources that would otherwise release new emissions—offers a means of achieving some climate benefit while taking advantage of a large existing carbon dioxide market. A recently announced plan from Occidental Petroleum to use DAC technology for its EOR operations in Texas suggests that this is an area that holds promise in terms of industry interest and potential for future public-private partnerships.⁷

BPC is aware, of course, that pairing DAC with EOR is controversial because of the concern that EOR, by expanding the supply of economically recoverable oil, promotes continued reliance on oil. On the other hand, in a context where oil use in large sectors of the global economy can be expected to continue for some years to come, and where oil companies will continue to implement EOR as market conditions justify, an argument can be made—and in fact has been made by some environmental advocates⁸—that DAC with EOR provides near- and long-term benefits and should be explored. The near-term benefit is that DAC offers a means to effectively cancel out at least some of the new emissions generated by using EOR-produced oil, insofar as it leads to carbon dioxide being removed from the atmosphere and sealed in depleted underground oil reservoirs. The longer-term benefit rests on the potential to use EOR to leverage the investments needed to improve and scale up DAC technology for expanded use in future mitigation efforts. Estimates of the net impacts of EOR with DAC vary, but at least one recent analysis from a non-industry source found that EOR with DAC could reduce net CO₂ emissions by about one-third compared to conventional oil production, subject to a number of input assumptions.⁹ Under other assumptions, including with respect to the DAC energy source and with respect to how much of the oil would have been produced anyway absent EOR, the benefit could be more or less.¹⁰

⁷ James Mulligan and Dan Lashof, “A CO₂ Direct Air Capture Plant Will Help Extract Oil in Texas. Could This Actually Be Good for the Climate?” World Resources Institute, July 31, 2019. Available at: <https://www.wri.org/blog/2019/07/co2-direct-air-capture-plant-will-help-extract-oil-texas-could-actually-be-good-climate>.

⁸ *Ibid*.

⁹ *Ibid*.

¹⁰ The International Energy Agency has estimated that for every ten barrels of oil produced using CO₂-based EOR, eight barrels would have been produced anyway. https://nachhaltigwirtschaften.at/resources/iea_pdf/reports/iea_ghg_storing_co2_trough_enhanced_oil_recovery.pdf

**Infrastructure and Permitting**

Other valuable provisions of the USE IT Act focus on improvements to permitting and siting for CCUS plants and infrastructure, including carbon dioxide pipeline networks. Addressing permitting and siting issues will be critical to supporting a national market for carbon capture and storage and for promoting the continued development and improvement of related technologies. The U.S. currently has 4,500 miles of carbon dioxide pipelines, but this network would have to be expanded substantially to deploy CCUS on the scale needed to contribute to climate mitigation goals.

Conclusion

Passage of the USE IT Act would be an important step toward advancing technologies that will be integral to a cost-effective and successful climate change mitigation strategy. Given expected growth in market demand for low-carbon technologies and carbon dioxide reductions, federal support will complement and bolster emerging trends in the private sector. The U.S. government has a long record of supporting technological innovations that have helped our economy navigate the major industrial transitions of past eras—and come out stronger in the process. The 116th Congress has made significant strides in producing thoughtful bills and discussion drafts that could provide the foundation for another such shift—this time to a low-carbon economy. The USE IT Act represents an important building block in that foundation, and we urge its prompt adoption by the full Congress.

Mr. TONKO. Thank you very much.

Now, we recognize Mr. Noel. You are recognized for 5 minutes, please.

STATEMENT OF JOHN NOEL

Mr. NOEL. Thank you. Chairman Tonko, Ranking Member Shimkus, members of the committee, thank you for inviting me to testify today. It is an honor.

My name is John Noel and I am a senior climate campaigner at Greenpeace USA.

We are not opposed to the provisions in the USE IT Act that support carbon utilization research. And of course, science and technology are going to play a major role in addressing the climate crisis but we do need a vision for carbon removal that is fully decoupled from oil production.

The amount of carbon we have to potentially remove is entirely up to us and what we do right now this decade. The oil and gas growth paradigm makes this difficult and that is what I am here to add context to about today and why we are skeptical of any policy that would strengthen the oil industry in the name of climate action. We see addressing the climate crisis and growing the fossil fuel industry is mutually exclusive.

We cannot escape the fact that absolute demand for and production of fossil fuels must decline rapidly. This necessary decline in oil production calls into question the wisdom of incentivizing enhanced oil recovery. As written, the USE IT Act does not provide any guardrails to ensure that it will not lead to decades of increased oil production. If it is, indeed, an onramp to a broader decarbonization agenda, where is the requisite off ramp for fossil fuels?

Proponents reported that the EOR industry could triple in size by 2030, with 375 million barrels of additional annual production. This would likely only occur under scenarios where the U.S. production continues to expand in the coming decade, rather than declining at a pace consistent with the 1.5 scenarios.

Proponents are also clear that the long-term growth for the industry is constrained by a lack of access to consistent sources of CO₂ and pipelines are needed to expand. Companies see the future that a subsidized EOR industry could unlock and the resource estimates we are talking about here are breathtaking in the context of an unfolding climate crisis.

Advanced Resources International says there are 284 billion barrels of additional oil that are technically favorable to CO₂ injection but the industry intends to step beyond just aging conventional oil fields and apply the technology to unconventional resources, as I talk more about in my written testimony. The expansion into unconventional resources complicates the oil industry's carbon storage narrative, as storage in unconventional resources is not well understood. We also note that CO₂ EOR operations are in addition to the rest of the industry's growing production pie. Nowhere in this discussion is there commitment to a managed phaseout of production in line with climate science. It is net expansion.

Part of the justification used for EOR and incentives created by the USE IT Act is that these same productive oil formations could

someday be converted to long-term storage. A 2010 DOE paper determined that it does not make sense as a mitigation tool to construct pipelines to oil fields to expand EOR without first establishing that suitable long-term storage capacity exists. This is not happening, as I talk more about in my written testimony.

IEA goes further and says we need a, quote, paradigm shift in regulations from the way EOR is currently practiced. I do not see the oil industry welcoming a paradigm shift in regulation. At this very moment, oil interests are working to undermine the existing secure geologic storage regulations under Section 45Q. This is a tax credit as part of the system of incentives designed to drive new carbon capture investment.

Senator Menendez recently sent a letter to the IRS Inspector General calling for an investigation into section 45Q, quote: publicly available data suggests that the vast majority of 45Q tax credits claimed have come absent the required the monitoring, reporting, and verification systems that ensure the safe disposal of captured carbon, in clear contravention of current law and guidance. End quote.

This is the type of the regulatory framework and associated tax incentives that this legislation is born into and we think that it ensures that the industry will pocket these subsidies, continue on its current course of full-throttle expansion, and fight any additional policies to reduce our dependence on oil. The industry's campaign to undermine true climate solutions in order to maintain demand is real and well-documented. EOR cannot be siloed off from the rest of a company's portfolio or business strategy. Climate science and carbon math are not complete without an honest analysis of political power.

Thank you for your consideration of these risks.

[The prepared statement of Mr. Noel follows:]

Legislative Hearing on “Clearing the Air: Legislation to Promote Carbon Capture, Utilization, and Storage”

Subcommittee on Environment and Climate Change

John Noël, Greenpeace USA

Addressing the climate crisis and growing the fossil fuel industry are mutually exclusive.¹² We cannot escape the fact that absolute demand for and production of fossil fuels must decline rapidly if we are to have a chance at meeting the Paris Climate targets. This necessary decline in oil production calls into question the wisdom of incentivizing Enhanced Oil Recovery (EOR). As written, the USE IT Act does not provide any guardrails to ensure it will not lead to decades of increased oil production. If it is an onramp to a broader decarbonization agenda, where is the requisite off ramp for fossil fuels? The current regulatory framework, tax incentives, and oil and gas growth paradigm this legislation is born into ensures the industry will pocket these subsidies, continue on its current course of full throttle expansion, and fight any policies to reduce our dependence on oil. It's a bad deal.

The oil extraction that could be supported as a result of streamlined CO₂ pipeline permitting will be delivered under the industry's new climate action PR campaign. The American Petroleum Institute, which all the major EOR players are dues paying members, has already signaled its support for this legislation.³ At the same time API recently spent 7 figures on a PR campaign to convince the public they are one of the biggest players fighting climate change. E&E News was quick to point out: “Despite the new campaign, API isn't changing any of its policies or opposition to regulation or legislation on climate.”⁴

Oil Industry's Growth Strategy

Oil and gas production in the U.S. is booming, placing our climate goals at risk, and the industry clearly aims to keep the expansion going. The primary market for CO₂ is enhanced oil recovery, meaning the infrastructure built under the USE It Act provisions would likely be used to connect CO₂ sources to oil fields.

¹ Andrew Grant. *Carbon Tracker*. September 21, 2019. ([link](#))

² We view the overshoot scenario in P4 as an unacceptable risk. To avoid this scenario, we must reduce oil consumption in the near term. IPCC. Characteristics of four illustrative model pathways. ([link](#))

³ American Petroleum Institute. *API: New NPC Research Underscores Opportunities to Sustain U.S. Energy Leadership and Environmental Progress*. December 12, 2019. ([link](#))

⁴ Timothy Cama. *Oil and Gas Industry Launches Climate Campaign*. E&E News. January 7, 2019. ([link](#))

Indeed the oil industry is ready to capitalize. The State CO₂-EOR Deployment Working Group⁵ reported the EOR industry could triple in size by 2030 with 375 million barrels in additional annual production.⁶ This would likely only occur under scenarios where U.S. production continues to expand in the coming decade, rather than declining at a pace consistent with 1.5C.⁷

The State CO₂-EOR Deployment Working Group goes on to propose a pipeline buildout, which the USE It Act would help jump start, that includes five pipeline corridors to EOR regions. CO₂-EOR proponents are clear that long term growth for the industry is constrained by lack of access to consistent sources of CO₂ and that the pipelines are needed to expand.⁸ Companies see the future that a subsidized EOR industry could unlock.

The resource estimates are breathtaking in the context of the unfolding climate crisis:

- Advanced Resources International says 284 billion additional barrels of oil are “technically favorable” with CO₂ injection, calling it the “CO₂-EOR Prize”.⁹
- Denbury Resources told investors there are 10.3 – 23.4 billion barrels of recoverable oil in Texas alone.¹⁰

USE It Act stakeholders point out that this is oil that would otherwise likely remain in the ground. According to the Working Group, “natural geologic supplies of CO₂ are constrained, so the potential to grow the EOR industry hinges on increasing the supply of anthropogenic CO₂...”¹¹ DOE listed a CO₂-EOR project on its website and highlighted that it was designed to add “another 25 years and as much as 130 million barrels of oil that might otherwise have been abandoned.”¹²

⁵ A project staffed by the Great Plains Institute, a convening member of the Carbon Capture Coalition, whose policy recommendations are largely reflected in the USE IT and FUTURE Act. The Working Group includes participants from fourteen states with current EOR development or potential.

⁶ State CO₂-EOR Deployment Working Group. *21st Century Energy Infrastructure: Policy Recommendations for Development of American CO₂ Pipeline Networks*. February 2017. ([link](#))

⁷ Production Gap Report. Stockholm Environment Institute, UN Environment Programme. December 2019. ([link](#))

⁸ State CO₂-EOR Deployment Working Group. *21st Century Energy Infrastructure: Policy Recommendations for Development of American CO₂ Pipeline Networks*. February 2017. ([link](#)) .

⁹ Michael Godec. *Importance of 45Q and Large Scale CO₂-EOR and Storage*. Advanced Resources International. CO₂-EOR Carbon Management Conference. December 3, 2018.

¹⁰ DNR- The Business of CO₂-EOR and Impediments to CCUS. Carbon/CO₂-EOR Conference Midland, Texas. December 2016. ([link](#))

¹¹ State CO₂-EOR Deployment Working Group. *21st Century Energy Infrastructure: Policy Recommendations for Development of American CO₂ Pipeline Networks*. February 2017. ([link](#))

¹² U.S. Department of Energy. *Enhanced Oil Recovery*. ([link](#))

We note that CO₂-EOR operations are in addition to the rest of the industry's growing production pie. Nowhere in the discussion is there a commitment to a managed phaseout of production in line with climate science. **It is net expansion.**

Also rarely discussed in mainstream CO₂-EOR conversations is the new push to apply the technology beyond aging conventional fields to unconventional resources.¹³ If the industry can perfect CO₂ injection into shale formations and tight oil, and it seems likely with continued federal and state support, it could unlock billions of barrels of oil under the right conditions. Pilot projects underway in the Bakken and the Eagle Ford Shale look so promising analysts are calling it the "next frontier."¹⁴ The National Petroleum Council recently looked at unconventional reserves for CO₂ injection and reported 110 billions of barrels of "EOR production potential" in oil shale reservoirs.¹⁵ The Department of Energy just announced a \$40 million research agenda into EOR, including one unconventional resource project.¹⁶

The expansion into unconventional resources complicates the oil industry's carbon storage narrative. Storage potential in shale is not well understood or necessary given the vast saline storage capacity often cited by permanent geologic sequestration proponents.

No End Game

Part of the justification used for CO₂-EOR (as it relates to CCS industry viability) and incentives created by the USE IT Act is that the same productive oil formations could someday be converted to long-term storage. However, not every EOR field is suitable for permanent mass storage of CO₂. The capacity for continuous high pressure CO₂ injection for storage over many decades is not uniform across EOR operations.

A 2010 DOE paper determined it does not make sense as a climate mitigation tool to construct CO₂ pipelines to oil fields looking to expand CO₂-EOR operations "without establishing that large additional suitable storage capacity exists in the area that can handle storage demand over the long term."¹⁷ Furthermore, there are a number of geologic and well integrity issues that can compromise a field's existing storage capacity that must be evaluated.¹⁸

¹³ State CO₂-EOR Working Group "Putting the Puzzle Together: State and Federal Policy Drivers for Growing America's Carbon Capture and CO₂-EOR Industry" p 23. ([link](#))

¹⁴ Brian Wazlel. *The Next Frontier: EOR In Unconventional Resources*. Hart Energy, August 8, 2017. ([link](#))

¹⁵ National Petroleum Council. *Meeting the Dual Challenge*. Chapter Eight. December 12, 2019. ([link](#))

¹⁶ U.S. Department of Energy. *Energy Department Invests \$40 Million in Enhanced Oil Recovery*. July 18, 2019. ([link](#))

¹⁷ Dooley, et al. "CO₂-driven Enhanced Oil Recovery as a Stepping Stone to What?" prepared for the US Department of Energy. July 2010. ([link](#))

¹⁸ Scott Anderson, Environmental Defense Fund, Carbon Sequestration in Oil and Gas Fields (in Conjunction with EOR and Otherwise): Policy and Regulation Issues, (Panel 3: Policy and Regulation) MIT. 2010. ([link](#))

Right now there is no widespread effort on the part of CO₂ pipeline companies or their partner EOR operators to evaluate eventual conversion of an EOR field to long term permanent storage. This evaluation would have to be done on a field by field basis determined by individual field's geology. Injection into unconventional resources complicates this rational even further.

The State CO₂-EOR Deployment Working Group even indicated the proposed pipeline network could divert CO₂ away from one of the only existing permanent geologic sequestration wells in the country and instead use it as an input for more oil production.¹⁹

Regulatory Capture

Sequestration and injection for oil production are two different enterprises. An IEA report from 2015 hinges the potential benefits of CO₂-EOR as a carbon storage mechanism on the understanding that more stringent regulations are necessary. IEA warns that a "paradigm shift" is necessary to see any potential carbon storage benefits. .

"While both the economic and CO₂ storage potential seem significant, adding these CO₂ storage practices to EOR (the "+" in EOR+) **requires a clear paradigm shift from current practices**. At present, no CO₂-EOR site is pursuing this dual objective: today EOR operations are carried out with the aim of maximising oil output with the minimum CO₂ input. Extending CO₂-EOR projects to include CO₂ storage as an end goal requires taking on activities associated with monitoring and verification of stored CO₂."²⁰

We do not see the oil industry welcoming a paradigm shift in regulation. At this very moment oil interests are working to undermine the existing secure geologic storage regulations under the Section 45Q tax credit.²¹ The only thing captured is our regulatory agencies.

This tax credit is part of the system of incentives designed to drive new carbon capture investment. Senator Menendez recently sent a letter to an IRS Inspector General calling for an investigation into the Section 45Q tax credits for enhanced oil recovery.²² The letter states:

"Publicly available data suggests that the vast majority of 45Q tax credits claimed have come absent the required monitoring, reporting, and verification systems that ensure the safe disposal of captured carbon, in clear contravention of current law and guidance."

¹⁹ State CO₂-EOR Deployment Working Group. *21st Century Energy Infrastructure: Policy Recommendations for Development of American CO₂ Pipeline Networks*. February 2017. P 18. ([link](#))

²⁰ International Energy Agency. *Storing CO₂ Through Enhanced Oil Recovery*. 2015. ([link](#))

²¹ See Energy Advance Center's submission to the IRS public comment docket for the Section 45Q guidance process. ([link](#))

²² Senator Menedez. Letter to Treasury Inspector General for Tax Administration. November, 19, 2019. ([link](#))

This brings into question how much CO₂ has actually been safely stored underground versus how much was claimed for tax credit.²³ The USE It Act will build on this compromised tax incentive and help streamline infrastructure to EOR fields.

Looking Forward

There could be another way to ensure climate benefits of a potential permanent storage and eventual drawdown program. We are not opposed to the proposals to support carbon utilization research in the bill and agree that an alternate vision for carbon removal decoupled from the oil industry is necessary. Yet the existing paradigm is primarily designed to streamline the permitting of enhanced oil production infrastructure and support the ongoing industry crusade against oversight and accountability, and therefore will not and should not inspire public confidence.

We can't meaningfully address the climate crisis if we continue to legitimize the oil industry in climate policy circles. This legitimacy is unearned and the economic incentives inherent to its current business model run counter to the requirements for climate sanity. The industry's campaign to undermine true climate solutions in order to maintain demand is real and well documented. CO₂-EOR cannot be siloed off from the rest of a company's portfolio or business strategy. Any policy that subsidizes increased oil production, which improves the borrowing position of the oil company, not only bolsters its ability to plow revenues back into expansion efforts, but also strengthens its social license and ability to run political interference against real climate action. Climate science and carbon math are not complete without an honest analysis of political power.

²³ Clean Water Action. *Carbon Capture and Release: Oversight Failures in the Section 45Q Tax Credit for Enhanced Oil Recovery*. September 2018. ([link](#))

Mr. TONKO. Thank you very much, Mr. Noel.

Mr. Begger, you are now recognized for 5 minutes, please.

STATEMENT OF JASON BEGGER

Mr. BEGGER. Mr. Chairman, Ranking Member, and members of the subcommittee, I appreciate the opportunity to speak with you today.

My name is Jason Begger, and I am the Executive Director of the Wyoming Infrastructure Authority. The WIA is tasked with promoting and assisting the development of energy infrastructure in deploying technology. We are focused on solutions.

Our largest current project is the Wyoming Integrated Test Center, which is a public-private partnership between the State of Wyoming, Basin Electric Power Cooperative, Tri-State Transmission and Generation Association, and the National Rural Electric Cooperatives Association. The ITC is a post-combustion research facility located at Basin Electric's Dry Fork Power Station near Gillette, Wyoming. It is the largest facility of its kind in the U.S., providing much-needed scaleup space to learn—to better learn how to reduce the costs and find new methods of capture in managing CO₂ afterwards.

At the top of our utilization efforts is a partnership with the NRG COSIA Carbon XPRIZE, which will award \$20 million in prizes to teams that are best able to convert CO₂ into other valuable products, such as carbon nanotubes, methanol, building materials, polymers, and plastics. Wyoming is also developing a project with Japan and Columbia University to convert CO₂ into calcium carbonate.

While developing high-tech products capture the imagination, the reality is we will require a wide array of options, including enhanced oil recovery and geologic sequestration. EOR is an attractive early option, due to the fact that it produces revenue and can help with the economics until capture costs are reduced in future years.

On the utilization side, the market for carbon nanotubes is small, whereas, concrete is immense but a lower value product. Determining how to best manage carbon is a large puzzle of factors, including geology, markets for products, and pipeline infrastructure. If the U.S. is going to permanently sequester CO₂, the country will need a massive expansion of pipelines to carry the carbon from places it is produced to the places it can be used.

For example, there is an extraordinary amount of CO₂ produced by Midwestern ethanol facilities. However, they are located hundreds of miles from places with the right geology for permanent storage for EOR and no pipeline exists in the Midwest. The current CO₂ pipeline network is about 5,000 miles of fragmented lines, compared to the current natural gas pipeline network, which is 60 times larger, about 300,000 miles. We will need a comparable network of CO₂ pipelines to move carbon from sources to sinks.

Further complicating pipeline buildout is many of the places with the best geology have a Federal lands nexus, which triggers National Environmental Policy Act reviews. A typical project with mixed Federal, State, and privately-owned lands may require upwards of 30 reviews, permits, and approvals from various regu-

latory bodies. If it crosses multiple states, this number increases accordingly.

NEPA analyses were historically completed in relatively short timeframes. Unfortunately, they have evolved in such a way that they may take upwards of a decade and tens of millions of dollars to complete. The NEPA analysis and permitting for a wind farm in Wyoming and accompanying multi-State transmission line has cost over \$200 million and has taken ten years.

In Wyoming, a right-of-way application for a 200-mile CO₂ pipeline project was submitted in February 2013. Six years later, in February of 2019, they finally received the Record-of-Decision from the Bureau of Land Management. Delays such as these affect the economics and viability of projects, not to mention the lost years of carbon reductions.

In an attempt to expedite the development of pipeline infrastructure, Wyoming launched the Wyoming Pipeline Corridor Initiative. This effort has identified the areas best suited to site projects, ideally near existing infrastructure and away from environmentally sensitive areas and critical wildlife habitats. In December 2019, the BLM closed a comment period on the proposal. We hope this initiative can shave years off the permitting process.

Oftentimes, we focus on the various pieces of carbon management and do not consider the entire system and necessary links to make it a reality. H.R. 1166 is very important to that effort, as it provides both critical fundings for the utilization of technologies and a mechanism to accelerate the construction of the CO₂ pipeline infrastructure that will be necessary.

I appreciate the opportunity to speak with you today and will gladly answer any questions.

[The prepared statement of Mr. Begger follows:]

**Written Testimony Submitted to the United States House of Representatives Committee on Energy
and Commerce Subcommittee on Environment and Climate Change**

“Clearing the Air: Legislation to Promote Carbon Capture, Utilization and Storage”

Submitted by Jason Begger, Executive Director, Wyoming Infrastructure Authority, February 6, 2020

Mr. Chairman, members of the Subcommittee, I appreciate the opportunity to speak to you today. My name is Jason Begger and I am the Executive Director of the Wyoming Infrastructure Authority. The WIA is a state instrumentality created by the Wyoming Legislature in 2004 to promote and assist in the development of energy infrastructure. Under our legislative authority, we work to construct electrical transmission lines, advanced generation facilities and energy export terminals. We also have the ability to issue up to \$1 billion in industrial revenue bonds to assist with project financing.

WIA’s largest current project is the Wyoming Integrated Test Center, which is a private/public partnership between the State of Wyoming, Basin Electric Power Cooperative, Tri-State Transmission and Generation Association and the National Rural Electric Cooperatives Association (NRECA). We have also received various in-kind contributions from Black Hills Energy and Rocky Mountain Power.

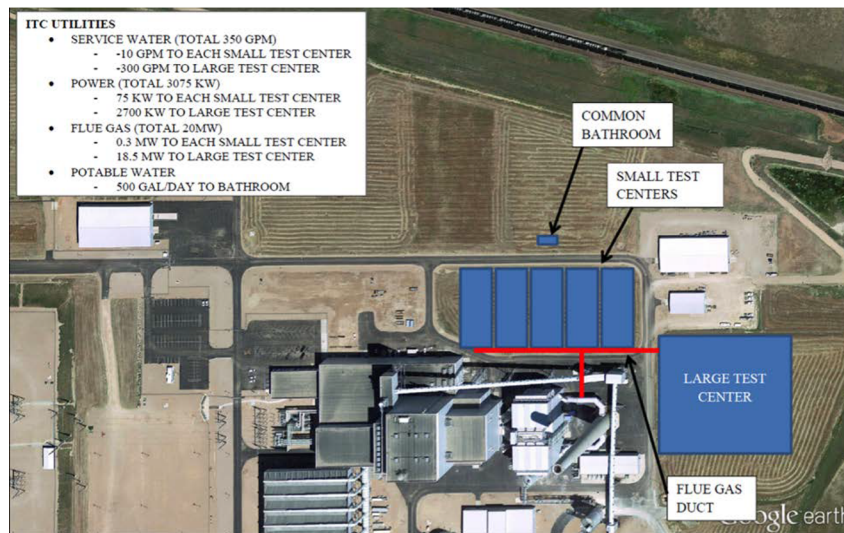
We have raised \$21 million in funding, \$15 million from the State of Wyoming, \$5 million from Tri-State G&T, and \$1 million from NRECA. \$14.9 million has been budgeted for capital construction and approximately \$500,000 for annual operating costs, providing us with the resources to construct and operate the ITC for a number of years. While we believe there is an important role for the Federal Government to play in advancing technology and we would welcome such a partnership, not one cent of federal funding has been utilized at the ITC.

The ITC is a post-combustion, flue gas research facility located at Basin Electric’s Dry Fork Power Station near Gillette, Wyoming. It will be the largest facility of its kind in the United States, delivering up to 20 MW worth of scrubbed flue gas to researchers testing CCUS technologies. The power plant will provide flue gas to five small research bays, each capable of hosting tests up to 0.4 MW and a large test bay that can host two demonstration projects with a cumulative total of 18 MW. It is the largest facility of its kind in the United States, providing much needed scale-up space to better learn how to reduce the costs and find new methods of capture and manage the CO₂ afterwards.

Given fossil energy’s prominent role in the Wyoming, investment in carbon control technologies by Wyoming may seem unusual, but it all stems from Governor Mark Gordon’s directive to move beyond the political rhetoric surrounding climate change science and focus on discovering technology solutions to ensure the long-term economic viability of Wyoming’s fossil energy resources. The ITC is just one of a number of Wyoming programs aimed at commercializing next generation energy technologies. The University of Wyoming School of Energy Resources works on small scale, academic research; the Wyoming Pipeline Corridor Initiative is working to pre-permit corridors for CO₂ pipelines; the Wyoming Enhanced Oil Recovery Institute researches the reservoir geology and is identifying carbon sinks for EOR

opportunities and the Carbon Management Institute has active grants with the Department of Energy to study permanent geologic sequestration.

The one constant variable for all of these state entities is a push to commercialization. Every project needs to continuously track costs and economics, because without a demonstrable path to commercialization, all you have is an interesting idea. Strong partnerships with the private sector, especially those industries that would ultimately be a customer of the technology, helps ensure our research objectives are aligned with their economic needs. A great example of how this has been successful for Wyoming is the ITC Technical Advisory Committee. This committee is comprised of representatives from major utilities who are involved in the technology evaluation processes for their various companies. If a utility does not see a particular technology as something they would employ, it is not given priority.



One of the most exciting partnerships we've developed is with the XPRIZE Foundation. XPRIZE organizes and administers competitions looking to solve complex engineering challenges. One of the best-known XPRIZE competitions was the Ansari XPRIZE, which awarded the first team to fly three people to space and back twice within 14 days.

The NRG COSIA Carbon XPRIZE, which will award \$20 million in prizes to the teams that are best able to convert CO₂ into other valuable products such as carbon nanotubes, methanol, building materials, polymers and plastics. Wyoming is also developing a project with Japan and Columbia University to convert CO₂ into calcium carbonate.

Yes, today's CCUS technology is expensive and still evolving, but as we know, technology gets better and less expensive over time. We need to begin to think about energy technology as we

do with the technologies we utilize and take for granted every day and recognize the important contributions early government support provided to make them reality. Touch screen glass, which is a staple of today's smart phones, was developed in the United Kingdom funded Royal Radar Establishment in the 1960's for air traffic control use. GPS, canned food, microwave ovens, the internet, microchips, vaccines and nylon are items all developed by federal research.

Stable, predictable and adequate funding is necessary to commercialize these technologies. Technology is apolitical and the U.S. can make its greatest impact by investing in technology development that can be utilized around the world. There is considerable debate over the future of fossil energy within the United States. However, every credible energy analysis from the UN Intergovernmental Panel on Climate Change to DOE acknowledges large amounts of coal will be used globally for the foreseeable future. Technology is the best way to ensure these countries have access to power, yet can meet environmental goals.

While developing high-tech products capture the imagination, the reality is we require a wide array of options, including enhanced oil recovery (EOR) and geologic sequestration. EOR is an attractive early option due to the fact it produces revenue and can help with the economics until capture costs are reduced in future years. On the utilization side, the market for carbon nanotubes is small, whereas concrete is immense, but a lower value product. Determining how to best manage carbon is a large puzzle of factors including geology, markets for products and pipeline infrastructure.

If the U.S. is going to permanently sequester CO₂, the country will need a massive expansion of pipelines to carry carbon from the places it's produced to the places it can be used. For example, there is an extraordinary amount of CO₂ produced by Midwestern ethanol facilities. However, they are located hundreds of miles from places with the right geology for permanent storage or EOR and no CO₂ pipelines exist in the Midwest.

The current CO₂ pipeline network is about 5,000 miles of fragmented lines, linking mostly natural CO₂ sources with EOR operations. To compare, the current natural gas pipeline network is 60 times larger, about 300,000 miles. We will need to see a comparable network of CO₂ pipelines in order to move carbon from sources to sinks.

Further complicating pipeline buildout is many of the places with the best geology have a federal lands nexus, triggering a National Environmental Policy Act (NEPA) review. A typical project, with mixed federal, state, and privately owned lands may require upwards of 30 reviews, permits, and approvals from federal, state, and local authorities. If it were to cross multiple states, this number increases accordingly.

NEPA analyses historically were completed in relatively short timeframes. Unfortunately, they have evolved in such a way that they may now take upwards of a decade and tens of millions of dollars to complete. The NEPA analysis and permitting for a wind farm in Wyoming and accompanying multi-state transmission line has cost over \$200 million and has taken over 10-years.

In Wyoming, a right-of-way application for a 200-mile CO₂ pipeline project was submitted in February 2013. Six years later, in February 2019, they finally received a Record-of-Decision from the Bureau of Land Management. Delays such as these affect the economics and viability of projects, not to mention the lost years of carbon reductions.

In an attempt to expedite the development of pipeline infrastructure, Wyoming launched the Wyoming Pipeline Corridor Initiative. This effort has identified the areas best suited to site projects, ideally near existing infrastructure and away from environmentally sensitive areas and critical wildlife habitat. The State has worked with federal land management agencies to include pipeline corridors in management plans and in December 2019, the BLM closed a comment period on the proposal. We hope this initiative can shave years off the permitting process.

Oftentimes we focus on the various pieces of carbon management and do not consider the entire system and necessary links to make it a reality. H.R. 1166 is very important to that effort as it provides both critical funding for utilization technologies and a mechanism to accelerate the construction of CO₂ pipeline infrastructure.

I appreciate the opportunity to speak with you today and will gladly answer any questions. Thank you.

Mr. TONKO. Thank you, Mr. Begger.

Dr. Harmon, you are now recognized for 5 minutes, please.

Your mike, please.

STATEMENT OF LAUREL HARMON, PhD.

Dr. HARMON. I just wanted to thank you, Chairman, Ranking Member, and members of the committee. On behalf of LanzaTech, for whom I am the Vice President of Government Relations, I am here to share our story of carbon capture and utilization to, I hope, explain to you that this is, in fact important, real, and accessible today and, at the same time, share, through our experience, why the research and development provisions in CCU that are in the USE IT Act are so important to advance the technology.

Carbon capture and utilization is an approach which will actually take carbon, which currently looks like an environmental liability, and turns it into an economic opportunity, creating jobs and creating new sustainable products.

LanzaTech was actually founded with the vision that carbon needs to be treated as a resource and that we need to find ways to reuse all carbon that has already served a function and turn it into products which then can supplement, replace those products which we currently rely on from petroleum and other virgin fossil sources. In particular, as we look ahead to a decarbonized world, we will need carbon-dense fuels for aviation. We will continue to need materials from—that are carbon-based materials.

So we are a biotech company. We are located in Skokie, Illinois, where we have about 130 people in Representative Schakowsky's district. We certainly appreciate the support we have gotten over the years. We are privately held. We have raised over \$340 million of capital from diverse global investors, all of whom see the value of CCU.

And in particular, I would like to emphasize that we are a technology—

Mr. TONKO. Dr. Harmon, I hate to interrupt you. Can you move the mike just a bit—

Dr. HARMON. Certainly.

Mr. TONKO [continue]. Because it is not recording on—OK. Thank you.

Dr. HARMON. Is that better?

We, as a technology-licensed—

Mr. SHIMKUS. But you need to mention Schakowsky's name one more time so it really gets out there.

Dr. HARMON. OK, I will say that very loudly.

So as a technology-licensor, the capital that we have raised has all been for the purposes of technology development and the technology is now being implemented throughout the world.

Our focus is on industrial carbon capture and utilization and our first target is in the steel sector. Our technology uses an ancient biological pathway in which microbes actually consume CO₂ instead of sugars in a fermentation that then produces ethanol, produces other chemicals, and we have platforms and partnerships to take our fermentation products and turn them into aviation fuel, into chemicals, and into, ultimately, textiles and other types of durable goods.

An important element, if we are looking at steel emissions, is that the steel sector produces emissions that are very highly concentrated in carbon monoxide. And in fact, carbon monoxide is the primary thing which our fermentation uses as its feedstock. And, therefore, it is very important, when we think about utilization at large and, in fact, for USE IT, that the utilization provisions extend not only to CO₂ but to carbon monoxide, in the form of carbon oxides, as expressed in 45Q.

I would like to share that our technology is gas fermentation technology, which I have written about more in the written testimony, is, in fact operating commercially, directly producing ethanol from steel mill emissions. And we have taken the ethanol produced from steel mill emissions and produced jet fuel, which has been used in both a transpacific and a transatlantic flight.

When we think about ethanol as a platform, it is suitable as a pathway to plastics, to the types of fuels that I mentioned but, in addition, technology such as ours can directly produce chemical intermediates that end up on coatings, in plastics, in jackets that people wear, or in yoga pants.

And so in closing, I would like to emphasize that the journey from an idea and a new technology to a commercial plant operating in the real world has taken 14 years and significant investment. And therefore, the investment in R&D represented by USE IT is extremely important to advance this industry.

So thank you, and I appreciate the opportunity, and look forward to any questions. [The prepared statement of Dr. Harmon follows:]

Opportunities for
Industrial Carbon Capture and Utilization

Statement of:

Dr Laurel Harmon (PhD)

Vice President Government Relations, LanzaTech Inc.

Before the

Committee on Energy and Commerce

Subcommittee on Environment and Climate Change

U.S. House of Representatives

February 6, 2020

Chairman Tonko, Ranking Member Shimkus, members of the committee, thank you for the opportunity to testify before you today on the USEIT Act, a bill that will advance capture and utilization of carbon into products that create value and economic opportunity. On behalf of LanzaTech, Inc., I welcome this chance to share our experience in developing and commercializing an industrial carbon capture and utilization (CCU) technology that is in commercial operation today. Industrial CCU represents an important new strategy for carbon mitigation that reduces emissions from manufacturing while substituting recycled carbon for fresh fossil resources in new products. I hope that our experience shines a light on both the opportunities and challenges for developing and scaling new CCU technologies and, in doing so, explains our support for the USEIT Act.

LanzaTech, Inc. is a biotechnology company, headquartered at the Illinois Science + Technology Park (ISTP) in Skokie, Illinois, where we employ a staff of nearly 130 highly trained scientists, engineers, and business professionals. We also have technology scale up operations at our Freedom Pines Biorefinery in Soperton, Georgia, where we have grown from a handful of staff to roughly 30. Additional staff are located at customer support offices in Europe, China, India.

The company is privately held and has to-date raised over \$340 million dollars from a diverse global investor pool to develop, scale up, and commercialize a complete biological CCU platform based on the fermentation of gases. Our headquarters houses the world-leading laboratories and unique experimental capabilities necessary to continue developing and demonstrating the biological CCU technologies which we then license to customers for deployment. Our Freedom Pines Biorefinery in Georgia is the site of our field pilot units and will host the precommercial demonstration of a second technology that produces jet fuel from ethanol, in design today. The company is in an active growth phase in the process of doubling the size of our headquarters, where we have added nearly 25 full-time staff just over the past 6 months.

Although we do not necessarily think of it this way, nature actually provides role models for CCU in biology. After all, plants and trees constantly capture and reuse carbon to make biomass. However they take up carbon only in the form of CO₂ and only after the carbon has already been emitted to

the atmosphere. LanzaTech was founded to exploit a different form of biological CCU – gas fermentation. LanzaTech's gas fermentation platform harnesses biology to capture waste carbon from industry, before it is emitted to the atmosphere, and to make new products in addition to biomass.

At the heart of industrial gas fermentation is an ancient biological pathway that allows certain microbes to get all their carbon and energy from gases, rather than the sugars or starches used in conventional fermentation. This ancient biology allows microbes to live on gases containing carbon monoxide (CO) and carbon dioxide (CO₂) – collectively referred to as "carbon oxides". In fact, they can live on CO alone, which is a major component of industrial emissions, including steelmaking. By this means, gas fermentation enables the continuous production of fuels and chemicals from industrial waste gases, simultaneously mitigating carbon emissions and creating products.

As I will describe later, LanzaTech has taken the first instance of gas fermentation, ethanol production from steel mill emissions, through to commercialization. While this has established the viability and near-term potential of industrial CCU, it took nearly 14 years to achieve, with multiple stages of scale up from the lab through pre-commercial demonstrations and increasing capital requirements at each stage. Since the field overall is at a relatively early stage, major investments in research, development, scale up and deployment will be required to realize the full carbon mitigation benefits of industrial CCU. Therefore, we are tremendously pleased with the commitment to research and development on CCU technologies in the USEIT Act. We also advise that application of CCU to major emitters in the industrial sector, such as steelmaking, requires that the research and development provision of the USEIT Act encompass utilization of carbon oxides, consistent with the utilization component of 45Q, rather than CO₂ alone.

By way of background, the CO from steel mills is an unavoidable byproduct of steelmaking chemistry, in which carbon is used to reduce iron ore. Because this CO cannot be released directly into the atmosphere due to its toxicity, it is inevitably combusted and instead released as CO₂. Industrial CCU captures the CO before it is combusted, preventing its release (and reducing criteria pollutants). In our process, microbes then consume the CO, along with any hydrogen and CO₂ that may be present, and through their own metabolism synthesize ethanol or other products. The microbes performing carbon capture are themselves a valuable protein rich nutrient source and can be converted to nutritional feed once spent.

The initial application of LanzaTech's CCU technology is in the steel sector, producing ethanol from steel mill emissions. The first commercial plant was commissioned in China in 2018. To date this plant has produced over 12 million gallons of low carbon ethanol from steel mill waste gases, equivalent to avoiding emissions of 60,000 tons of CO₂. Further commercial plants are in design or under construction around the world, using gases from steel mills, ferroalloy plants, and refineries, as well as gasified biomass and municipal waste.

In addition to its use in road transport, ethanol from industrial CCU can be converted to plastics, or turned into jet fuel. These downstream markets enable continued growth of ethanol production from industrial CCU or other any other process, independent of future demand for cars and the "blend wall". LanzaTech is itself commercializing technology that converts ethanol to sustainable aviation fuel, which is of strategic importance to US airlines for meeting their commitments and international obligations to reduce emissions. This Alcohol-to-Jet technology originated in the Department of Energy's Pacific Northwest National Laboratory and was scaled up by LanzaTech at our Georgia facility, with support from the Department of Energy. LanzaTech has converted ethanol from steel mill emissions into aviation fuel that powered a commercial Boeing 747 flight from Florida to London in October of 2018, the first flight ever to use CCU fuel. Last October, the fuel was

used in the delivery flight of a brand new All Nippon Airways (ANA) Boeing 777-300ER commercial passenger aircraft from Boeing field in Everett, Washington to Japan.

In partnerships with other companies, LanzaTech is also investigating ways to convert CO₂ into chemicals and fuels by combining electrochemistry with our gas fermentation. Through electrochemistry, CO₂ can be converted to CO and fed into LanzaTech's existing gas fermentation process. This will broaden the commercial applications of gas fermentation to CO₂ sources that do not contain CO, such as waste gases from corn ethanol fermentation and, ultimately, CO₂ from Direct Air Capture.

Industrial CCU has the potential to create jobs and increase revenues in America's steel and other manufacturing sectors. Using industrial CCU to produce ethanol or sustainable aviation fuel can expand the pool of Advanced Biofuels or serve chemical and material markets, increasing energy security without additional pressure on land, water, or biodiversity. At least 33 ethanol plants, producing over 1 Billion gallons of Advanced Biofuel, could be built in states such as Indiana, Ohio, Illinois, Michigan, California, Texas, and Louisiana using only 60% of suitable waste gases. Each would create over 1000 jobs during construction and 240 during operation (direct, indirect and induced)¹. Combined, these plants would add \$660M annually to local economies. Productive utilization of steel waste gases also benefits the U.S. coal sector, which supplies metallurgical coke for steelmaking.

To expand our product portfolio, LanzaTech has pioneered the development of a full industrial microbiology capability for gas fermenting organisms, which enables production of high value chemical intermediates used to make materials such as acrylics, fibers, plastics, and synthetic rubber. In fact, LanzaTech has demonstrated the production of over 50 valuable chemical intermediates from gas streams in the laboratory. In the future, once fully developed, these new microbes can be dropped into an existing industrial gas fermentation facility to make a new product, in many cases leading to carbon capture and sequestration in durable goods.

In the future, industrial CCU has the potential to mitigate emissions across a wide range of sectors and produce low carbon products serving a wide range of markets. Examples of other products that will be accessible through industrial CCU include:

- Transportation
 - Fuel Ethanol, Diesel, Jet, novel fuel blend components
- Materials (Commodity chemicals)
 - Textiles, Plastics, Rubber
- Household (Solvents, Specialty chemicals, Industrial Enzymes)
 - Detergents, Cleaners, Fragrances, Cosmetics, Coatings, Colors, Dyes, etc
- Nutrition (Proteins, Vitamins, Amino Acids)
 - Synthetic proteins, Sweeteners, Amino acids, Omega-3's, Flavors (e.g. Vanilla), Fish/Animal Feed

In summary, LanzaTech represents only one of many potential platforms for industrial CCU, which can transform the way we think about industrial emissions. Instead of an environmental liability, they become resources for making valuable products, simultaneously preventing emissions from

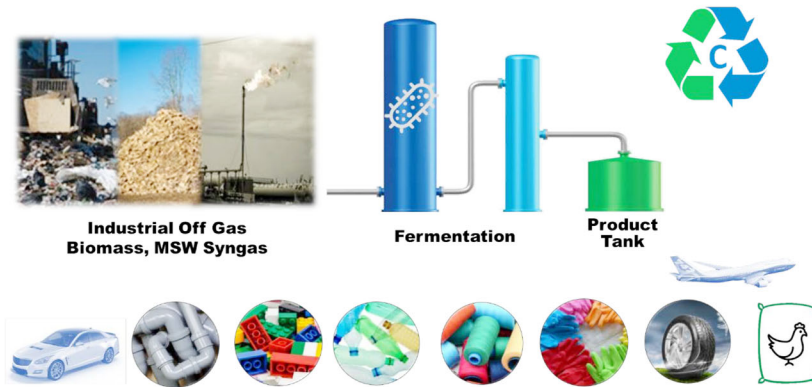
¹ Jobs impact estimated using multipliers for construction and chemical manufacturing from <https://www.epi.org/publication/updated-employment-multipliers-for-the-u-s-economy/>.

industry and reducing demand for fresh fossil feedstocks. The USEIT Act's investment in research and development that specifically focuses on carbon capture and utilization is a significant step in advancing this tremendously important avenue for mitigating carbon emissions from the industrial sector.

In closing, I would like also to acknowledge the many ways that LanzaTech has benefited from numerous partnerships with Federal agencies since 2010, including DOE, ARPA-E, DARPA and FAA. These partnerships have been instrumental in allowing us to develop the fundamental knowledge of our microbe and the gas fermentation process, tools for high throughput modification of our industrial microbe, and pathways to new products including the Alcohol to Jet technology.

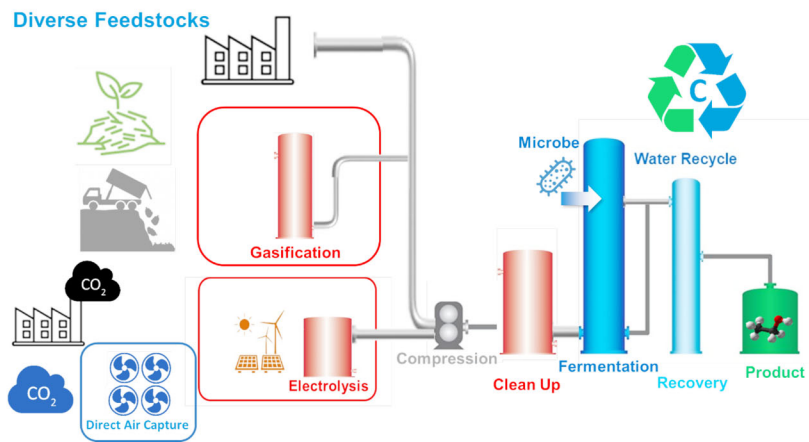
Thank you again for the opportunity to testify today and for your kind attention.

Recycling Carbon

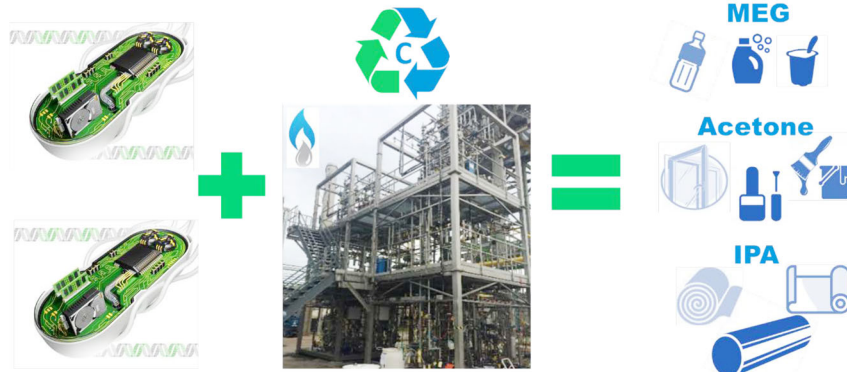


Recycling Gases: Environmental, Economic, Social Benefits





Direct Production of Chemicals from Recycled Carbon



Direct Production Reduces Costs & Footprint

Putting Carbon in the Circular Economy



Mr. TONKO. Thank you so much, Dr. Harmon.

And now, Mr. Anderson, you are recognized for 5 minutes, please.

STATEMENT OF LEE ANDERSON

Mr. ANDERSON. Thank you, Chairman Tonko, Ranking Member Shimkus, and distinguished members of the subcommittee. My name is Lee Anderson and I am the Government Affairs Director for the Utility Workers Union of America.

The Utility Workers Union represents around 50,000 workers in the electric, gas, nuclear, and water utility sectors. It is a truism, at this point, that the manner in which the world generates electricity is evolving rapidly. The Utility Workers recognize that this change is being driven by economics, by the recognition that global climate change is happening, and that it is the result of manmade carbon emissions.

That point is clear. The need to manage carbon emissions at scale globally is urgent. We must decarbonize our economy; however, we must do so in a manner that does not crash local and regional economies. To date, however, change has been occurring randomly, even chaotically, in the absence of a comprehensive plan for how to curb emissions without disrupting our economy.

The closure of a power plant means the loss of many hundreds of jobs for working people directly employed in the operation and maintenance of these large facilities. As these plants are often situated in areas that make them the best source of high-quality employment for many miles around, the challenges these workers often face in seeking new equivalent employment can range from difficult to nearly insurmountable. This is why we will continue to fight for the survival of all of our facilities, the employment of workers, and the stability of their communities wherever we see hope for the future, particularly through the use of science.

Technology enabling the decarbonization of power plants holds the potential to change the economics of a facility, enabling it to compete with other generation options and the opportunity for these workforces to make their contribution in the fight against global climate change, all while preserving the culture and social fabric of families, communities, and way of life that, once lost, can never be replaced. This is the simple reason why we support the USE IT Act.

Policy choices, or the lack thereof, have very real human consequences. Using public policy to advance research and development on carbon capture technology will make it easier and cheaper to build these systems at scale. Moving the science through successive generations, driving down costs, innovating ever-better approaches to the problem of carbon emissions, all this adds up to a greater ability to operate power plants as cleanly and efficiently as possible and retain them for what they are—critical infrastructure, providing an essential public service and anchor institutions that underpin the lives of workers, their families, and their communities.

Indeed, the follow-on effects to communities, with the loss of many thousands of jobs indirectly supported by these plants, the shuttering of small businesses dependent on the middle-class work-

ers in the power sector as their customers, as well as the impact on town and county budgets after the loss of significant portions of their annual tax revenues due to the closer of these large plants, have all too often added up to a landscape of cultural and personal destruction.

For our members, then, the best outcome will always be to keep their families and communities intact but this outcome requires retaining the economic anchors that make that possible. When facilities close, very soon families disperse, towns haul out, and what is left behind are empty desks in the schools, empty pews in the churches, and empty coffers in local government budgets.

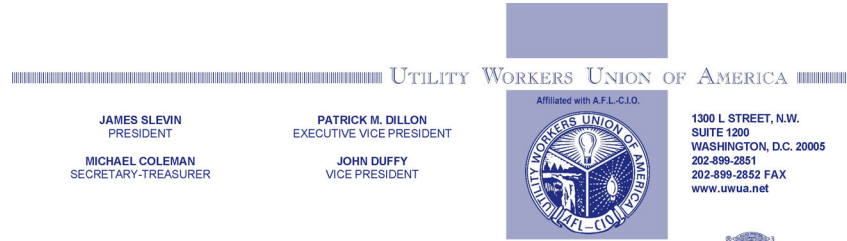
Although we also call on policy leaders to develop a system that addresses the needs of workers and communities in the aftermath of plant closures, the reality is that this remains almost entirely in the realm of the hypothetical, one that is meaningless for those who have already lost their jobs, and for those who will continue to do so, unless we can harness technology to retain the assets that make these jobs possible in the first place.

Without this ability, workers with few or no easy alternatives will continue to be left behind. Personal calamity, whether due to divorce, bankruptcy, substance abuse, or simply the Diaspora of families and the economic, social, and physical collapse of communities, will continue to occur time and again as deindustrialization continues to play out across the U.S.

In summary then, we believe the USE IT Act will promote the use of technology that can create a cleaner environment, create and retain family-supporting and community-supporting jobs, and preserve American communities anchored by the energy industry.

Thank you for the opportunity to be a part of today's proceedings. I look forward to answering your questions.

[The prepared statement of Mr. Anderson follows:]



WRITTEN TESTIMONY

Lee Anderson
Government Affairs Director, Utility Workers Union of America
Before the 116th Congress, House Committee on Energy and Commerce
Subcommittee on Environment and Climate Change
Consideration of H.R. 1166, the Utilizing Significant Emissions with Innovative Technologies Act
Rayburn House Office Building, Room 2123
Thursday, February 6, 2020

Thank you, Chairman Tonko, Ranking Member Shimkus, and distinguished members of the subcommittee. My name is Lee Anderson, and I am the Government Affairs Director for the Utility Workers Union of America, AFL-CIO (UWUA). The Utility Workers Union represents around 50,000 workers in the electric, gas, nuclear and water utility sectors. Our members operate utility infrastructure throughout the United States.

In the power sector specifically, our members maintain electric generation assets including nuclear, coal, natural gas, and liquid-fueled powerplants, as well as utility scale wind farms, solar arrays, and energy storage facilities including those based on both battery and pumped hydrologic technologies. Outside of generation, our members maintain the grid including substation operations, above and below-ground line crews, and even tree-trimming crews. There is not an aspect of power generation, transmission, and distribution which Utility Workers do not have a hand in maintaining and operating. Our members have proudly kept the lights on in America since the early part of the 20th Century.

It is a truism at this point that the manner in which the United States and, indeed, the world, generates electricity is evolving rapidly.

Let me also be clear in stating the Utility Workers Union recognizes global climate change is happening, and that it is the result of man-made carbon emissions. Our union is made up of highly skilled, technically minded people whose every day work involves thinking like an engineer, a mechanic, a scientist.

We understand perfectly well the science behind the crisis facing humanity and, in seeking solutions, we again look to the science. We ask, how do we engineer our way through this challenge not how do we argue or vote our way out of this. In answering this question, there are both opportunities, and challenges, in the power sector.

Cleaner Powerplants Can Save Communities

One point is clear - the need to manage carbon emissions at scale, globally, is urgent. We must decarbonize our economy but, we must do so in a manner that does not crash local and regional economies. For many years, change has been occurring as energy generation assets of various types have been removed or added to the grid, both here in the U.S. and globally, leading to both reductions and increases in carbon emissions – changes that

occur almost randomly in the absence of a comprehensive, technology-based engineering plan for how to curb emissions overall.

As our union's members have witnessed in many communities, the closure of a powerplant means the loss of many hundreds of jobs for working people directly employed in the operation and maintenance of these large facilities. Recognizing that power plants are often situated in areas that make them the best source of high-quality employment for many miles around, the challenges these workers often face in seeking new, equivalent employment can range from difficult to nearly insurmountable, as was experienced by our members most recently at UWUA Local 175 in southern Ohio who experienced the simultaneous closure of two powerplants in one county.ⁱ

Of course, the follow-on effects to the communities, with the loss of many thousands of jobs indirectly supported by these plants, the shuttering of small businesses dependent on the middle-class workers in the power sector as their customers, as well as the impact on town and county budgets after the loss of significant portions of their annual tax revenues due to the closure of these large plants have all added up to a landscape of cultural and personal destruction. Too often, the culmination of these effects leads to real tragedy due to the ever-growing misuse of prescription medications, and the spreading pandemic of substance abuse so commonly found in many of these devastated areas, particularly across the industrial Midwest and Appalachia.

This is why, at the UWUA, we will continue to fight for the survival of all our facilities, the employment of workers, and the stability of communities wherever we see hope for the future, particularly through science. Technology enabling the large-scale decarbonization of coal-fired powerplants holds the potential to change the economics of coal, enabling it to compete with other, currently less-expensive fuel options, and the opportunity for these workforces to make their contribution in the fight against global climate change, all while preserving the culture and social fabric of families and communities, their schools, churches, and way of life that, once lost, can never be replaced.

Unfortunately, although our Union has advocated for many years for national policy to assist workers, their families, and their communities in navigating the changes happening in the energy industry, to date very little has been done at either the national or state level. Overwhelmingly, change has simply meant one catastrophic event after another played out at the human level in community after community as people are forced to deal with the loss of some of the highest quality jobs in the national economy.

Although we will continue to call on policy leaders to work towards a system that addresses the needs of workers and communities in the aftermath of plant closures, the reality is that this remains almost entirely a hypothetical, one that is meaningless for those who have already lost their jobs, and for those who will continue to do so unless we can harness technology to retain the assets that make these jobs possible.

In the meantime, workers with few or no easy alternatives continue to be left behind. Personal calamity, whether due to divorce, bankruptcy, substance abuse, or simply the diaspora of families and the economic, social, and physical collapse of communities has occurred time and again as deindustrialization has played out across the U.S. That a lowered life expectancy in the U.S., and the rise of 'deaths of despair' has come to seem normal speaks volumes regarding the current failure of public policy to manage changes in the economy. We choose instead to live at the mercy of 'creative destruction' – an impersonal force that is certainly destructive but is no way creative.

For the UWUA as a Union, our number one priority is the representation and well-being of our members, members who enjoy a solid, middle-class lifestyle because of the work the UWUA has done for many decades to craft the agreements with employers that make that possible. The middle class did not come into being by accident, it was created and grown by the labor movement over the course of the last century, a process that continues to this day.

For our members the best outcome will always be to keep their families and communities intact but, this outcome requires retaining the anchor institutions – in our case powerplants – that make that possible. When facilities close, very soon families disperse, towns hollow out and what's left behind are empty desks in the schools, empty pews in the churches, and empty coffers in local government budgets.

What this means for our members, then, is that utilizing carbon capture technology can change not only the chemical profile of a powerplant, but also its economics, and can change a waste product – carbon dioxide – into a valuable commodity that can help stabilize a facility and, by extension, its workforce, their families, and their communities. Alternatives that could come into play after a facility closure, assuming public policy were to actually be created, while at least theoretically important, will never serve to prevent all of the economic and social unraveling that happens in the wake of mass job loss.

Addressing Global Climate Issues Requires Engineering Solutions

For our union, the polestar in understanding the science of climate change, and the appropriate response to it, is the Intergovernmental Panel on Climate Change (IPCC).ⁱⁱ Bringing together the world's leading climate scientists to understand the problem, and the necessary responses, reflects our approach to day-to-day power sector work and seems the obvious starting point.

Unfortunately, after three years of relatively little change, global carbon emissions grew last year, reaching an all-time high of 600 million tonsⁱⁱⁱ evidence that old philosophies grounded in reducing carbon emissions to zero have failed in a big way. As a result, a mainstream consensus is growing that a new approach, one that adopts a *net* zero emissions philosophy is needed. Human civilization is deeply complex and will always have a carbon cost, no matter our best intentions. Accepting this truth about the world as it is, not as we wish it to be, acknowledges that carbon emissions will continue to happen, but that a variety of low-carbon power generation, carbon reduction, and carbon removal strategies will be needed to compensate for them as an engineering, not political proposition.

This crucial course averts the worst-case climate change scenarios, based on actual climate science. Equally as important, it gets us out of the zero-sum thinking inherent in imagining a world without carbon emissions at all. To get there, particularly in achievable timeframes, an engineered mix of carbon capture technology, nuclear power, renewable energy, energy efficiency, and energy storage options would all play a role in achieving net zero emissions. That is the science – getting to net zero will require a role for all technologies and saying otherwise is simply climate science denial.

USE IT Moves Carbon Capture Forward

As we see, the emerging 'carbontech' sector is developing and deploying technologies that capture carbon emissions from industrial and power plant sources, as well as through direct air capture, and convert them into useful materials and products. By leveraging technological innovation and market forces, carbontech can play a significant role in the deployment of carbon capture and removal technologies and in decarbonization generally.

Building on recent landmark reform of the federal 45Q tax credit to incentivize deployment of carbon capture technology, the USE IT Act will foster continued development and deployment of carbon capture by authorizing the EPA Administrator to coordinate with the Secretary of Energy on furthering research, development and demonstration of carbon utilization and direct air capture technologies. The bill would also support collaboration between federal, state and non-governmental interests to facilitate planning and deployment of pipelines to transport CO₂ for ultimate storage or beneficial use.

With passage of the USE IT Act, we can help to advance next generation carbon capture and utilization technologies to transform CO₂ into a beneficial resource and economic opportunity while reducing emissions and – crucially – creating and preserving American jobs, working families, and their communities.

In order to make this work, industry will have to build new pipelines, or extend already existing pipelines to transport carbon dioxide from where it is captured to where it may be stored or used. The existing network of CO₂ pipelines – some 5,000 miles – is simply not enough. We need more pipelines to transport CO₂ to oil fields and to other locations for storage and utilization purposes. The economic incentive to build at the scale required – certainly in the early going – would come from additional oil production via Enhanced Oil Recovery (EOR), a process that involves injecting CO₂ into aging oil fields to increase recovery. Thousands of jobs can be created through the construction of this infrastructure alone and the operation and maintenance of the entire system, from CO₂ production, to transport, to storage and utilization would create and preserve many thousands more.

Carbon Capture Deployment Is Just Beginning

According to the IPCC, wide-scale use of carbon capture technology is indispensable to our ability to combat a changing climate. In their reporting the IPCC has stated that less than 50 percent of their climate models can achieve a 450 ppm CO₂ target by the year 2100 without the widespread use of carbon removal technologies in power generation and industrial processes. For those models that do achieve the goal without its use, the price increases by 138 percent.^{iv} Given the number of challenges already facing us, placing yet another one in the form of an enormous price tag in the way, seems obviously counterproductive.

The emerging carbon-usage sector is developing and deploying technologies that capture carbon emissions from industrial and powerplant sources, as well as through direct air capture, and convert them into useful materials such as plastics, chemicals, cement, or jet fuel to give a few examples, or use it in processes such as enhanced oil recovery which leave the CO₂ permanently sequestered from the atmosphere. Today there are more than 300 carbon capture and storage operations globally, 53 of which are in the United States, including some of the world's most technologically innovative projects such as the Petra Nova project in Texas.^v

Other examples of the use of this technology in the U.S. include natural gas processing facilities, nitrogen fertilizer production, and even ethanol production. In the power sector, a prominent example of decarbonization is at the Boundary Dam facility in Saskatchewan, Canada, a retrofit of a coal-fired unit that today captures up to one million tons of carbon dioxide per year.^{vi} In New Mexico, plans are in motion to retrofit the San Juan Generating Station in Farmington with carbon capture technology to remove up to 90 percent of its carbon emissions and extend the life of the facility beyond its previously announced 2022 closure date.^{vii} If completed, this would not only reduce emissions, but also preserve thousands of local jobs and an almost existential source of tax revenue for the local communities.

In North Dakota, the Project Tundra initiative aims to build the world's largest carbon capture facility at the Milton R. Young Station, operated by the Minnkota Power Cooperative to capture 90 percent of the carbon emissions from the Station's Unit 2 generator and permanently sequester it in a geologic formation more than a mile underground.^{viii} The technology is real and, in some applications in the energy industry has been in large-scale use since the 1970s.

Some of our own union members in three coal-fired powerplants in Wyoming have witnessed growing interest in their facilities from the petroleum industry who view them as potential sources of carbon dioxide for use in the state's energy production.^{ix} Though closure dates have been announced for some – though not all – units over the next 10 years,^x building a project there that harnessed what is otherwise a waste product could not only change the emissions profile of a given plant, it could change its economics by monetizing the carbon dioxide, alter its role in overall energy production, and keep it in operation. For our members whose livelihoods and

rural communities depend on the high-quality jobs and tax revenue from these facilities, such a change could potentially preserve their entire way of life.^{xj}

Direct Air Capture

There are deeper opportunities in the power sector, however, not just to remove carbon from current processes of power generation but also to use power generation to drive technologies necessary to actively remove existing carbon dioxide from the atmosphere. Known as direct air capture, this technology extracts carbon directly from the air and, once captured, it can be used in manufacturing or permanently sequestered below ground just as carbon from power generation or industrial sources.

Such systems would simply be scaling up technologies already used in naval and aeronautics applications to scrub carbon dioxide from the air in submarines and spacecraft in order to prevent such closed environments from becoming toxic. The chemical process is well-known, the difference would be in scale and, in the need for the power sector to play a role in meeting the power demands of large-scale versions.

There are several advantages to this technology. First, such systems can literally be placed anywhere, eliminating the costs of transporting carbon dioxide and potentially providing a source for job in rural areas that have been hard hit by the loss of other industry. Second, the modular design of these systems is such that they can be gradually scaled while maintaining a relatively small physical footprint – they could even be located on former industrial sites. Third, moving companies and sectors not only to net-zero emission but all the way to net-negative emissions could be required with this type of affirmative carbon removal. Even for carbon-intensive processes, therefore, a combination of carbon capture and carbon removal technologies could wholly obviate the carbon impact of such activity.

There are currently large-scale commercial development efforts for this technology in the United States, Canada, Switzerland, the Netherlands, and Iceland.^{xii} As we build the engineering ecosystem needed to control carbon emissions, direct air capture can, and must, be considered as a part of this solution.

Conclusion

In summary, we see reason for optimism, but also reasons to be cautious. The technology already exists to retain and build-out low- or zero-carbon power generation, there is nothing which needs to be invented from scratch, only systems which need to be scaled, improved or, in some cases, simply retained. As an institution, our Union has striven to hew to the science both as to the causes of climate change and to the technologies necessary, and capable, of dealing with the challenge.

As Utility Workers, we are at the front lines of the power sector, and closest to the changes that are occurring. Like a lineman faced with a downed high voltage line, we are cautious, but prepared to step in and deal with the problem based on a clear-eyed view of the technologies involved. If done thoughtfully, reducing carbon emissions in the U.S. power sector can be an opportunity to create and retain high quality jobs, preserve communities and combat climate change.

We thank you for the opportunity to be a part of today's proceedings and look forward to working with the Committee as we move into the future.

ENDNOTES

-
- ⁱ *Forced to Choose Between a Job – and a Community*, ProPublica, May 23, 2018
<https://www.propublica.org/article/adams-county-ohio-coal-forced-to-choose-between-a-job-and-a-community>
- ⁱⁱ *Global Warming of 1.5C. An IPCC Special Report on the Impacts of Global Warming*, IPCC 2018
<https://www.ipcc.ch/sr15/>
- ⁱⁱⁱ *The Solar Singularity: 2019 Update (Part 3)*, Greentechmedia.com, May 1st 2019
<https://www.greentechmedia.com/articles/read/the-solar-singularity-2019-update-part-3#gs.95u1nh>
- ^{iv} *Synthesis Report of the IPCC Fifth Assessment: Climate Change 2014*, IPCC 2014
<https://www.ipcc.ch/report/ar5/syr/>
- ^v *Carbon Capture Projects Map*, Third Way, July 18, 2018
<https://www.thirdway.org/graphic/carbon-capture-projects-map>
- ^{vi} *Boundary Dam Power Station*, Saskpower.com, SaskPower, 2014
<https://www.saskpower.com/Our-Power-Future/Our-Electricity/Electrical-System/System-Map/Boundary-Dam-Power-Station>
- ^{vii} *New Mexico City Aims to Keep Open San Juan Coal-Fired Power Plant*, Associated Press, August 16, 2019
<https://www.slttrib.com/news/environment/2019/08/16/new-mexico-city-aims-keep/>
- ^{viii} *Project Tundra*, Minnkota Power Cooperative, 2019
<https://www.projecttundrand.com/>
- ^{ix} *PacifiCorp May Have Buyer For Its Dave Johnston Plant*, Argus Media, March 25, 2019
<https://www.argusmedia.com/en/news/1872332-pacifiCorp-may-have-buyer-for-its-dave-johnston-plant>
- ^x *PacifiCorp Details Early Bridger, Naughton Coal Closures*, WyoFile, October 3, 2019
<https://www.wyofile.com/pacifiCorp-details-early-bridger-naughton-coal-closures/>
- ^{xi} *Opinion: Energy – The FUTURE of Wyoming*, Sweetwater NOW, Chauffe Schirmer, Financial Secretary, UWUA Local 175
<https://www.sweetwaternow.com/opinion-energy-future-wyoming/>
- ^{xii} *Direct Air Capture, a Carbon180 Fact Sheet*, Carbon180, 2019
https://static1.squarespace.com/static/5b9362d89d5abb8c51d474f8/t/5c5bc23b419202c2a4d1a8f6/1549517373480/DAC+Fact+Sheet+2019_final_web.pdf

Mr. TONKO. Thank you, Mr. Anderson.

We will now move to member questions.

Before we do that, however, our technical team has asked that our guests move the microphones directly front and center, so that the recording is as crisp as it can be. So, I thank you for that.

I will now start the member questions by recognizing myself for 5 minutes and, Mr. Mackler, let's begin with you.

Last year the Bipartisan Policy Center worked with the Energy Futures Initiative looking at Federal R&D investments in carbon removal. Do you believe getting these innovative new technologies commercialized at scale requires significantly greater Federal support?

Mr. MACKLER. I think the short answer to that is yes. I think direct air capture, in terms of a Federal priority for research funding, is only just emerging now as a high-level issue. And for that reason, we actually, at the BPC, launched last year a Direct Air Capture Advisory Council to really help to make the case for a stronger, more ambitious innovation program focused on industrial direct air capture technologies.

Mr. TONKO. Thank you. And EFI also published a report, Clearing the Air, that provides a potential multiagency roadmap for Federal spending. Are you familiar with that report?

Mr. MACKLER. I am.

Mr. TONKO. That report makes the case that many agencies should have a role in carbon removal policy, which I agree with, but EFI has suggested that DOE could play a leading role in carbon removal technology R&D and suggests they should receive the most funding.

Do you believe, based on its previous CCS work, DOE has the technical expertise to lead a negative emissions technologies research agenda?

Mr. MACKLER. I do agree with that.

Mr. TONKO. And Dr. Harmon, how has LanzaTech partnered with DOE on R&D projects in the past and have they contributed to your ongoing utilization efforts?

Dr. HARMON. Absolutely. We have worked with the Department of Energy on all aspects of our technology. That includes support from RPE as to develop the technology by which our gas fermentation fundamentally operates, our bioreactor technology.

We have worked with the Department of Energy for development of pathways within our microbes to produce products. We have, through that type of support, demonstrated over 50 direct fermentation products, many of which are direct substitutes then for chemical intermediates.

And a very major piece of work, which has extended since 2012, is the development of the pathway from ethanol to aviation fuel, for which the front end is the ethanol from CCU.

Mr. TONKO. Thank you very much.

And so DOE has existing relationships with many of the stakeholders and technical expertise on CCUS, but I don't want to suggest EPA shouldn't play any role.

Mr. Mackler, I think it was clear from your testimony that BPC cares about achieving emissions reduction goals and that negative emissions be properly recognized. For the credibility and, poten-

tially, compensation of these projects, whether they are technological or natural, how important is it to have an accurate and verified account of how much carbon is removed?

Mr. MACKLER. I mean this is central to the rationale for supporting the technologies, in particular, supporting the utilization of CO₂ as part of a climate strategy that really needs to be based on sound science, on deep analysis, and on very strong regulatory frameworks that can ensure the CO₂ is removed and permanently sequestered.

So this is it is a critical piece of the overall rationale.

Mr. TONKO. And I know there are a couple of different methods for nature-based projects, for greenhouse gas life cycle assessments, but should more work be done to standardize the accounting and verify the impacts of negative emissions technologies?

Mr. MACKLER. Yes, I think that is right. I mean we need to make a distinction between removal technologies that permanently take CO₂ out of the carbon cycle, which is what direct air capture technology would do if you were to remove the CO₂ and inject it underground, compared to natural solutions, which really they remove CO₂ but they are not permanently removed because they can always—there is a flux between the biological carbon cycle and the full carbon cycle.

But the short answer is more analysis is really needed to understand the specifics of the carbon balance of various approaches. But we know, from a general standpoint, that the benefits are there but, if we are going to quantify them, we should probably get a little more precise on how we measure and certify the storage.

Mr. TONKO. Thank you.

Mr. Noel, you suggest safeguards to this bill. Could that include ensuring that carbon removal is validated and storage sites are better monitored and regulated?

Mr. NOEL. It should but that is not what is happening right now and there is a lot of work to do to get there.

Mr. TONKO. What types of requirements do you envision from EPA regarding the monitoring of regulation of sequestration?

Mr. NOEL. I would say there needs to be an update to the UIC regulations that govern enhanced oil recovery. Right now, companies don't have to report the amount of CO₂ that is actually sequestered or come up with a monitoring plan. The companies just report the amount of CO₂ they receive.

Mr. TONKO. Thank you.

With that, we will now move to Mr. Shimkus, the subcommittee ranking member, to question for 5 minutes, please.

Mr. SHIMKUS. Thank you, Mr. Chairman. I am going to change up my order a little bit.

I want to start with Mr. Anderson because your people are my people. I really appreciate your testimony. I mention those concerns almost every hearing that I have. Sometimes my facilities are operated by the Boilermakers.

So we just had an announced closure, fortunately, none in my district, but announced closures of Canton, Coffeen, Havana, and Hennepin. Now, those communities don't speak out as to they are not a Chicago. They are not a New York. They are not an L. A. So these are the small rural communities that you mentioned.

Can you briefly just talk about what, in a small community, the loss of 50 employees in a power plant? Again, I think you mentioned wages. You mentioned tax base. You mentioned—just go over that because it does have real world impact in many of our congressional districts around the country.

Mr. ANDERSON. Absolutely. Thank you very much for that question, sir.

You really can't overstate the effects. And these are, as you say, the sort of places that are the definition of the kind of places that get overlooked and left behind.

As it happens, our most recent example was in Ohio, two power plants that closed at the same time in one county right along the Ohio River. It is not an overstatement, it is literally the case that the tax revenue from those power plants was 75 percent of the town and county budgets and that paid for schools, fire stations, police. It paid for everything. And this was about two years ago and the immediate effect was many of those things started to close, or downsize, or they no longer do that anymore.

The people tried to sell their houses as fast as they can before they lose all of their value. Trying to find other alternatives elsewhere in the country, sometimes they do; sometimes they don't.

But even if individuals are able to sort something out for themselves and find a job in Dayton, or in another State, or whatever, what they leave behind is what I was talking about, an emptied out community that is no longer the same or they won't see their families for more than once or twice a year because now they live hundreds of miles apart.

It seems like a small thing when we are talking about economics but, as a human thing, it is a very big deal.

Mr. SHIMKUS. Yes, I appreciate that. And just following up, so a lot of us, when we are visited by folks and people talk about jobs and economic development, then there is a multiplication factor of three. You know for every one job here you are going to have the convenience mart. You are going to have the grocery store. You are going to have this.

So I guess what I am hearing is that there is not a multiplying, it is a division aspect, where you are going to start losing the convenience store. You are going to start losing the gas station. You are going to start losing the grocery store, and the local theater, and the like.

Is that what you have observed?

Mr. ANDERSON. Absolutely. When that was happening and we were trying to find options for those power plants at the time, some of our strongest allies were Chamber of Commerce people, business leaders, and people who knew exactly what was going to happen to the business community in those towns because they were completely dependent on the people who lived there and worked there for business.

So politically, our allies were up and down the spectrum because we all saw the same thing coming.

Mr. SHIMKUS. Yes, thank you for speaking out. I do it. I am a politician, so I am not really trusted all the time but you are supporting the men and women—the working men and women, I do appreciate the testimony and thanks for coming here.

Mr. Begger, you say that enhanced oil recovery, EOR, is an attractive early option for CCUS development. Can you elaborate what you mean by that?

Mr. BEGGER. Mr. Chair and Mr. Shimkus, it is one of the few, I guess you would call, commercially-deployable revenue streams for carbon management right at this time. You know I think we all are looking for geologic storage, carbon products, those types of things, but technologies get cheaper over time. You know if you look to say, for example, the Petra Nova Plant in Texas, they feel like the lessons learned from just building that first one, they could build the second one 30 percent cheaper and just hope that you will see those incremental cost reductions with every generation and every one that is built.

And so we feel like EOR is currently viable today. And as we do more and more of those things, it will bring the cost down to make other pathways economic.

Mr. SHIMKUS. So this helps drive down the economies of scale for deployment—

Mr. BEGGER. Yes.

Mr. SHIMKUS [continue]. Because there is a revenue stream that helps offset, whether it is a tax credit or direct Federal funding for these projects.

And Mr. Noel, I don't have time to ask a question but I appreciate your testimony. I appreciate it was delivered in the manner in which you did. Hopefully, we can find a method to get this forward.

And I do appreciate the sponsors of this legislation, Mr. Peters and Mr. McKinley, for moving this forward.

And with that, I yield back my time.

Mr. TONKO. The gentleman yields back.

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

Mr. PETERS. Thank you, Mr. Chairman. Today we have the opportunity to discuss climate legislation with a real shot at becoming law. USE IT passed the Senate Committee on Environment and Public Works by unanimous consent last year. That includes Senators Barrasso, Bernie Sanders, and Ed Markey. So that is a pretty good breadth of support.

And I am sorry that the Nature Conservancy representative couldn't be here. So that is good news/bad news because a baby is a nice event but, clearly, it would have been better if it was tomorrow but we can't plan that out. That is nature, I guess.

So what the bill does is it provides Federal research support of a suite of CCUS technologies, including \$35 million to provide competitive grants for technologies that can cost-effectively remove carbon dioxide out of the air through direct air capture and \$50 million to support research and technologies for commercial uses of captured carbon dioxide.

Second, it codifies an existing interpretation that comes from the Obama administration that CO₂ pipelines and CCUS infrastructure projects could be considered covered projects under FAST-41, if there also Federal actions under the jurisdiction of Federal agencies. It does not weaken NEPA.

And I think people have discussed a lot of the need for developing these kinds of carbon capture facilities. There are only two commercial direct air capture projects now. The largest is a plant in Alabama that only captures 4,000 tons per year and one active CCUS project capturing CO₂ for permanent storage in the saline reservoir and that plan is based in Illinois. We need to accelerate this and this is our opportunity to do that.

I just want to address briefly the EOR issue, the enhanced oil recovery. No one is claiming that linking EOR to captured CO₂ is a panacea. Clearly in the long run, we have a lot of techniques we would like to do to phase out the use of fossil fuels. Among those might be pricing carbon and providing incentives.

But I would just note that we have, many of us in this committee have signed a letter to preserve the CAFE standards, which are intended to ensure that cars, as they come off the production line, are more efficient, they use less gas. But we have implicitly acknowledged by doing that that we are going to have gas cars for a while. Even if today we decided that every car would be electric, it would take about 25 years for the fleet to turn over.

So, in the meantime, the capturing of CO₂ for EOR in the near-term can reduce the carbon footprint of that oil and gas we will be using. So that is all to the good. It is not a panacea. It is not where we want to end but it is a good place to start.

Now I want to begin by asking Mr. Mackler about this, the concern about streamlined CO₂ permitting. And there is a concern that that would lead to an increase in oil production that would derail our climate goals but according to the Clean Air Task Force, if the U.S. EOR expanded to its maximum potential, this was all done with CO₂ from direct air capture, the atmospheric benefit would be substantial.

Do you agree with that?

Mr. MACKLER. Yes, I do agree that in the limit, if we are talking about in the limit here, if direct air capture were deployed to its full potential to meet demands for EOR, there would very likely be a substantial climate benefit because if direct air capture technologies were married with the best resources for producing oil and storing CO₂, you could conceive of a project that was actually producing net carbon neutral oil. And so if that was your goal, it could be achieved through direct air capture.

And it is our view at the Bipartisan Policy Center that when it comes to climate risks, the real problem is carbon and CO₂, and not necessarily fossil fuels. We need to be looking at the carbon accounting.

Mr. PETERS. Right. And so the notion is that in the short-term, at least while we are using fossil fuels, we would like the lowest carbon output as possible, correct?

Mr. MACKLER. That is right. There is a net benefit from using captured CO₂ to produce the oil. So, we should be doing that as we transition to a lower carbon economy.

Mr. PETERS. And in the long run, we are not getting away, necessarily, from transitioning to a lower carbon economy.

Mr. MACKLER. Right.

Mr. PETERS. But we are also potentially developing technologies that could draw carbon out of the atmosphere and really do what the IPCC said we had to do, the United Nations.

Mr. MACKLER. That is exactly right. You are buying down the cost of developing and stealing these technologies and, at the same time, leveraging those economics to build out an infrastructure, CO₂ pipelines. Most importantly, that can then be used later just for storage.

Mr. PETERS. OK, thank you so much.

My time has expired. I yield back.

Mr. TONKO. The gentleman yields back.

The Chair now recognizes Representative Walden, full committee ranking member, for 5 minutes, please.

Mr. WALDEN. Well good morning, Mr. Chairman, again, and thanks to our witnesses. You have done a great job educating us on some of these matters.

I wondered—I have been reading this report out of MIT about engineers there who have designed an ability to remove carbon dioxide from the air using, basically, batteries that attract. Are you familiar with that, Mr. Mackler?

Mr. MACKLER. Not in great technical detail but I am aware of the research.

Mr. WALDEN. And so, as the report goes, they can get down to the 400 parts per million in the atmosphere, remove that carbon, and requires really no new fuels. It is the effect of the battery charging and discharging, and the air would just flow through, and they can capture the carbon and release it.

And Dr. Harmon, I am curious. Is that the kind of work you are engaged in in your company to remove carbon?

Dr. HARMON. So we are removing carbon directly from industrial emissions. These are emissions that contain a lot of CO, which is toxic and must be combusted. And so, in a sense, you can think of it as a pre-combustion approach.

And our particular technology is biological. So we are using a biological process—

Mr. WALDEN. Got it.

Dr. HARMON [continue]. To capture that carbon and transform it into another output.

Mr. WALDEN. All right. I—

Dr. HARMON. I would say—I just was going to say that the products of direct air capture, in whatever technology is representative, also can become feed for our fermentation and we work with partners and other methods to do that.

Mr. WALDEN. OK.

Mr. WALDEN. So I mean my approach to this is innovation is going to be the way out of this. We have to set the right sort of incentive system, and we will have debates about what that is, but our great innovators at MIT and elsewhere are really on the forefront of this. And the consumer can win, the American consumer can win because we can develop this technology here and actually achieve the goals that the IPCC and others say we have to achieve going forward.

A lot of us believe this USE IT legislation, coupled with the 45Q tax credit, provides a nice companionship going forward.

And Mr. Begger, I wanted to ask you about the Department of Treasury. They still have to issue the guidelines, as I understand it, for those applicable applications for the credits but, in the meantime, they are offering a potentially good incentive for private sector investment. Is that right?

Mr. BEGGER. Mr. Chairman, Mr. Walden, that is correct. We are still waiting on the IRS to issue that guidance.

Mr. WALDEN. Yes, we have been pushing them, too.

So 45Q is an important reform for the development of the industry. Can you explain how the USE IT Act fits in here, because we think there is a marriage to be had, and what benefits would it supply to the development of CCUS and the related infrastructure?

Mr. BEGGER. Mr. Chairman, Mr. Walden, you know these first few projects are going to be, I guess the pathway to making them economically viable is going to require sort of layering a number of different benefits, you know whether it is the tax credit, a DOE grant, a State grant, private investment. You know when you look at early technologies, you do need that sort of layering to get the first ones built, to bring those costs down. And then, hopefully at some point, they are just able to stand on their own two feet.

Mr. WALDEN. I want to make a comment about your comments about NEPA because I'm, too, actually, from a western State. I kid my friend from Ohio or Wyoming that she is from one of those big rectangular eastern States because Oregon is actually out west. But we face the same sort of issues with public lands. Trying to get anything done there can take a decade and then you litigate. And we know if we are going to actually deal with this crisis at hand, we have got to move faster than a decade or more to be able to build the facilities, build the pipelines, build the power lines to get a grid that works to factor in the renewables and everything else.

And so I am intrigued by that and I am pleased by the administration's movement forward on NEPA reform, the first major reform since 1978 when the rules were first adopted. To try and just streamline the process, go back to the original intent.

I want to also recognize that the study released by the Department of Energy's National Energy Technology Laboratory in September, which found that Russian natural gas exported to Europe has a lifecycle greenhouse gas emission profile that is 41 percent—41 percent higher than U.S. gas exported to Europe. And for natural gas sent to China, the Russian gas is 47 percent higher in total life cycle.

So do you think it makes sense for the U.S. to send cleaner gas to those areas?

Mr. BEGGER. Mr. Chairman, Mr. Walden, you are absolutely correct. My organization, we conducted a study about five years ago about coal exports to Asia.

Mr. WALDEN. Cleaner coal?

Mr. BEGGER. When you look at the tier 2 engines that we use in our mining equipment, the just the cleaner, safer, more productive operations that we have across the fossil energy industry in the United States, there is a lower carbon footprint to export U.S. commodities around the world.

Mr. WALDEN. All right, thank you, Mr. Chairman. And thanks again to our witnesses. I look forward to continuing to work with all of you.

Thank you, Mr. Chairman.

Mr. TONKO. The gentleman yields back.

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

Mr. SOTO. Thank you so much.

First of all, I wanted to ask both Mr. Mackler and Mr. Noel about sort of the net reduction that could potentially happen or not happen when we are talking about using direct air capture for advanced oil recovery. Could it lead to a reduction either now or in the near future?

It would be great to hear from both of you.

Mr. MACKLER. Sure, I would be happy to respond to that.

The short answer is yes. There will be a climate benefit from using captured CO₂, particularly atmospheric CO₂ for the production of oil. The precise carbon benefit depends on several factors—what the oil field looks like, for example, how much CO₂ is needed to be injected per barrel of oil that is produced. What is the particular direct air capture technology? What kind of energy source does that system use and where is that energy sourced from?

So there is a range of expected benefits, which is why that we are sort of talking in generalities here. So more work needs to be done on how we calculate those life cycle benefits.

But the ability to store that CO₂ permanently underground as part of this EOR process is very well-understood and the regulatory frameworks are in place.

Mr. SOTO. OK, Mr. Noel.

Mr. NOEL. Yes, I mean it all depends on the assumptions embedded in those analyses and different players are going to have different motivations to come up with those assumptions.

We do think there is a better way to tackle climate change, rather than sucking carbon pollution out of the ambient atmosphere. The original carbon sequestration is to leave it in the ground.

Mr. SOTO. Thanks for that.

And I was intrigued about using the CO₂ to develop construction materials, cement, concrete, and other construction materials, where we advanced the Moving Forward Infrastructure package just last week, a \$319 billion highway investment that would expand research and innovation. Part of that is innovative materials that last longer and that reduce carbon pollution.

So it would be great to hear from Mr. Anderson and Dr. Harmon on the—would it be helpful for jobs, Mr. Anderson?

And Dr. Harmon, would it be something feasible to be able to really utilize cement from carbon capture to do a major infrastructure rebuild of America?

We will start with you, Mr. Anderson.

Mr. ANDERSON. The short answer is yes, absolutely, it would be good for jobs.

I mean in the first place, all of these systems have to be built and my brothers and sisters in the building trades unions love to build things. That is an enormous amount of work that would have to be done.

In the second place, once it is up and running, then there are other people, like the folks in my union, who will operate and maintain those systems and who will operate and maintain the things on either end of the pipeline, things that are making the CO₂ in the places where the sinks are. Those are jobs that we get to keep.

Yes, that will create and retain jobs is literally true.

Mr. SOTO. And Dr. Harmon, based upon your manufacturing experience, do you think we could get there, sooner rather than later, to help create cement, concrete, and other construction materials from condensed CO₂?

Dr. HARMON. Absolutely. I will say that that is not a part of our particular business.

Mr. SOTO. I understand.

Dr. HARMON. But we work with other companies that are very far along in that that are producing materials today. It is an extremely viable and high-volume, high-opportunity pathway and one which, in each instance, will create those manufacturing jobs and in sectors, not just the utilization sector but in manufacturing areas that badly need them.

Mr. SOTO. Thank you.

And Mr. Beggar, are you seeing that among Wyoming's infrastructure utilizing CO₂ to create building materials just yet; if not, will we see it on the horizon?

Mr. BEGGER. Mr. Chairman, Congressman, Wyoming right now our focus has really just been on providing the platform to develop these technologies, recognizing that where particular things are deployed is really dependent on a lot of different factors.

You know, for example, we have great rock quarries out west. So a synthetic material is not going to be probably as economic as the natural one. But for example, our relationship with Japan, that after Fukushima they are doing away with their nuclear, they don't have great land mass and things for renewables, they are doubling down on coal but their western society, their modern society wants low carbon technologies. And so we are working with them on a utilization technology that would use concrete because they have a huge market for that.

Mr. SOTO. Thank you and I yield back.

Mr. TONKO. The gentleman yields back.

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

Mr. MCKINLEY. Thank you, Mr. Chairman, and thank you for holding this hearing on our bill.

American innovation in carbon capture technology and utilization will—the premise I am working under, will lead to reduced carbon emissions, not only in America but, more importantly, around the globe, especially in China and India. Because if you go back to the MIT report, where they say unless growing emissions from the rest of the world are addressed, there still will be global catastrophe. That is why the global carbon capture program is so vital.

For years, our office has led the efforts to advance innovation, increasing fossil fuel research funding, and implementing 45Q. As the lead co-sponsor of the USE IT Act, I am proud to work for the past three years with Scott Peters on this effort.

The USE IT Act had broad support from bipartisan members of the Congress, as well as a host of industry, labor, and environmental stakeholders and the Senate has already advanced it twice in '18 and '19. Consequently, I was disappointed that last year we missed the opportunity to sign this bill into law when it was a part of the defense bill. So I am hoping, rather than throw up roadblocks, the majority will continue working with us and pass this bill as a standalone legislation.

Look, let's be honest here with all of this. If America doesn't lead the way on carbon capture technology, who will? Do we really think China, and India, and the rest of the world are going to do that? They have shown no commitment to be able to do that. So for us to maintain our mantle of leadership on energy, this bill will help.

Please direct my question to Mr. Anderson, if I could, please. The primary objective of the USE IT Act is to use R&D funding to spur development and deployment of carbon capture utilization and storage projects. Let's go back over it. I want to make sure that people really hear what will be the impact of that on the jobs and various utility workers.

Mr. ANDERSON. Well, I can use an example right there in your district, Congressman. We have two coal-fired power plants in your district. The Harrison plant is one example. I am sure you are very familiar with that facility, and the number of people who work there, and what else is around there, which is not a lot. If a plant like that goes down, the alternative is basically to leave. And good luck finding another opportunity somewhere else, especially if you are a 50-something boiler mechanic.

Mr. MCKINLEY. I know in Pleasants County, it was over 30 percent of the budget for that county, the tax revenue. That is going to affect schools, fire departments, first responders, all of that is going to be. So it is important for us to continue this, continue this effort to try to reduce the emissions and I think we can do this with innovation.

Dr. Harmon, if I could to you, just how big a barrier is the lack of infrastructure in developing carbon capture and storage projects?

Dr. HARMON. So I would say it depends upon the application. As utilization technologies scale, infrastructure will be extremely important to collect large volumes of feedstock and enable large-scale utilization applications, which then drive down costs. Luckily today, we can at least get started with co-located facilities but being able to bring large volumes to sites where either the chemical facilities are available, where hydrogen is available, where renewable power is available, all of that will be extremely valuable in scaling up and promoting utilization.

Mr. MCKINLEY. Let me stay with you on a little bit and try to paint a picture here.

If we do this retrofitting of our power plants, and maybe Mr. Anderson this goes to you as well, if we retrofit our power plants to remove, if we implement a carbon capture program, we are already capturing and storing the fly ash, the coal ash, residual, we are taking care of that. What is the motivation, then? Why are we so—if we are on that cusp of being able to accomplish this, what is the cusp then to continue closing down our coal- and gas-fired power plants across America if we are capturing all the emissions and es-

pecially given the impact it has on our communities, for our schools, our first responders, and the like? If we do this, wouldn't that address this problem we are trying to focus?

Dr. HARMON. So I am not an expert in capture from power facilities because we specialize in industrial facilities.

What I can say is that, to the extent that we can create value from emissions, such as from the power sector and from the industrial sector, we are not only keeping plants open but we are adding those jobs that are associated with utilization and with infrastructure development and, therefore, there is a multiplicative effect when we look at opportunities to use carbon that is otherwise going to waste.

Mr. MCKINLEY. Thank you.

My time has expired. I yield back.

Mr. TONKO. The gentleman yields back.

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

Ms. SCHAKOWSKY. Thank you so much.

You know we absolutely all have to have a sense of urgency. The science is so clear that the climate crisis is an existential one for us. And if we are to save our planet for our children and grandchildren, we have to accept that challenge right now.

So to ensure temperatures don't rise above two degrees Celsius and to avoid climate change's worst consequences, I think we do need to go beyond reducing emissions. Rapidly transitioning from fossil fuels, building nature-based infrastructures, and I think carbon capture are all necessary. We simply can't afford to pursue one solution at a time. We also can't afford to focus too much on mitigation, while ignoring the real problem of being the world's largest emitters of greenhouse gases, historically.

Still, carbon capture can be part of the solution, I think.

So Mr. Mackler, in your opinion, would the USE IT Act detract from or discourage the use of other strategies like nature-based solutions?

Mr. MACKLER. Thanks for that question. I don't think it would detract from nature-based solutions because I think that that is a completely different area when it comes to policy, and when it comes to policy needs, and funding needs.

When we are talking about industrial direct air capture, this is a technological approach that really needs an injection of capital to foster technological innovations in the chemical processes, in the industrial processes needed to capture the CO₂.

The nature-based solutions are very important but it is sort of a different arena, I think, from this.

And so both are needed and they are complementary, not competing.

Ms. SCHAKOWSKY. So you think it is important to pursue multiple climate solutions alongside carbon capture technology?

Mr. MACKLER. Definitely. We are in all of the above, you know low-carbon energy—we taken all of the above low-carbon energy perspective.

Ms. SCHAKOWSKY. Thanks.

And I am glad that companies like LanzaTech, which, as Dr. Harmon said, is in my district. I am very proud of that. And I ap-

preciate your finding innovative solutions to address the climate crisis.

So, Dr. Harmon, how can creative approaches to utilization reduce emissions and repurposing CO₂ benefit the ways in which—in your opinion, how does utilization need to be—to be limited regarding enhanced oil—no—is that right? Do I want those? Yes, OK.

Talk to me about Lanza.

Dr. HARMON. Well, to your first question: How can utilization contribute to our climate objectives at large? As I said earlier, we all understand implicitly that we need carbon in our future. We will need aviation fuel. We will need plastics. And yet, the carbon that is being emitted today that we see as a liability from a climate perspective is actually the building block that we need.

So utilization in the form of products that substitute for those that we would get from petroleum or from natural gas in fact do a dual value. On the one hand, they are producing new low-carbon alternatives and they are reducing the emissions, the atmospheric emissions. And this is all done in the context of actually creating value and creating money. None of our partners are doing it for charity or to meet regulatory demands. They are doing it because they can make money from emissions.

Ms. SCHAKOWSKY. And I appreciate the list of different kinds of products that can be produced that you included.

I wanted to also ask Mr. Noel: Do you think that we can have some guardrails? Do you think we need to limit the use of capturing carbon for enhanced oil recovery?

Mr. NOEL. Absolutely. EOR operations, as I said in my testimony, are part of an expansion strategy. It can't be siloed off from the rest of a company's portfolio.

Ms. SCHAKOWSKY. So it is not an all or nothing thing. We can put some guardrails, some limitations on the kind of work that we do.

Mr. NOEL. The way that carbon capture is currently practiced is all the carbon capture in this country is sold back to the oil companies should not inspire public confidence.

Ms. SCHAKOWSKY. I appreciate that.

I yield back.

Mr. TONKO. The gentlewoman yields back.

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

Mr. LONG. Thank you, Mr. Chairman, and thank you all for being here today.

Mr. Begger, do you live in Casper or where do you live?

Mr. BEGGER. I live in Cheyenne.

Mr. LONG. Oh, you do? Good. Good.

Mr. BEGGER. But I have lived in Casper and I spend a lot of time in Gillette.

Mr. LONG. Yes, my wife is from Cheyenne. So that is why I was asking. She grew up there. So, yes.

We have been talking about carbon capture for before there was any functioning facilities. So for years, we have been talking about carbon capture on this committee. And we have people come in all the time from our district and we will have meetings in our office. And when we are in a committee hearing like this, sometimes I

will come down here, which just happened to me a few minutes ago. I went out and had a meeting in the side office over here with some folks from our district and they are working on a project trying to get it out of the EPA. And it has been ready to go for 8 or 9 years now, trying to get it out of—so with that in mind, I have a question about bureaucratic red tape.

Does that stand in the way of innovating new technologies that can expand American energy and manufacturing jobs, while we do see harmful emissions?

Mr. BEGGER. Mr. Chairman, I think where this program would best be fitted, you know it is a policy decision for Congress. I do think that the regulators and the EPA have a role to play in making sure that the policies set forth align with the technological reality. And so you know I have great confidence in EPA—or excuse me—in Department of Energy, and their team, and what they are able to do but you know I think there is a role for EPA to play as well.

Mr. LONG. You think what?

Mr. BEGGER. There is a role for EPA to play as well in understanding things. But you are right, one of the biggest challenges that we have is bureaucracy and red tape. I mean I spoke about NEPA and some of those processes. And the last thing that we need to do is head down a pathway where we are not able to actually get things built and get things done because of bureaucracy.

Mr. LONG. OK, thank you. Like I said, I just walked out of a meeting behind the TV monitor right there in the next room, where they have been waiting for an answer from EPA. As I say, they have had it ready for 8 or 9 years now.

Mr. Mackler, I am going to go to you next. How important is deploying carbon capture technologies to help promote affordable and reliable energy production, while putting the U.S. on a path towards meeting domestic climate objectives?

Mr. MACKLER. Well, we think carbon capture is essential to decarbonization of the energy system at least cost. And there has been an analysis conducted that suggests if carbon capture is not part of the toolkit going forward, the cost of hitting or achieving our climate goals could double.

So it is really important for a variety of reasons. Because we need a big toolkit, we need as many solutions on the table as possible. And frankly, there are not alternatives to some of the energy consuming parts of our economy today, so carbon capture. There are not alternatives to fossil combustion in some of these parts of our economy and carbon capture is really the only pathway forward for some of these places.

Mr. LONG. OK, I am going to stick with you, Mr. Mackler.

Even as coal production in the United States declines, we know that fossil fuel, as being a cheap and reliable source of energy, will continue to be used in the U.S. power sector. Even more developing countries, like China and India, will continue to rely heavily on fossil fuels as they look to grow their economies.

How does the U.S. stand to benefit from being at the forefront of the carbon capture implementation, particularly as it relates to global climate policies?

Mr. MACKLER. That is a great question and I think it is important to note that we have seen enormous advances in renewable energy over the last 15 to 20 years. The prices of solar and wind have decreased dramatically and they have deployed very successfully in the U.S. and around the world. It is a great success story.

But if you look at how that is fitting into the global energy picture, it is mostly a case of those technologies meeting new demand. And so the use of fossil fuels continues to increase, even as we are deploying these other technologies.

So we are going to need carbon capture to start to get at the existing infrastructure and energy chains that we use today. And if the U.S., with all of its innovative commercial expertise, and its innovation systems, and all the companies working on these technologies gets out in front in developing these next generation carbon capture technologies, it is an enormous market for our U.S. companies to export to globally.

Mr. LONG. OK, thank you.

And Mr. Anderson, how would the increased use of carbon capture technology, both here and around the world, impact jobs here in America?

Mr. ANDERSON. Well I think there is really three pieces to it. One, to start with, is the manufacturing. It all has to be made. It would be wonderful to make all of that equipment here in America. The second thing is that it all has to be built. It all has to be constructed by somebody. And the third thing is that then it has to be operated and maintained.

That whole chain is thousands upon thousands of jobs that we could have all over the country.

Mr. LONG. OK, thank you.

And Mr. Begger, just to wrap up my earlier comment—I don't know how long you have lived in Cheyenne, but my wife and I—everybody want to know how I met someone from Cheyenne. But we met at the Tollerton School of Ballet in Cheyenne, Wyoming.

I yield back.

Mr. TONKO. Well, we thank you for that information.

The gentleman yields back.

And now the Chair recognizes Representative Matsui for 5 minutes, please.

Ms. MATSUI. Thank you very much, Mr. Chairman, and I thank the witnesses for being here today.

As we look at the technologies and the solutions currently available to us, it has become quite clear that carbon reduction strategies are not enough. It is critical that we begin laying the groundwork for robust deployment negative emission technologies to remove carbon dioxide from the air and sequester it. This is likely the only way we can possibly hope to achieve the emissions reductions needed to prevent catastrophic climate change.

We know there are natural sequestration efforts like afforestation and reforestation uptake, and storage by agricultural soils, and biomass energy with carbon capture and storage.

Mr. Mackler, are these natural sequestration efforts sufficient to keep limit warming of our planet at 1.5 degrees Celsius? And a yes or no is all I need here.

Mr. MACKLER. They are not sufficient. They are important but not sufficient.

Ms. MATSUI. All right. Do you think that there is currently an adequate investment at the Federal level for carbon capture research and development? Yes or no?

Mr. MACKLER. No.

Ms. MATSUI. What kinds of improvements in CCUS technology can we expect from the improvements—from investments made under H.R. 1166?

Mr. MACKLER. I think we can expect to see improvements in the technologies around direct air capture. That would probably be the primary benefit.

Ms. MATSUI. OK, thank you.

Some of my colleagues and one of the witnesses on the panel had raised concerns about the potential support that this bill provides for increased investments in oil development. At a time when we are doing everything we can to ramp up investments in renewable and clean energy technologies and transition away from fossil energy, we should not be subsidizing or supporting new investments in construction of fossil fuel development.

I would like to ask each of the witnesses: Do you believe that, in its current form, H.R. 1166 could lead to increased investments in oil development? Just a yes or no, starting with Mr. Mackler.

Mr. MACKLER. I do believe it could lead to increased investments in oil and gas development, yes.

Ms. MATSUI. Mr. Noel?

Mr. NOEL. Yes.

Ms. MATSUI. Mr. Begger?

Mr. BEGGER. Yes.

Ms. MATSUI. Dr. Harmon?

Dr. HARMON. Yes.

Ms. MATSUI. Mr. Anderson?

Mr. ANDERSON. Yes.

Ms. MATSUI. Mr. Noel, you referenced a 2010 DOE study that states that CO₂ pipeline to oil fields looking to expand EOR operations should not be constructed without establishing that large, additional, suitable storage capacity exists in the area that can handle storage over the long-term.

Does H.R. 1166 contain any provisions that would ensure this? Yes or no?

Mr. NOEL. No.

Ms. MATSUI. Are there ways this bill can be improved and strengthened to ensure that sequestration is done safely and at significant scale, while minimizing other environmental risk?

Mr. NOEL. There are ways on multiple fronts to strengthen this bill.

Ms. MATSUI. Can you please provide an example of potential improvements?

Mr. NOEL. Sure. Explicitly exclude enhanced oil recovery from the research provisions. Also, explicitly state that the pipelines should not be sent to EOR regions to produce oil—

Ms. MATSUI. OK.

Mr. NOEL [continue]. Among other things, which I can submit for the record.

Ms. MATSUI. OK, thank you.

As you probably are aware, in 2018, the State of California amended its Low Carbon Fuel Standard to enable CCS projects that reduce emissions associated with a production of transport fuels sold in California and projects that directly capture carbon dioxide to generate LCFS credits. This qualification for credits came with a few stipulations, including a requirement that operators of CCS projects monitor the site for at least 100 years post-injection.

Mr. Mackler or Mr. Noel, do you think a monitoring requirement like this would strengthen the integrity of carbon capture projects?

Mr. MACKLER. Yes, I do.

Ms. MATSUI. Mr. Noel?

Mr. NOEL. Sure.

Ms. MATSUI. So do you think the 100-year timeline is appropriate? Either—Mr. Mackler.

Mr. MACKLER. Well, I think it is very rigorous. You know whether or not it is the right number I think is an open question but it is certainly a very rigorous approach.

Ms. MATSUI. OK. Mr. Noel?

Mr. NOEL. Agreed. And what happens on the 101st year?

Ms. MATSUI. OK. I don't have much time but there seems to be a broad agreement in this room that CCUS has an important part to play in achieving our carbon reduction goals but some here are more supportive of EOR than others. I believe we should be focused on other means of sequestration, such as long-term geologic storage.

Mr. Mackler, in what ways has the U.S. demonstrated or deployed carbon dioxide sequestration and utilization, other than EOR? And I realize I am going over time but quickly, can you?

Mr. MACKLER. Well, we share your view that, in the long-term, geologic saline storage should be the priority for most of the CO₂ that we capture. The U.S. Department of Energy has had a very sweeping research program on saline for many years now and so we have demonstrated global leadership there.

Ms. MATSUI. Thank you very much. I am signaled that I have run out of time.

I yield back. Thank you very much.

Mr. TONKO. The gentlelady yields back.

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

Mr. CARTER. Thank you, Mr. Chairman, and thank all of you for being here. Obviously, it is extremely important.

I continue to say that innovation is going to be the key for us. And when you say innovation, a lot of people think, when you are talking about the climate, that we are talking about renewable fuels, and we are, but this is also innovation. This is extremely, extremely important.

I want to start with you, Dr. Harmon. LanzaTech has a plant near my district in Soperton, Georgia, right outside my district. And whereas I have not had the opportunity to visit it yet, I do plan on doing that and want to go by and see exactly what you are doing. And from what I understand, it is a very large operation and we appreciate your investment in our area.

Tell me, obviously, it looks like you see a viable opportunity here to create these products from waste gases. What kinds of industrial gases and waste submissions are you utilizing here?

Dr. HARMON. So our first commercial plant is directly converting steel mill emissions into ethanol. We have projects in development around the world, actually, which use refinery gasses, ferroalloy gases, which are similar to steel-making gases. These are gasses that are rich in carbon monoxide, carbon dioxide, and hydrogen, depending upon the source.

Mr. CARTER. Do you know, do you see other kinds of gasses like this being able to be utilized?

Dr. HARMON. There are other industrial sectors for which the technology is also applicable. Calcium carbide would be one. There are emissions in the chemical sector as well. It is quite a very broad opportunity.

Mr. CARTER. You mention in your testimony about gas fermentation and the use of carbon dioxide to develop beneficial products such as this. What do you see as the future of that?

Dr. HARMON. So just to be clear, the gas fermentation relies not just on carbon dioxide but on carbon monoxide. We see this as very broadly deployable, even in the U.S. Taking strictly the gases from industry that area accessible to us today, we could build 33 plants, based just on 60 percent of that gas.

Mr. CARTER. Wow.

Dr. HARMON. And each of those plants would create probably a thousand jobs during construction, maybe 240 during operation, and that takes into account the multipliers that were referenced earlier.

But these are substantial operations in areas that need that kind of—

Mr. CARTER. And see, this is the point I try to make. I look at this as being a tremendous opportunity for us. You are talking about creating jobs right here. A tremendous opportunity.

One last thing, Dr. Harmon. You mentioned how Federal research had actually assisted and help kickstart this type of technology. Could you just expound upon that for just a second?

Dr. HARMON. Certainly. If we talk about our site in Georgia, for example, there we have, in fact, a pilot operation that is demonstrating our next generation bioreactor technology and that technology originated at small scale, with support from RPE. And with support from RPE, we were then able to scale that up to a larger what we call a field pilot.

At the very moment, sticking with Georgia, we are in fact designing a 10 million gallon per year facility to produce jet and diesel fuel from ethanol that is brought from all parts of the U.S. And that is, it is a pre-commercial demonstration but, in fact, it will be commercially viable.

And if you are aware of the scale of some of the renewable fuel and sustainable aviation fuel initiatives, this is a substantial opportunity that can be replicated everywhere, and that technology was developed and scaled up with support from the Department of Energy's Bioenergy Technologies Office.

Mr. CARTER. So Government created the environment for you to succeed in. That is the point we have been trying to make. Thank you for verifying that.

Very quickly, Mr. Begger, I wanted to ask you. You mentioned the XPRIZE Foundation. Can you just tell me about that, explain that to me?

Mr. BEGGER. Sure. Mr. Chairman, Representative, XPRIZE Foundation is sort of a philanthropical foundation that has offered a lot of engineering competition prizes over about the last 20 years. Probably the one that they are most well-known for is SpaceX; that started out of an XPRIZE competition.

And so they have done a lot around public health, and water, these sorts of things, but they have one now that is really focused on carbon utilization. So three or four years ago, I think there was 47 teams from seven or eight different countries that put forth proposals to best pull CO₂ out of a power plant stream and convert it into some other marketable product.

Mr. CARTER. Right. Right. Just another example of how the private sector is helping us in this goal that we all share in.

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

Mr. TONKO. The gentleman yields back.

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

Mr. MCNERNEY. I thank the chairman. I thank the witnesses for your testimony; it was informative and useful. I appreciate it.

Especially, Mr. Anderson, I agree with your testimony and I wholeheartedly agree that we need to find a way to positively utilize the human resources and capital currently employed in the fossil fuel industry. Hopefully, Federal regulation will help in that regard, including the USE IT Act.

Mr. Mackler, is there an accurate cost model for direct air capture, say in dollars per ton, or something like that?

Mr. MACKLER. Well because this is such a nascent field, with many different technology strands and sort of pathways being developed in real time, some of them privately developed so it is hard to look under the hood and see what they cost, we don't have great insight into what the costs are.

There have been some studies that have been put out that suggest costs could be as high as \$600 per ton, but that is really seen as very much on the high end, and as low as potentially \$100 to \$200 per ton within sight, and potentially less than that at some point in the future.

Mr. MCNERNEY. Where do we need to be, dollars per ton?

Mr. MACKLER. Well, it depends on the business model, and it depends on you know what the climate goals are, but I think if we are in the range of \$100 per ton, we are going to see significant deployment of direct air capture.

Mr. MCNERNEY. Thank you.

Dr. Harmon, a similar question in terms of carbon usage: How far are we from competitive uses of carbon usage and what are the biggest cost production obstacles?

Dr. HARMON. So the distinction in this case is that we are, in fact, producing a product that goes into the market. So the ethanol

that is being produced from steel mill emissions is being sold as a gasoline blending component and that is a profitable operation.

There are high-value products in the chemical sector that create really significant value but in any and every instance, those partners, industrial partners that we work with, are motivated by actually a positive economic return. They evaluate these investments in the same way that they would evaluate any other.

Mr. MCNERNEY. We need large-scale commercial applications.

Dr. HARMON. We need to move to large-scale. As I mentioned, it took us 14 years to get to this point. Any of the new technologies, and there is a whole portfolio that is emerging across the innovation world, they will all need to move to scale. They need that type of support.

Mr. MCNERNEY. Right.

Well, Mr. Mackler, what additional forms of policy do you see—this was already asked of Mr. Noel—do you see needed in addition to the USE IT Act?

Mr. NOEL. For carbon capture in particular?

Mr. MCNERNEY. Carbon capture.

Mr. NOEL. Well I think the USE IT Act does some very important things in terms of investing in direct air capture and in helping to facilitate the construction of infrastructure.

The most important policy for driving large-scale carbon capture and direct air capture into the marketplace would be a market for low-carbon energy, whether that takes the form of a clean energy standard, of a carbon price, or procurement policies that could actually provide the developers of the technologies and the projects a means to recoup their investment, that is the most important policy.

Mr. MCNERNEY. Thank you.

Mr. Begger, while enhanced oil recovery is currently one of the primary applications for utilizing captured carbon dioxide, its usefulness is expected to diminish as we transition away from reliance on fossil fuels.

In your testimony, you noted the role of carbon control technologies beyond EOR. Please describe some of the more interesting projects that your State is funding for utilizing captured carbon beyond EOR.

Mr. BEGGER. Mr. Chairman, Congressman, there really is a suite of different technologies. Sometimes I think we tend to gravitate towards the carbon fibers and these high-tech sort of things and there certainly are opportunities there because, at the end of the day, this is just chemistry. We are taking CO₂, you know one atom of carbon, two atoms of oxygen, and converting it into something else.

Mr. MCNERNEY. We have to do it economically, right? I mean—

Mr. BEGGER. We have to do it economically and so you know it is a very strong chemical bond that needs to be broken. And so what are the economics to take that energy and put—and convert it into something else?

I think sometimes, too, we try to demonize the particular carbon source when, in reality, we need to be focused on carbon itself. It shouldn't matter if it comes from EOR, or coal, or natural gas, or ethanol. It is what are doing? Are we capturing the carbon and uti-

lizing it or permanently sequestering it in a place where we can't use it?

So you know there are things like cryogenic carbon capture that could be used. There are things—membrane, solvents, absorbents. You know while we can't forget about the carbon capture piece—you have to capture it first—and then you know what you do with it. There is far more carbon out there than just EOR can support, or products, or geologic sequestration. So it is going to have—it is fitting those puzzle pieces together.

Mr. MCNERNEY. Thanks.

Mr. Chairman, thanks for your indulgence. I yield back.

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

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

Mr. JOHNSON. Well thank you, Chairman Tonko, and Ranking Member Shimkus for this hearing today because I think it is an important one. I want to thank our witnesses for being with us talk about a path forward on carbon capture technology.

You know whatever your opinion is on carbon emissions, it is good to see a number of us on both sides of the aisle taking a look at this thing and saying hey, how do we get some use out of it you know. We don't all have the same scientific background but we have been working on it now for a number of years and I am looking forward to seeing, through this legislation that we are looking at, how we can make this work.

I want to start out by mentioning and springing off of something my colleague, Mr. Carter from Georgia, said. You know what is going to really address the climate concerns across the globe is innovation. That is what is going to solve the problem—market-driven solutions and discoveries like carbon capture and others. Yes, there is a place for alternative fuels, and biofuels, and wind, and solar, and absolutely we should let the market drive innovation on those and use them as they fit into our energy profile but we are not going to solve the climate concerns with government mandates. We are just not going to do that. It is going to be smart folks like you guys and others that come up with solutions that solve the problem.

So let me start with Mr. Mackler, if I could, and Mr. Begger, you can chime in here, too. Last Congress, I co-sponsored, along with several of my colleagues, the legislation to reform the 45Q tax credit enacted as a part of the 2018 Omnibus, which was intended to incentivize the acceleration of new technologies to capture and store carbon for practical use.

While I understand that a number of carbon capture projects have been announced since those changes, I am told the IRS is sort of slow-walking, taking their time on making a number of clarifications for credits or for companies wishing to claim this tax credit.

So first, I would like to ask: How important has the Section 45Q tax credit been in some of the recent project announcements across the country, Mr. Mackler and Mr. Begger, if you would?

Mr. MACKLER. It has been central. It is the most important policy we have in place today for carbon capture.

Mr. JOHNSON. OK. Mr. Beggar.

Mr. BEGGER. I agree. You know there have been a lot of people who are using I guess those dollar figures for that tax credit to at least do some early back-of-the-envelope calculations on what projects would look but, ultimately, until they receive final guidance, you won't be able to pull together a project.

Mr. JOHNSON. Right. OK. So here is a case where Government policy of incentivizing innovation is producing results, rather than mandating a solution, giving the innovators an opportunity to work the problem.

And so if we can get some certainty with the IRS and guidance, which we know would minimize some ambiguity for businesses looking to invest in carbon capture technology, what effect would that have going forward, Mr. Mackler and Mr. Begger, again?

Mr. MACKLER. I think it would kickstart the commercial industry in a way we haven't seen yet. So it would be very catalytic. Of course, you know some of it depends on the details around what the IRS specifies in terms of how to implement the tax credit. So, that needs to come out quickly so we can take advantage of the credit because the window of opportunity is closing because there is a sunset on the tax credit and so we are losing time. But if enough time remains or if the credit is extended, it could be very catalytic.

Mr. JOHNSON. OK. Mr. Begger, do you agree?

Mr. BEGGER. I agree. I think the carrot of a tax credit has done far more to advance commercialization than any regulation, or threat of a carbon tax, or anything has ever done.

Mr. JOHNSON. I like your term, Mr. Mackler, it would kickstart it. You know it wasn't until the Wright brothers solved the problem with powered flight that it kicked into high gear the aviation industry. You know I mean we have got many, many examples like that and this is just another one.

We need to give the innovators an opportunity to innovate. That is what we need to be doing.

Mr. Chairman, I yield back.

Mr. TONKO. Thank you. The gentleman yields back.

The Chair now recognizes Representative Blunt Rochester for 5 minutes, please.

Ms. BLUNT ROCHESTER. Thank you, Mr. Chairman and Ranking Member Shimkus. Thank you also the panelists.

We are in a climate emergency. We are seeing the impacts from climate change in our communities every day. We are getting grave warnings from scientists and economists about our future, if we fail to address climate change. So, we must act.

Not only do our children and grandchildren depend on it for their futures, we all depend on it right now. That means that we must use every tool available to us to try to avoid the worst impacts from climate change. Numerous witnesses have testified that carbon capture and sequestration will be an important and even required tool, as we work to drastically reduce emissions.

I agree that carbon capture has a critical role to play in developing climate solutions, which is why I look forward to working with my colleagues on this legislation, but we must ensure that we get this policy right so that we can deploy this technology while also protecting our communities and our health.

Mr. Noel, in your testimony, you mentioned that, following enhanced oil recovery, carbon dioxide is stored underground. Are there environmental impacts to injecting carbon dioxide into the ground and, specifically, does it pose risks to drinking water sources?

Mr. NOEL. Sure, there are a whole unique set of risks that injecting continuous CO₂ under the ground at high pressures present to underground sources of drinking water. And we do not think the regulations on EOR, as currently practiced, are anywhere near where they need to be.

Ms. BLUNT ROCHESTER. Thank you.

And Mr. Mackler, as you know, throughout this Congress, this subcommittee has held a series of hearings on the challenges stemming from the climate crisis, as well as the solutions needed to address it. In your testimony, you discussed the need to bring a diverse set of solutions that will work comprehensively across economic sectors.

Can you elaborate on this and how this legislation will add to the suite of policy options to tackle the climate crisis?

Mr. MACKLER. Sure, I would be happy to.

Yes, so we have reviewed the analysis that has been done on how we can most cost-effectively decarbonize the U.S. and the global energy system. And it is very clear that the broader the toolkit of solutions, the more likelihood that we are going to actually achieve our climate goals, and especially achieve them at the lowest cost.

And so historically here in the United States, we have invested an enormous amount of resources quite successfully in bringing down the cost of wind and solar. And that is a major success story. We need to now do the similar thing for other energy technologies to ensure we are positioning ourselves for success. And the USE IT Act can be a part of a strategy for bringing forward carbon capture.

Ms. BLUNT ROCHESTER. Mr. Mackler, do you believe that this bill can be improved in ways that bolster public health protections, while maintaining its fundamental purpose to support CCUS deployment?

Mr. MACKLER. Yes, it could probably be improved in some ways.

Ms. BLUNT ROCHESTER. Do you have any suggestions?

Mr. MACKLER. Well, I haven't given a lot of thought to that part of this bill but I am sure there are ways that this could be done. I would be happy to submit that for the record later.

Ms. BLUNT ROCHESTER. That would be awesome.

Do you believe that these priorities—those priorities are compatible or are they mutually exclusive?

Mr. MACKLER. They are very compatible. I mean we have been injecting CO₂ into the subsurface through the enhanced oil recovery industry for more than 50 years. And so we can go and look, and see what impact that has had on the local environment, and I think we can demonstrate very clearly it has been minimal.

And so those parts of the challenges, to the extent that they remain, can be managed.

Ms. BLUNT ROCHESTER. And Mr. Anderson, in your testimony, you discussed how deploying carbon capture technology can impact your workers and communities.

Can you elaborate on how this legislation would create jobs?

Mr. ANDERSON. Well, as I mentioned earlier, there are three main components to it. All of the technology has to be made somewhere. It has to be manufactured. I think, personally, that we should make that domestically in America and export it abroad, as well as here.

Second of all, it all has to be constructed. Whatever the CO₂ source, there is no need to, as my colleague said, demonize any particular CO₂ source. They all need it and all of these systems would be built for that. That is thousands of jobs.

And then once they are in place, they have to be maintained, repaired, operated. That never ends. That is an unending source of jobs, literally.

Ms. BLUNT ROCHESTER. Thank you. I want to just close out by saying I believe it is not an all or nothing, and that we can't just do something today and not do something for tomorrow, or not do something for tomorrow and not do something right now, and that is why this legislation is important. But we also have to take into account the health outcomes as well. And so we look forward to working with you, Mr. Peters and Mr. McKinley, thank you, on this legislation.

Thank you so much and I yield back.

Mr. TONKO. The gentlewoman yields back.

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

Ms. BARRAGÁN. Thank you. Thank you for having this conversation. The climate crisis does require urgent action and we need to consider all options.

I think that there are merits to carbon capture technology for preventing greenhouse gas emissions. I am a little concerned about some of the unintended consequences that can arise from it.

Mr. Noel, one of the most significant reasons for environmental injustice in low-income communities and communities of color is their close proximity to fossil-fueled power plants and industrial facilities, such as coal.

In a carbon-constrained future, could carbon capture and storage keep a facility open longer in a disadvantaged community and would there still be the emission of pollutants, such as sulfur dioxide particulate matter and mercury, into the community?

Mr. NOEL. Yes, and it is one of the reasons Greenpeace does not support carbon capture in fossil fuel plants. Existing fossil fuel plants should be phased out.

And I also say that there is no consensus, in our view, on these technologies without representation of communities who live on the front line, who have to live next to extraction projects that would be prolonged as a result of deploying these technologies.

Ms. BARRAGÁN. So it would take us longer to get away from the reliance on fossil fuels. Would that be accurate in what you are saying?

Mr. NOEL. Yes.

Ms. BARRAGÁN. Mr. Mackler, one of the main uses for captured CO₂ is enhanced oil recovery, which makes it easier to extract oil from oil wells. My district has a lot of urban oil drilling. You can drive around my district and you can actually see it right in people's backyards, right next to where kids play on soccer fields, and

you can also see our kids walk around with inhalers around their necks.

So I have been fighting for closure of some urban oil wells, not understanding why we need them in people's backyards and next to parks where our kids play.

Could the oil industry use this enhanced oil recovery to extend the life of these wells?

Mr. MACKLER. Well that is a very good question. And the one thing to keep in mind when it comes to CO₂ injection for enhanced oil recovery is it can't be used in every reservoir. There are only certain reservoirs that are amenable to CO₂ injection for enhanced oil recovery. So I can't speak specifically, for example, around the production that is happening in your district and to whether or not they would be extended in their life by the injection of CO₂.

Ms. BARRAGÁN. What about urban drilling, in general?

Mr. MACKLER. I don't think that carbon capture or EOR would have any special impact on urban drilling, in general.

Ms. BARRAGÁN. And so following up on that question, does the streamlined permitting in the bill reduce the level of public input and environmental protections for establishing carbon capture in enhanced oil recovery?

Mr. MACKLER. Well it is really, you know those provisions that help to streamline the permitting of infrastructure do not—are not designed to circumvent the environmental review process. They are really designed to help accelerate and better coordinate environmental review and permitting of certain projects.

So I think that, in general, you know one should not look at that provision as sort of a workarround of environmental permitting.

Ms. BARRAGÁN. Mr. Noel, do you have anything you want to add?

Mr. NOEL. Yes, I would say the whole point of EOR is to extend the life of oil fields. It is right on DOE's website. It is in all the oil industry's literature.

I was at a briefing yesterday with an oil company who said you could almost apply EOR to every oil reservoir in the world, if they perfect this technology.

So if they get—continue to get Federal, State support and incentives, we are talking an insane amount of oil on deck.

Ms. BARRAGÁN. Thank you.

Mr. Noel, how does the current cost of carbon capture and storage, as a climate solution, compare to the cost to reduce emissions through other means, like solar, wind, geothermal, and energy efficiency investments?

Mr. NOEL. It is probably the most expensive way to do it right now in the near-term. Energy efficiency seems to be the cheapest.

Ms. BARRAGÁN. Right. Thank you to our panelists.

I yield back.

Mr. TONKO. The gentlewoman yields back.

I believe that completes the list of members choosing to ask questions of our panelists, and we thank you all for appearing here today and for your help, too, in bringing us together.

So I do have a request for unanimous consent to enter the following into the record: a letter from Clean Water Action; a letter from the Portland Cement Association; a letter from Sfonte (phonetic); a letter from the Western Governors Association; a letter

from Our Children's Trust; a report from World Resources Institute entitled CarbonShot: Federal Policy Options for Carbon Removal in the United States; a memo from the Congressional Research Service regarding CCUS projects and CO₂ pipelines as covered projects under FAST 41 guidance; and then finally six letters of support from various groups that were sent to the Senate in 2019.

Without objection, so ordered.

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

Mr. TONKO. And I again thank all of our witnesses for joining us for today's hearing.

Mr. Anderson, thank you. I know you did some reach out with the subcommittee and thank you for that.

Mr. ANDERSON. Thank you.

Mr. TONKO. And I remind Members that, pursuant to committee rules, they have ten business days by which to submit additional questions for the record to be answered by our witnesses. I would only ask that each witness respond promptly to any such questions that you may receive.

And at this time, this subcommittee is adjourned.

[Whereupon, at 12:09 p.m., the subcommittee was adjourned.]

116TH CONGRESS
1ST SESSION

H. R. 1166

To support carbon dioxide utilization and direct air capture research, to facilitate the permitting and development of carbon capture, utilization, and sequestration projects and carbon dioxide pipelines, and for other purposes.

IN THE HOUSE OF REPRESENTATIVES

FEBRUARY 13, 2019

Mr. PETERS (for himself, Mr. MCKINLEY, Mr. VEASEY, Mr. SCHWEIKERT, and Mrs. BUSTOS) introduced the following bill; which was referred to the Committee on Energy and Commerce, and in addition to the Committees on Science, Space, and Technology, Natural Resources, and Transportation and Infrastructure, for a period to be subsequently determined by the Speaker, in each case for consideration of such provisions as fall within the jurisdiction of the committee concerned

A BILL

To support carbon dioxide utilization and direct air capture research, to facilitate the permitting and development of carbon capture, utilization, and sequestration projects and carbon dioxide pipelines, and for other purposes.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*

1 **SECTION 1. SHORT TITLE.**

2 This Act may be cited as the “Utilizing Significant
3 Emissions with Innovative Technologies Act” or the “USE
4 IT Act”.

5 **TITLE I—ENCOURAGING**
6 **PROJECTS TO REDUCE EMIS-**
7 **SIONS**

8 **SEC. 101. RESEARCH, INVESTIGATION, TRAINING, AND**
9 **OTHER ACTIVITIES.**

10 Section 103 of the Clean Air Act (42 U.S.C. 7403)
11 is amended—

12 (1) in subsection (c)(3), in the first sentence of
13 the matter preceding subparagraph (A), by striking
14 “precursors” and inserting “precursors”; and

15 (2) in subsection (g)—

16 (A) by redesignating paragraphs (1)
17 through (4) as subparagraphs (A) through (D),
18 respectively, and indenting appropriately;

19 (B) in the undesignated matter following
20 subparagraph (D) (as so redesignated)—

21 (i) in the second sentence, by striking
22 “The Administrator” and inserting the fol-
23 lowing:

24 “(5) COORDINATION AND AVOIDANCE OF DU-
25 PPLICATION.—The Administrator”; and

- 1 (ii) in the first sentence, by striking
2 “Nothing” and inserting the following:
3 “(4) EFFECT OF SUBSECTION.—Nothing”;
4 (C) in the matter preceding subparagraph
5 (A) (as so redesignated)—
6 (i) in the third sentence, by striking
7 “Such program” and inserting the fol-
8 lowing:
9 “(3) PROGRAM INCLUSIONS.—The program
10 under this subsection”;
11 (ii) in the second sentence—
12 (I) by inserting “States, institu-
13 tions of higher education,” after “sci-
14 entists,”; and
15 (II) by striking “Such strategies
16 and technologies shall be developed”
17 and inserting the following:
18 “(2) PARTICIPATION REQUIREMENT.—Such
19 strategies and technologies described in paragraph
20 (1) shall be developed”; and
21 (iii) in the first sentence, by striking
22 “In carrying out” and inserting the fol-
23 lowing:
24 “(1) IN GENERAL.—In carrying out”; and
25 (D) by adding at the end the following:

1 “(6) CERTAIN CARBON DIOXIDE ACTIVITIES.—

2 “(A) IN GENERAL.—In carrying out para-
3 graph (3)(A) with respect to carbon dioxide, the
4 Administrator shall carry out the activities de-
5 scribed in each of subparagraphs (B), (C), (D),
6 and (E).

7 “(B) DIRECT AIR CAPTURE RESEARCH.—

8 “(i) DEFINITIONS.—In this subpara-
9 graph:

10 “(I) BOARD.—The term ‘Board’
11 means the Direct Air Capture Tech-
12 nology Advisory Board established by
13 clause (iii)(I).

14 “(II) DILUTE.—The term ‘dilute’
15 means a concentration of less than 1
16 percent by volume.

17 “(III) DIRECT AIR CAPTURE.—

18 “(aa) IN GENERAL.—The
19 term ‘direct air capture’, with re-
20 spect to a facility, technology, or
21 system, means that the facility,
22 technology, or system uses car-
23 bon capture equipment to cap-
24 ture carbon dioxide directly from
25 the air.

1 “(bb) EXCLUSION.—The
2 term ‘direct air capture’ does not
3 include any facility, technology,
4 or system that captures carbon
5 dioxide—

6 “(AA) that is delib-
7 erately released from a natu-
8 rally occurring subsurface
9 spring; or

10 “(BB) using natural
11 photosynthesis.

12 “(IV) INTELLECTUAL PROP-
13 ERTY.—The term ‘intellectual prop-
14 erty’ means—

15 “(aa) an invention that is
16 patentable under title 35, United
17 States Code; and

18 “(bb) any patent on an in-
19 vention described in item (aa).

20 “(ii) TECHNOLOGY PRIZES.—

21 “(I) IN GENERAL.—Not later
22 than 1 year after the date of enact-
23 ment of the USE IT Act, the Admin-
24 istrator, in consultation with the Sec-
25 retary of Energy, shall establish a

1 program to provide, and shall provide,
2 financial awards on a competitive
3 basis for direct air capture from
4 media in which the concentration of
5 carbon dioxide is dilute.

6 “(II) DUTIES.—In carrying out
7 this clause, the Administrator shall—

8 “(aa) subject to subclause
9 (III), develop specific require-
10 ments for—

11 “(AA) the competition
12 process; and

13 “(BB) the demonstra-
14 tion of performance of ap-
15 proved projects;

16 “(bb) offer financial awards
17 for a project designed—

18 “(AA) to the maximum
19 extent practicable, to cap-
20 ture more than 10,000 tons
21 of carbon dioxide per year;
22 and

23 “(BB) to operate in a
24 manner that would be com-
25 mercially viable in the fore-

1 seeable future (as deter-
2 mined by the Board); and

3 “(cc) to the maximum ex-
4 tent practicable, make financial
5 awards to geographically diverse
6 projects, including at least—

7 “(AA) 1 project in a
8 coastal State; and

9 “(BB) 1 project in a
10 rural State.

11 “(III) PUBLIC PARTICIPATION.—

12 In carrying out subclause (II)(aa), the
13 Administrator shall—

14 “(aa) provide notice of and,
15 for a period of not less than 60
16 days, an opportunity for public
17 comment on, any draft or pro-
18 posed version of the requirements
19 described in subclause (II)(aa);
20 and

21 “(bb) take into account pub-
22 lic comments received in devel-
23 oping the final version of those
24 requirements.

1 “(iii) DIRECT AIR CAPTURE TECH-
2 NOLOGY ADVISORY BOARD.—

3 “(I) ESTABLISHMENT.—There is
4 established an advisory board to be
5 known as the ‘Direct Air Capture
6 Technology Advisory Board’.

7 “(II) COMPOSITION.—The Board
8 shall be composed of 9 members ap-
9 pointed by the Administrator, who
10 shall provide expertise in—

11 “(aa) climate science;

12 “(bb) physics;

13 “(cc) chemistry;

14 “(dd) biology;

15 “(ee) engineering;

16 “(ff) economics;

17 “(gg) business management;

18 and

19 “(hh) such other disciplines
20 as the Administrator determines
21 to be necessary to achieve the
22 purposes of this subparagraph.

23 “(III) TERM; VACANCIES.—

1 “(aa) TERM.—A member of
2 the Board shall serve for a term
3 of 6 years.

4 “(bb) VACANCIES.—A va-
5 cancy on the Board—

6 “(AA) shall not affect
7 the powers of the Board;
8 and

9 “(BB) shall be filled in
10 the same manner as the
11 original appointment was
12 made.

13 “(IV) INITIAL MEETING.—Not
14 later than 30 days after the date on
15 which all members of the Board have
16 been appointed, the Board shall hold
17 the initial meeting of the Board.

18 “(V) MEETINGS.—The Board
19 shall meet at the call of the Chair-
20 person or on the request of the Ad-
21 ministrator.

22 “(VI) QUORUM.—A majority of
23 the members of the Board shall con-
24 stitute a quorum, but a lesser number
25 of members may hold hearings.

1 “(VII) CHAIRPERSON AND VICE
2 CHAIRPERSON.—The Board shall se-
3 lect a Chairperson and Vice Chair-
4 person from among the members of
5 the Board.

6 “(VIII) COMPENSATION.—Each
7 member of the Board may be com-
8 pensated at not to exceed the daily
9 equivalent of the annual rate of basic
10 pay in effect for a position at level V
11 of the Executive Schedule under sec-
12 tion 5316 of title 5, United States
13 Code, for each day during which the
14 member is engaged in the actual per-
15 formance of the duties of the Board.

16 “(IX) DUTIES.—The Board shall
17 advise the Administrator on carrying
18 out the duties of the Administrator
19 under this subparagraph.

20 “(X) FACA.—The Federal Advi-
21 sory Committee Act (5 U.S.C. App.)
22 shall apply to the Board.

23 “(iv) INTELLECTUAL PROPERTY.—

24 “(I) IN GENERAL.—As a condi-
25 tion of receiving a financial award

1 under this subparagraph, an applicant
2 shall agree to vest the intellectual
3 property of the applicant derived from
4 the technology in 1 or more entities
5 that are incorporated in the United
6 States.

7 “(II) RESERVATION OF LI-
8 CENSE.—The United States—

9 “(aa) may reserve a non-
10 exclusive, nontransferable, irrev-
11 ocable, paid-up license, to have
12 practiced for or on behalf of the
13 United States, in connection with
14 any intellectual property de-
15 scribed in subclause (I); but

16 “(bb) shall not, in the exer-
17 cise of a license reserved under
18 item (aa), publicly disclose pro-
19 prietary information relating to
20 the license.

21 “(III) TRANSFER OF TITLE.—
22 Title to any intellectual property de-
23 scribed in subclause (I) shall not be
24 transferred or passed, except to an
25 entity that is incorporated in the

1 United States, until the expiration of
2 the first patent obtained in connection
3 with the intellectual property.

4 “(v) AUTHORIZATION OF APPROPRIA-
5 TIONS.—There is authorized to be appro-
6 priated to carry out this subparagraph
7 \$35,000,000, to remain available until ex-
8 pended.

9 “(vi) TERMINATION OF AUTHORITY.—
10 The Board and all authority provided
11 under this subparagraph shall terminate
12 not later than 10 years after the date of
13 enactment of the USE IT Act.

14 “(C) CARBON DIOXIDE UTILIZATION RE-
15 SEARCH.—

16 “(i) DEFINITION OF CARBON DIOXIDE
17 UTILIZATION.—In this subparagraph, the
18 term ‘carbon dioxide utilization’ refers to
19 technologies or approaches that lead to the
20 use of carbon dioxide—

21 “(I) through the fixation of car-
22 bon dioxide through photosynthesis or
23 chemosynthesis, such as through the
24 growing of algae or bacteria;

1 “(II) through the chemical con-
2 version of carbon dioxide to a material
3 or chemical compound in which the
4 carbon dioxide is securely stored; or

5 “(III) through the use of carbon
6 dioxide for any other purpose for
7 which a commercial market exists, as
8 determined by the Administrator.

9 “(ii) PROGRAM.—The Administrator,
10 in consultation with the Secretary of En-
11 ergy, shall carry out a research and devel-
12 opment program for carbon dioxide utiliza-
13 tion to promote existing and new tech-
14 nologies that transform carbon dioxide
15 generated by industrial processes into a
16 product of commercial value, or as an
17 input to products of commercial value.

18 “(iii) TECHNICAL AND FINANCIAL AS-
19 SISTANCE.—Not later than 2 years after
20 the date of enactment of the USE IT Act,
21 in carrying out this subsection, the Admin-
22 istrator, in consultation with the Secretary
23 of Energy, shall support research and in-
24 frastructure activities relating to carbon
25 dioxide utilization by providing technical

1 assistance and financial assistance in ac-
2 cordance with clause (iv).

3 “(iv) ELIGIBILITY.—To be eligible to
4 receive technical assistance and financial
5 assistance under clause (iii), a carbon diox-
6 ide utilization project shall—

7 “(I) have access to an emissions
8 stream generated by a stationary
9 source within the United States that
10 is capable of supplying not less than
11 250 metric tons per day of carbon di-
12 oxide for research;

13 “(II) have access to adequate
14 space for a laboratory and equipment
15 for testing small-scale carbon dioxide
16 utilization technologies, with onsite
17 access to larger test bays for scale-up;
18 and

19 “(III) have existing partnerships
20 with institutions of higher education,
21 private companies, States, or other
22 government entities.

23 “(v) COORDINATION.—In supporting
24 carbon dioxide utilization projects under
25 this paragraph, the Administrator shall

1 consult with the Secretary of Energy, and,
2 as appropriate, with the head of any other
3 relevant Federal agency, States, the pri-
4 vate sector, and institutions of higher edu-
5 cation to develop methods and technologies
6 to account for the carbon dioxide emissions
7 avoided by the carbon dioxide utilization
8 projects.

9 “(vi) AUTHORIZATION OF APPROPRIA-
10 TIONS.—There is authorized to be appro-
11 priated to carry out this subparagraph
12 \$50,000,000, to remain available until ex-
13 pended.

14 “(D) DEEP SALINE FORMATION RE-
15 PORT.—

16 “(i) DEFINITION OF DEEP SALINE
17 FORMATION.—

18 “(I) IN GENERAL.—In this sub-
19 paragraph, the term ‘deep saline for-
20 mation’ means a formation of sub-
21 surface geographically extensive sedi-
22 mentary rock layers saturated with
23 waters or brines that have a high total
24 dissolved solids content and that are
25 below the depth where carbon dioxide

1 can exist in the formation as a super-
2 critical fluid.

3 “(II) CLARIFICATION.—In this
4 subparagraph, the term ‘deep saline
5 formation’ does not include oil and
6 gas reservoirs.

7 “(ii) REPORT.—In consultation with
8 the Secretary of Energy, and, as appro-
9 priate, with the head of any other relevant
10 Federal agency and relevant stakeholders,
11 not later than 1 year after the date of en-
12 actment of the USE IT Act, the Adminis-
13 trator shall prepare, submit to Congress,
14 and make publicly available a report that
15 includes—

16 “(I) a comprehensive identifica-
17 tion of potential risks and benefits to
18 project developers associated with in-
19 creased storage of carbon dioxide cap-
20 tured from stationary sources in deep
21 saline formations, using existing re-
22 search;

23 “(II) recommendations for man-
24 aging the potential risks identified

1 under subclause (I), including poten-
2 tial risks unique to public land; and

3 “(III) recommendations for Fed-
4 eral legislation or other policy changes
5 to mitigate any potential risks identi-
6 fied under subclause (I).

7 “(E) REPORT ON CARBON DIOXIDE NON-
8 REGULATORY STRATEGIES AND TECH-
9 NOLOGIES.—

10 “(i) IN GENERAL.—Not less fre-
11 quently than once every 2 years, the Ad-
12 ministrator shall submit to the Committee
13 on Environment and Public Works of the
14 Senate and the Committee on Energy and
15 Commerce of the House of Representatives
16 a report that describes—

17 “(I) the recipients of assistance
18 under subparagraphs (B) and (C);
19 and

20 “(II) a plan for supporting addi-
21 tional nonregulatory strategies and
22 technologies that could significantly
23 prevent carbon dioxide emissions or
24 reduce carbon dioxide levels in the air,

1 in conjunction with other Federal
2 agencies.

3 “(ii) INCLUSIONS.—The plan sub-
4 mitted under clause (i) shall include—

5 “(I) a methodology for evaluating
6 and ranking technologies based on the
7 ability of the technologies to cost ef-
8 fectively reduce carbon dioxide emis-
9 sions or carbon dioxide levels in the
10 air; and

11 “(II) a description of any nonair-
12 related environmental or energy con-
13 siderations regarding the technologies.

14 “(F) GAO REPORT.—The Comptroller
15 General of the United States shall submit to
16 Congress a report that—

17 “(i) identifies all Federal grant pro-
18 grams in which a purpose of a grant under
19 the program is to perform research on car-
20 bon capture and utilization technologies,
21 including direct air capture technologies;
22 and

23 “(ii) examines the extent to which the
24 Federal grant programs identified pursu-

1 ant to clause (i) overlap or are dupli-
 2 cative.”.

3 **TITLE II—IMPROVEMENT OF**
 4 **PERMITTING PROCESS FOR**
 5 **CARBON DIOXIDE CAPTURE**
 6 **AND INFRASTRUCTURE**
 7 **PROJECTS**

8 **SEC. 201. INCLUSION OF CARBON CAPTURE INFRASTRUC-**
 9 **TURE PROJECTS.**

10 Section 41001(6) of the FAST Act (42 U.S.C.
 11 4370m(6)) is amended—

12 (1) in subparagraph (A)—

13 (A) in the matter preceding clause (i), by
 14 inserting “carbon capture,” after “manufac-
 15 turing,”;

16 (B) in clause (i)(III), by striking “or” at
 17 the end;

18 (C) by redesignating clause (ii) as clause
 19 (iii); and

20 (D) by inserting after clause (i) the fol-
 21 lowing:

22 “(ii) is covered by a programmatic
 23 plan or environmental review developed for
 24 the primary purpose of facilitating develop-
 25 ment of carbon dioxide pipelines; or”; and

1 (2) by adding at the end the following:

2 “(C) INCLUSION.—For purposes of sub-
3 paragraph (A), construction of infrastructure
4 for carbon capture includes construction of—

5 “(i) any facility, technology, or system
6 that captures, utilizes, or sequesters car-
7 bon dioxide emissions, including projects
8 for direct air capture (as defined in para-
9 graph (6)(B)(i) of section 103(g) of the
10 Clean Air Act (42 U.S.C. 7403(g)); and

11 “(ii) carbon dioxide pipelines.”.

12 **SEC. 202. DEVELOPMENT OF CARBON CAPTURE, UTILIZA-**
13 **TION, AND SEQUESTRATION REPORT, PER-**
14 **MITTING GUIDANCE, AND REGIONAL PERMIT-**
15 **TING TASK FORCE.**

16 (a) DEFINITIONS.—In this section:

17 (1) CARBON CAPTURE, UTILIZATION, AND SE-
18 QUESTRATION PROJECTS.—The term “carbon cap-
19 ture, utilization, and sequestration projects” includes
20 projects for direct air capture (as defined in para-
21 graph (6)(B)(i) of section 103(g) of the Clean Air
22 Act (42 U.S.C. 7403(g))).

23 (2) EFFICIENT, ORDERLY, AND RESPON-
24 SIBLE.—The term “efficient, orderly, and respon-
25 sible” means, with respect to development or the

1 permitting process for carbon capture, utilization,
2 and sequestration projects and carbon dioxide pipe-
3 lines, a process that is completed in an expeditious
4 manner while maintaining environmental, health,
5 and safety protections.

6 (b) REPORT.—

7 (1) IN GENERAL.—Not later than 180 days
8 after the date of enactment of this Act, the Chair of
9 the Council on Environmental Quality (referred to in
10 this section as the “Chair”), in consultation with the
11 Administrator of the Environmental Protection
12 Agency, the Secretary of Energy, the Secretary of
13 the Interior, the Executive Director of the Federal
14 Permitting Improvement Council, and the head of
15 any other relevant Federal agency (as determined by
16 the President), shall prepare a report that—

17 (A) compiles all existing relevant Federal
18 permitting and review information and re-
19 sources for project applicants, agencies, and
20 other stakeholders interested in the deployment
21 of carbon capture, utilization, and sequestration
22 projects and carbon dioxide pipelines, includ-
23 ing—

24 (i) the appropriate points of inter-
25 action with Federal agencies;

1 (ii) clarification of the permitting re-
2 sponsibilities and authorities among Fed-
3 eral agencies; and

4 (iii) best practices and templates for
5 permitting;

6 (B) inventories current or emerging activi-
7 ties that transform captured carbon dioxide into
8 a product of commercial value, or as an input
9 to products of commercial value;

10 (C) inventories existing initiatives and re-
11 cent publications that analyze or identify pri-
12 ority carbon dioxide pipelines needed to enable
13 efficient, orderly, and responsible development
14 of carbon capture, utilization, and sequestration
15 projects at increased scale;

16 (D) identifies gaps in the current Federal
17 regulatory framework for the deployment of
18 carbon capture, utilization, and sequestration
19 projects and carbon dioxide pipelines; and

20 (E) identifies Federal financing mecha-
21 nisms available to project developers.

22 (2) SUBMISSION; PUBLICATION.—The Chair
23 shall—

24 (A) submit the report under paragraph (1)
25 to the Committee on Environment and Public

1 Works of the Senate and the Committee on En-
2 ergy and Commerce of the House of Represent-
3 atives; and

4 (B) as soon as practicable, make the report
5 publicly available.

6 (c) GUIDANCE.—

7 (1) IN GENERAL.—After submission of the re-
8 port under subsection (b)(2), but not later than 1
9 year after the date of enactment of this Act, the
10 Chair shall submit guidance consistent with that re-
11 port to all relevant Federal agencies that—

12 (A) facilitates reviews associated with the
13 deployment of carbon capture, utilization, and
14 sequestration projects and carbon dioxide pipe-
15 lines; and

16 (B) supports the efficient, orderly, and re-
17 sponsible development of carbon capture, utili-
18 zation, and sequestration projects and carbon
19 dioxide pipelines.

20 (2) REQUIREMENTS.—

21 (A) IN GENERAL.—The guidance under
22 paragraph (1) shall address requirements
23 under—

24 (i) the National Environmental Policy
25 Act of 1969 (42 U.S.C. 4321 et seq.);

1 (ii) the Federal Water Pollution Con-
2 trol Act (33 U.S.C. 1251 et seq.);

3 (iii) the Clean Air Act (42 U.S.C.
4 7401 et seq.);

5 (iv) the Safe Drinking Water Act (42
6 U.S.C. 300f et seq.);

7 (v) the Endangered Species Act of
8 1973 (16 U.S.C. 1531 et seq.);

9 (vi) division A of subtitle III of title
10 54, United States Code (formerly known
11 as the “National Historic Preservation
12 Act”);

13 (vii) the Migratory Bird Treaty Act
14 (16 U.S.C. 703 et seq.);

15 (viii) the Act of June 8, 1940 (16
16 U.S.C. 668 et seq.) (commonly known as
17 the “Bald and Golden Eagle Protection
18 Act”); and

19 (ix) any other Federal law that the
20 Chair determines to be appropriate.

21 (B) ENVIRONMENTAL REVIEWS.—The
22 guidance under paragraph (1) shall include di-
23 rection to States and other interested parties
24 for the development of programmatic environ-
25 mental reviews under the National Environ-

1 mental Policy Act of 1969 (42 U.S.C. 4321 et
2 seq.) for carbon capture, utilization, and se-
3 questration projects and carbon dioxide pipe-
4 lines.

5 (C) PUBLIC INVOLVEMENT.—The guidance
6 under paragraph (1) shall be subject to the
7 public notice, comment, and solicitation of in-
8 formation procedures under section 1506.6 of
9 title 40, Code of Federal Regulations (or a suc-
10 cessor regulation).

11 (3) SUBMISSION; PUBLICATION.—The Chair
12 shall—

13 (A) submit the guidance under paragraph
14 (1) to the Committee on Environment and Pub-
15 lic Works of the Senate and the Committee on
16 Energy and Commerce of the House of Rep-
17 resentatives; and

18 (B) as soon as practicable, make the guid-
19 ance publicly available.

20 (4) EVALUATION.—The Chair shall—

21 (A) periodically evaluate the reports of the
22 task forces under subsection (d)(5) and, as nec-
23 essary, revise the guidance under paragraph
24 (1); and

1 (B) each year, submit to the Committee on
2 Environment and Public Works of the Senate,
3 the Committee on Energy and Commerce of the
4 House of Representatives, and relevant Federal
5 agencies a report that describes any rec-
6 ommendations for legislation, rules, revisions to
7 rules, or other policies that would address the
8 issues identified by the task forces under sub-
9 section (d)(5).

10 (d) TASK FORCE.—

11 (1) ESTABLISHMENT.—Not later than 18
12 months after the date of enactment of this Act, the
13 Chair shall establish not less than 2 task forces,
14 which shall each cover a different geographical area
15 with differing demographic, land use, or geological
16 issues—

17 (A) to identify permitting and other chal-
18 lenges and successes that permitting authorities
19 and project developers and operators face; and

20 (B) to improve the performance of the per-
21 mitting process and regional coordination for
22 the purpose of promoting the efficient, orderly,
23 and responsible development of carbon capture,
24 utilization, and sequestration projects and car-
25 bon dioxide pipelines.

1 (2) MEMBERS AND SELECTION.—

2 (A) IN GENERAL.—The Chair shall—

3 (i) develop criteria for the selection of
4 members to each task force; and

5 (ii) select members for each task force
6 in accordance with clause (i) and subpara-
7 graph (B).

8 (B) MEMBERS.—Each task force—

9 (i) shall include not less than 1 rep-
10 resentative of each of—

11 (I) the Environmental Protection
12 Agency;

13 (II) the Department of Energy;

14 (III) the Department of the Inte-
15 rior;

16 (IV) any other Federal agency
17 the Chair determines to be appro-
18 priate;

19 (V) any State that requests par-
20 ticipation in the geographical area
21 covered by the task force;

22 (VI) developers or operators of
23 carbon capture, utilization, and se-
24 questration projects or carbon dioxide
25 pipelines; and

1 (VII) nongovernmental member-
2 ship organizations, the primary mis-
3 sion of which concerns protection of
4 the environment; and

5 (ii) at the request of a Tribal or local
6 government, may include a representative
7 of—

8 (I) not less than 1 local govern-
9 ment in the geographical area covered
10 by the task force; and

11 (II) not less than 1 Tribal gov-
12 ernment in the geographical area cov-
13 ered by the task force.

14 (3) MEETINGS.—

15 (A) IN GENERAL.—Each task force shall
16 meet not less than twice each year.

17 (B) JOINT MEETING.—To the maximum
18 extent practicable, the task forces shall meet
19 collectively not less than once each year.

20 (4) DUTIES.—Each task force shall—

21 (A) inventory existing or potential Federal
22 and State approaches to facilitate reviews asso-
23 ciated with the deployment of carbon capture,
24 utilization, and sequestration projects and car-

1 bon dioxide pipelines, including best practices
2 that—

- 3 (i) avoid duplicative reviews;
4 (ii) engage stakeholders early in the
5 permitting process; and
6 (iii) make the permitting process effi-
7 cient, orderly, and responsible;

8 (B) develop common models for State-level
9 carbon dioxide pipeline regulation and oversight
10 guidelines that can be shared with States in the
11 geographical area covered by the task force;

12 (C) provide technical assistance to States
13 in the geographical area covered by the task
14 force in implementing regulatory requirements
15 and any models developed under subparagraph
16 (B);

17 (D) inventory current or emerging activi-
18 ties that transform captured carbon dioxide into
19 a product of commercial value, or as an input
20 to products of commercial value;

21 (E) identify any priority carbon dioxide
22 pipelines needed to enable efficient, orderly, and
23 responsible development of carbon capture, uti-
24 lization, and sequestration projects at increased
25 scale;

1 (F) identify gaps in the current Federal
2 and State regulatory framework and in existing
3 data for the deployment of carbon capture, uti-
4 lization, and sequestration projects and carbon
5 dioxide pipelines;

6 (G) identify Federal and State financing
7 mechanisms available to project developers; and

8 (H) develop recommendations for relevant
9 Federal agencies on how to develop and re-
10 search technologies that—

11 (i) can capture carbon dioxide; and

12 (ii) would be able to be deployed with-
13 in the region covered by the task force, in-
14 cluding any projects that have received
15 technical or financial assistance for re-
16 search under paragraph (6) of section
17 103(g) of the Clean Air Act (42 U.S.C.
18 7403(g)).

19 (5) REPORT.—Each year, each task force shall
20 prepare and submit to the Chair and to the other
21 task forces a report that includes—

22 (A) any recommendations for improve-
23 ments in efficient, orderly, and responsible
24 issuance or administration of Federal permits
25 and other Federal authorizations required

1 under a law described in subsection (c)(2)(A);
2 and

3 (B) any other nationally relevant informa-
4 tion that the task force has collected in carrying
5 out the duties under paragraph (4).

6 (6) EVALUATION.—Not later than 5 years after
7 the date of enactment of this Act, the Chair shall—

8 (A) reevaluate the need for the task forces;
9 and

10 (B) submit to Congress a recommendation
11 as to whether the task forces should continue.

○

February 5, 2019

The Honorable Paul Tonko
Chair, Subcommittee on Environment
and Climate Change
U.S. House of Representatives
2123 Rayburn House Office Building
Washington, DC 20515

The Honorable John Shimkus
Ranking Member, Subcommittee on
Environment and Climate Change
U.S. House of Representatives
2123 Rayburn House Office Building
Washington, DC 20515

Chair Tonko and Ranking Member Shimkus

On behalf of Clean Water Action, our members, and supporters, I write to provide a written statement for the subcommittee's February 6, 2020 hearing on H.R. 1166, the "Utilizing Significant Emissions with Innovative Technologies Act," or the "USE IT Act." The stated purpose of the bill is to support direct air capture and storage of greenhouse gases, and facilitate the permitting and development of carbon capture utilization and storage (CCUS) projects and CO₂ pipelines. However, the language as drafted is problematic in that the bill would encourage oil development and put our water at risk. Clean Water Action recommends amending the bill to exclude oil production activities from the scope of the USE IT Act.

USE IT supports more oil production:

- **As written, the legislation will result in increased federal funding and preferential treatment for oil companies**, who are already the primary beneficiaries of federal incentives for carbon capture activities. Oil companies have received at least hundreds of millions in tax credits under Section 45Q of the tax code, with inadequate oversight, raising concerns as to whether the CO₂ has indeed been placed in secure geological storage, as required by law.¹
- Currently, the only robust market for captured or mined CO₂ is enhanced oil recovery, meaning that infrastructure built under USE IT provisions would likely be used to connect CO₂ sources to oil fields. The oil industry forecasts significant growth as a result of readily available carbon. Non-oil production uses of CO₂ should be prioritized to avoid undercutting and potentially eliminating the climate benefits of carbon capture.
- Although permanent sequestration is the stated end goal of pipelines and other infrastructure developed under USE IT, storage/utilization options not associated with oil production are not targeted with the policies in the bill. Without guardrails to ensure that

¹ Noël, John. "Carbon Capture and Release: Oversight Failures in the Section 45Q Tax Credit for Enhanced Oil Recovery" Clean Water Action/Clean Water Fund. Spring 2018. Available at: <https://www.cleanwateraction.org/publications/carbon-capture-and-release>

oil companies are not the beneficiaries of USE IT, the bill would lead to more oil production.

- **CO₂-EOR is a mature industry that does not need federal support** in the form of R&D funding paid by taxpayers and/or weakening environmental review for its infrastructure. As currently written, USE IT does not steer these resources and processes toward new and developing industries that would put captured carbon to uses that benefit the climate.

CO₂-EOR puts our air and water at risk. CO₂-EOR promises to extend the lifespan of oil fields by decades and lead to continued pollution of the air and water for those living nearby. By encouraging more oil production that utilizes CO₂-EOR, USE IT will lead to:

- **More oil and gas wastewater.** More oil production means more wastewater, which will be piped, trucked, spilled, injected, and dumped - all of which threaten water quality. The most common form of CO₂-EOR (water alternating gas injection) is especially water intensive, requiring the injection of an average of roughly 13 barrels of water for every barrel of oil produced.² This process creates huge volumes of wastewater and many related problems. From our years of work on oil and gas wastewater issues in states such as Pennsylvania, California, Texas, Oklahoma, and Colorado, we know that wastewater challenges follow oil and gas production, everywhere. State agencies aren't up to the task of effective oversight, and the industry will seek the cheapest disposal options, regardless of threats to water and health. In states where oil production is expanding, operators are seeking the ability to discharge into rivers and streams despite the fact that oil and gas wastewater is chock full of harmful chemicals, including some that we can't even detect or treat. With the finalization of the Dirty Water Rule (revised definition of a *Water of the US*), this means more of that wastewater will end up in our rivers, streams and wetlands.
- **More harmful chemicals in the environment.** More injection and oil production means more chemicals - both the additives, and the naturally occurring chemicals that come to the surface with oil and gas. From routine well drilling and maintenance activities, to well stimulation and injection products, the use of environmentally harmful chemicals in oil operations is common. The dangerous chemicals used for hydraulic fracturing are also used in conventional and EOR wells.³ And CO₂-EOR techniques may utilize PFAS chemicals. Research is ongoing for chemicals in this class to be used to improve CO₂-EOR productivity by acting as a CO₂ thickener, among other uses.⁴ At a moment when

² Wu, May, and Yiwen Chiu. "Consumptive Water Use in the Production of Ethanol and Petroleum Gasoline – 2011 Update." Argonne National Laboratory, 2011. <https://greet.es.anl.gov/publication-consumptive-water>

³ Stringfellow, William T., Mary Kay Camarillo, Jeremy K. Domen, Seth B. C. Shonkoff. "Comparison of chemical-use between hydraulic fracturing, acidizing, and routine oil and gas development" PLOS ONE. April 19, 2017. <https://doi.org/10.1371/journal.pone.0175344>

⁴ Xu, Xianhang. "Carbon Dioxide Thickening Agents for Reduced CO₂ Mobility" University of Pittsburgh. Feb 20, 2003. http://d-scholarship.pitt.edu/6471/1/dissertation_jianhang.pdf

we are trying to get a handle on PFAS/PFOA in the environment and drinking water, encouraging the oil industry to launch an expansion of their use would be reckless.

- **Threats to groundwater.** CO₂-EOR, along with other forms of enhanced recovery, like waterflooding and steamflooding, are the only forms of oil production regulated federally by the Safe Drinking Water Act's Underground Injection Control (UIC) program. That's because they put groundwater at risk, through the injection of fluids into the subsurface, potential for well failures and blowouts, and the large volumes of contaminated fluids that must be managed. But despite federal regulation, implementation has been lackluster in several states and by EPA. Congress has not raised EPA's budget to oversee injection wells in years, and state programs have struggled to effectively regulate the industry. Rapidly scaling up EOR activities without first fixing the UIC program could be a recipe for disaster for groundwater.

Finally, we are concerned with provisions in USE IT which could weaken environmental review of CO₂ pipelines and other infrastructure. It amends Title 41 of the FAST Act to include carbon capture infrastructure projects among the list of "covered projects" that receive limited public input and consideration of alternatives under NEPA. Giving oil infrastructure and pipelines preferred status for any kind of environmental review is inappropriate and puts water, air and climate at risk.

We urge you to amend and improve USE IT in order to ensure it does not lead to more oil production, more water pollution and weakened environmental reviews.

Thank you for your consideration of our views.

Sincerely,



Andrew Grinberg
National Campaigns Special Projects Manager
Clean Water Action



Portland Cement Association
 200 Massachusetts Ave NW, Suite 200
 Washington D.C., 20001
 202.408.9494 Fax: 202.408.0877
www.cement.org

February 5, 2020

The Honorable Paul Tonko
 Chairman
 Energy & Commerce
 Subcommittee on the Environment
 House of Representatives
 Washington, DC 20515

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

Dear Chairman Tonko and Ranking Member Shimkus:

I am writing on behalf of the Portland Cement Association to share our support for the Utilizing Significant Emissions with Innovative Technologies Act (USE IT Act, H.R. 1166). We believe that this legislation is an important step to help develop the technology needed to address climate change.

PCA, founded in 1916, is the premier policy, research, education, and market intelligence organization serving America's cement manufacturers. PCA members represent 93 percent of the United States' cement production capacity and have facilities in all 50 states. Cement and concrete product manufacturing, directly and indirectly, employs approximately 600,000 people in our country, and our collective industries contribute over \$100 billion to our economy. Portland cement is the fundamental ingredient in concrete. The Association promotes safety, sustainability, and innovation in all aspects of construction, fosters continuous improvement in cement manufacturing and distribution, and promotes economic growth and sound infrastructure investment.

Understanding the cement production process is essential for understanding the extensive environmental regulations that the industry complies with and its role in the economy. Portland cement is the primary ingredient of concrete, the principal material in a wide variety of infrastructure. Concrete is formed when portland cement is mixed with water, and aggregate (sand and rock), and allowed to harden. Cement is manufactured through a tightly controlled chemical combination of calcium, silica, aluminum, iron, and other minor ingredients. These chemicals are commonly derived from limestone, chalk, or marl, combined with shale, clay, slate, blast furnace slag, silica sand, and iron ore. These materials are heated to high temperatures, 3500°F or more, until they liquefy and become clinker. Once cooled, gypsum is added to the clinker, and the product is ground into the fine powder that becomes portland cement.

Carbon dioxide comes from two parts of cement production: calcification and the burning of the fuels to heat the minerals. Calcification is essential to converting limestone (CaCO_3) to the quicklime (CaO) in clinker to give cement its strength. But the chemical process of calcification results in carbon dioxide as a byproduct. The Cement industry has worked to reduce its GHG

emissions through efficiency improvements in the manufacturing process over the past 50 years. We have reduced energy use 40% from 7.8 gigajoules per equivalent tons in 1972 to 4.6 gigajoules per equivalent ton in 2016. For 2017, twenty-six U.S. cement plants, over a quarter, won awards from the Department of Energy's EnergyStar program for their efforts to improve their efficiency. The improvements include installation of more efficient motors, upgraded equipment controls & software, and improved operations.

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

Considering the chemistry required to make cement, reducing emissions will require utilization research, such as how to cost-effectively mineralize carbon. The USE IT Act provides the research, financial support, collaboration coordination, and permitting assistance to ensure Americans preserve their quality of life while fighting this environmental challenge.

PCA appreciates the opportunity to share our member's views on this legislation. We look forward to working with the subcommittee to advance this legislation and ensure cement manufacturers have the support required from the federal government as we work together to enable the industry's continued reduction of its carbon footprint in a responsible and sustainable manner.

Sincerely,

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

February 6, 2020

The Honorable Paul Tonko
Chairman
Subcommittee on Environment and Climate Change
Committee on Energy and Commerce
U.S. House of Representatives

The Honorable John Shimkus
Ranking Member
Subcommittee on Environment and Climate Change
Committee on Energy and Commerce
U.S. House of Representatives

Dear Chairman Tonko and Ranking Member Shimkus:

My name is Claude Letourneau and I am the CEO of Svante. I am submitting these remarks on behalf of Svante. Svante appreciates your leadership in holding this hearing of the Subcommittee on Environment and Climate Change to examine the issue of carbon capture technology, and H.R. 1166, the Utilizing Significant Emissions with Innovative Technologies (USE IT) Act. Deploying carbon capture technology is vital if we are to address rising concentrations of carbon dioxide in the atmosphere and curb the impacts of climate change.

Named for Svante Arrhenius, recipient of the 1903 Nobel Prize in Chemistry and one of the first scientists to discover the relationship between atmospheric carbon dioxide (CO₂) and warming Earth temperatures, Svante is an innovative, North American company manufacturing proprietary carbon capture technology.

First-generation capture technology uses liquid chemicals to capture CO₂. It is costly and requires a lot of space. Svante, in contrast, uses proprietary solid adsorbents with very large internal surface areas, which maximizes efficiency and requires only half the capital to construct. Svante's technology enables these adsorbents to switch between adsorbing CO₂ (catch) and releasing CO₂ (release) very quickly, resulting in more CO₂ being captured per unit volume of adsorbent. This results in very compact, less expensive equipment.

While this technology can be used for carbon capture from almost any source, including fossil fuel power plants, industrial sources, and direct air capture, its comparative efficiency enables capture of CO₂ from industrial sources at approximately half the capital cost of other technologies. Svante currently has a pilot facility in operation at a Husky Energy plant in Saskatchewan, Canada, which is capturing 30 tonnes per day of CO₂.

As the Committee knows, industrial emissions are responsible for approximately 21% of total global greenhouse gas emissions—more than all car, truck, aviation, and marine transportation



emissions combined. About 60% of direct CO₂ industry emissions come from large emitters such as cement plants, steel/iron and metals foundries, and chemical facilities. Currently, there are limited incentives for cement producers and other industrial sources to implement CCUS technology to capture emissions from the production processes at their plants, and few substitutes for the materials being produced at such plants.

Accordingly, while a central focus of HR 1166 is on Direct Air Capture, I strongly urge the Committee to support proposals to encourage the development of viable technologies and projects for capture of industrial emissions. This will be a crucial step in the quest to reduce GHGs worldwide.

Svante recently announced a collaborative project with Lafarge North America to construct a CO₂ capture project at Lafarge's Portland Cement Plant outside of Colorado Springs, Colorado. The Lafarge plant has an annual capacity of 1.8 million metric tons of cement, supplying cement throughout a seven-state region. This application of Svante's technology will capture approximately 2,500 tonnes of CO₂ per day per train, and can capture more than 90% of the plant's current CO₂ emissions. The cement plant is near an existing CO₂ pipeline that connects to the Permian Basin, so Svante is partnering with Occidental Petroleum. Occidental will be the CO₂ off-taker and will utilize the CO₂ for enhanced oil recovery (EOR). Occidental is the largest user of CO₂ for EOR in the world. This supply of anthropogenic CO₂ will supplant a comparable amount of CO₂ currently being mined for use in EOR, while enhancing the economic viability of the full-scale pilot project.

I also want to note that, in a newly announced partnership with Climeworks, we are collaborating on integrating industrial CO₂ capture with direct air capture to focus on achieving net-zero emissions, as well as leveraging Svante's core technology to help make direct air capture more economic. This collaboration could demonstrate the technology's capability for direct air capture of CO₂ at the same site.

As the Chairman's memo recognizes, the use of captured CO₂ for EOR is not a panacea, but absent both a price on carbon and a market demand and price on CO₂ for alternative uses, the combination of selling CO₂ for EOR and the 45Q tax credit are crucial for making an industrial capture project economically viable.

Accordingly, we support all efforts to increase demand for alternative uses of CO₂, and strongly support H.R. 1166 and its Section 101, which would provide support for research and development of new and existing CO₂ utilization technologies that transform captured emissions into commercial products or inputs to commercial products.

The Chairman's memo also references the 45Q tax credit for capture and storage of CO₂. While the tax credit is not in the jurisdiction of this Subcommittee, I would like to recommend that the credit should not only be extended, but the length of time for which emitters receive the credit should be lengthened beyond the current twelve years. The current credit enables emitters to recover the capital costs of carbon capture facilities, as well as provide very modest support for the operations and maintenance costs during the initial 12 years. However, absent a price on



carbon, the economics of operating a carbon capture facility beyond the twelve-year duration of the credit will be challenging, even if emitters are able to sell their captured CO₂ at the current rate of \$20 a ton.

Regardless of whether captured carbon is utilized for yet-to-be-developed uses of CO₂, stored, or used for EOR, virtually all capture projects will rely on pipelines to carry the captured CO₂ to its next use or permanent storage. The process for permitting of pipelines may be the long pole in the quest to deploy cost effective CCUS projects, given the complexity and overly lengthy timeframes of the current processes for permitting. Accordingly, Svante strongly supports Title II of HR 1166 that addresses the current challenges for permitting pipelines.

We are proud to be a major player in this emerging industry that will be critical to the efforts to capture CO₂ and the efforts to address climate change. This is an important hearing in those efforts, and this legislation will be key. We thank you again for holding this hearing and for the Committee's support of CCUS going forward. I would be happy to answer any questions the Committee may have about Svante, or the business model for deploying carbon capture projects in a cost-effective manner.

Sincerely,

Claude Letourneau
CEO
Svante



DOUG BURGUM
GOVERNOR OF NORTH DAKOTA
CHAIR

KATE BROWN
GOVERNOR OF OREGON
VICE CHAIR

JAMES D. OGSBURY
EXECUTIVE DIRECTOR

February 4, 2020

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

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

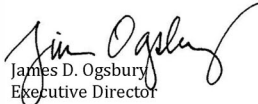
Dear Chairman Tonko and Ranking Member Shimkus:

Western states supply a majority of the country's energy resources and electric power. To ensure energy is affordable, reliable and meets environmental goals, Western Governors promote a balanced energy portfolio and the advancement of new technology, including carbon capture. Thank you for considering this important matter at your February 6 hearing on Clearing the Air: Legislation to Promote Carbon Capture, Utilization and Storage. To inform the Subcommittee's consideration of this subject, I request that you include the following attachments in the permanent record of the hearing:

- WGA Policy Resolution 2018-04, *Energy in the West*;
- Western Governors' Energy Vision for the West; and
- A 2018 letter from Western Governors supporting S. 2602, which aligns substantively with H.R. 1166.

Thank you for your consideration of this request.

Respectfully,


James D. Ogsbury
Executive Director

Attachments



**Western Governors' Association
Policy Resolution 2018-04**

Energy in the West

A. BACKGROUND

1. Energy policy and the development of sustainable energy resources are major priorities for every Western Governor.
2. Western Governors recognize that approaches to energy use and development vary among our states, territories, and flag islands. However, the Governors remain committed to the development of policies and utilization of state energy endowments that result in the maximum benefit for their citizens, the region, and the nation.
3. Western energy production is indispensable to meeting national energy demands. The West is the energy breadbasket of the United States:
 - a. Western states have all high-yield geothermal energy capacity in the continental United States.
 - b. Western states supply the majority of non-federal United States petroleum.
 - c. Western states are at the forefront of unconventional natural gas production.
 - d. The Pacific Northwest produces the largest output of hydropower in the nation.
 - e. Western states have the largest contiguous areas of wind power resources in the nation.
 - f. The Southwest has some of the highest-identified solar energy resource areas in the United States.
 - g. Western states produce the largest portion of coal in the United States, which is the fuel that constitutes the largest share of the national electricity generation mix.
 - h. The West has the largest contiguous areas of high-yield biomass energy resource potential in the nation.
 - i. Western states have nuclear power generation facilities and produce all domestic uranium.
4. Western states, Pacific territories, and flag islands have the resources to drive job creation and economic development through broad growth in the energy industry.

5. The Merchant Marine Act of 1920 has prevented certain noncontiguous states, territories, and flag islands from being supplied with domestically produced energy commodities.

B. GOVERNORS' POLICY STATEMENT

1. Western Governors recognize the following as energy policy priorities for the West:
 - a. Secure the United States' energy supply and systems, and safeguard against risks to cybersecurity and physical security.
 - b. Ensure energy is clean, affordable, and reliable by providing a balanced portfolio of renewable, non-traditional, and traditional resources.
 - c. Increase energy efficiency associated with electricity, natural gas, and other energy sources and uses to enhance energy affordability and to effectively meet environmental goals.
 - d. Advance efficient environmental review, siting, and permitting processes that facilitate energy development and the improvement and construction of necessary electric grid (transmission and distribution) and pipeline infrastructure, while ensuring environmental and natural resource protection.
 - e. Improve the United States' electric grid's reliability and resiliency.
 - f. Protect western wildlife, natural resources, and the environment, including clean air and clean water, and strive to reduce greenhouse gas emissions.
 - g. Make the West a leader in energy education, technology development, research, and innovation.
 - h. Utilize an all-of-the-above approach to energy development and use in the West, while protecting the environment, wildlife, and natural resources.
2. Western Governors support increasing the development and use of energy storage, alternative transportation fuels, and alternative vehicles.
3. Western Governors call on the federal government to lift a barrier to domestic free trade between the contiguous United States and the noncontiguous states, territories and U.S. flag islands by the Merchant Marine Act of 1920 by allowing those jurisdictions to receive energy commodities produced in the mainland but transported by foreign vessels, should those jurisdictions, and the jurisdictions whose ports are being used to ship these materials, desire it.
4. Redundant federal regulation of energy development, transport, and use is not required where sufficient state, territorial, or flag island regulations exist. Existing state authority should not be replaced or impeded by Congress or federal agencies.

C. GOVERNORS' MANAGEMENT DIRECTIVE

1. The Governors direct WGA staff to work with Congressional committees of jurisdiction, the Executive Branch, and other entities, where appropriate, to achieve the objectives of this resolution.
2. The Governors also direct WGA staff to consult with the Western Interstate Energy Board to recommend updates to the 10-Year Energy Vision that provide detail on the Governors' energy policy objectives outlined in this resolution.
3. Furthermore, the Governors direct WGA staff to consult with the Staff Advisory Council regarding its efforts to realize the objectives of this resolution and to keep the Governors apprised of its progress in this regard.

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



Energy Vision for the West

Introduction

The resource-rich West supplies a majority of the country's energy resources and electric power. The United States is currently projected to become a net energy exporter within five years. The increase in natural gas developed in the West, coupled with increased investment in renewable and alternative energy sources, have positioned the region and its Governors to play a central role in the nation's economy and energy policy.

The West's vast energy resources and the Governors' role in the development of energy policy underscores the value of a regional energy policy, the *Energy Vision for the West*. This policy does not impede states or territories from approaching energy choice and industry growth based on their own resource endowments and policies. It illustrates that Western Governors have coalesced around common issues and specific goals, despite diverse geography, resources, and politics. The *Energy Vision for the West* elaborates on the Governors' objectives set forth in WGA Policy Resolution [2018-04, Energy in the West](#).

Western Governors support a comprehensive energy portfolio for the West to ensure that energy is clean, affordable, and reliable. They are also committed to energy policies that promote economic growth and protect the environment. This approach facilitates a strong economy and jobs across a variety of professions, skill sets, and educations.

This approach also recognizes that there are challenges and opportunities associated with every type of energy resource and use, the costs and benefits of which must be considered in policymaking. One such opportunity – and challenge – is creating an effective state-federal partnership in energy development, lands management, and environmental protection. This regional policy is a guide for realizing opportunities to advance the West as the nation's principal energy provider and a leader in energy innovation and effective policy.

Goal 1: Secure the United States' energy supply and systems, and safeguard against risks to cybersecurity and physical security.

Addressing threats to the nation's energy systems and resources is a high priority of Western Governors. Coordination between states, the federal government, and the private sector on energy emergency planning and response is vital to addressing physical and cybersecurity impacts on the West's energy systems and resources. To this end, the Governors establish the following objectives:

- Work with the Department of Defense to meet its national security mission by ensuring safe and secure onsite and off-site electricity generation for key defense installations.
- Continue to reduce reliance on non-North American oil imports from unstable foreign sources through individualized state-by-state solutions, such as increasing North American production, improving fuel efficiency, and developing renewable and alternative fuels.

- Ensure there is sufficient domestic energy supply, including domestic renewable electric generation, to meet existing and new market demand.
- Identify security and other vulnerabilities of energy infrastructure and create programs and standards to defend infrastructure from cyber and physical attacks, as well as natural disasters.
- Encourage effective relationships between state agencies, federal agencies, public utilities, and the private sector to prevent and prepare for risks to the region's energy supply and systems, as well as to respond to and recover from disruptions.
- Partner with the federal government to ensure the provision of adequate funding and access to resources for state emergency planning, response, and recovery.
- Expand, upgrade, and secure transmission and pipeline infrastructure, as well as ensure that all federal pipeline safety measures are efficiently implemented.

Goal 2: Ensure energy is clean, affordable and reliable by providing a balanced portfolio of renewable, non-traditional and traditional resources.

Western Governors believe that a balanced energy portfolio should consist of energy sources that are clean, affordable and reliable, that maintain system reliability, and limit rapid rate increases. These resources also require the maintenance and expansion of transmission and distribution infrastructure. To this end, the Governors establish the following objectives:

- Recognize the importance of western renewable (wind, solar, biomass, biofuels, geothermal, hydropower), nuclear, coal and natural gas resources, and the generation facilities that utilize those resources.
- Adapt utility regulation to changing markets, technologies, and resources.
- Encourage the addition of renewable, low-carbon, and clean generation, including utility-scale and distributed generation.
- Promote, advance and fund the evolution of new technologies, including carbon capture and advancements in renewable energy.
- Maintain the Rural Energy for America (REAP) program, which has benefited farmers, ranchers and rural businesses that are often underserved by other federal energy efforts.

Goal 3: Increase energy efficiency associated with electricity, natural gas, and other energy sources and use to enhance energy affordability and to effectively meet environmental goals.

Eliminating waste and using resources wisely are cornerstones of a sound energy strategy. State and local governments, utilities, households, and businesses are currently realizing the economic and other benefits of energy efficiency, but there are still substantial gains to be made. To this end, the Governors establish the following objectives:

- Prioritize energy efficiency associated with electricity, natural gas, and vehicle transportation.

- Enhance utility rate designs, including time-varying rates, and cost-effective utility energy efficiency programs that deliver electricity and natural gas savings to consumers.
- Support energy efficiency programs that provide incentives and rebates to lower the incremental up-front costs of energy efficiency technologies; Energy Service Company (ESCO) programs; and where successful, utility ratepayer-funded energy efficiency programs, including the use of rate decoupling.
- Encourage the retrofit of residential and commercial buildings and improve the energy efficiency of new buildings, such as through building energy codes and programs that stimulate energy efficient construction.
- Decrease energy intensity using tools such as combined heat and power and waste heat to power systems.
- Incorporate systems strategies to improve efficiency throughout the building lifecycle and to improve grid connectivity, including energy systems that enable two-way, automated utility-to-customer communications to facilitate demand response programs.
- Maintain funding and support long-term authorization for the State Energy Program (SEP), Weatherization Assistance Program (WAP), and Low-Income Home Energy Assistance Program (LIHEAP).

Goal 4: Advance efficient environmental review, siting and permitting processes that facilitate energy development and the improvement and construction of necessary electric grid (transmission and distribution) and pipeline infrastructure, while ensuring environmental and natural resource protection.

Responsible energy development and a robust, well maintained energy delivery system are vital to the economy and quality of life in the West. To this end, the Governors establish the following objectives:

- Encourage responsible leasing and development of energy resources and infrastructure.
- Create a clear and transparent process for regulation and permitting, coordinated among well-trained and adequately funded federal, state and local agencies.
- Streamline project-permitting reviews to minimize timelines, without compromising environmental and natural resource protection or states' roles in those processes.
- Maintain state and local decision-making authority over transmission line siting and permitting.
- Encourage regional transmission planning organizations to conduct interconnection-wide planning with the full participation of the states and with consideration of state energy policies.
- Create functional partnerships among states, federal agencies, tribal governments and local jurisdictions to solve conflicts that hinder energy infrastructure and resource development.

- Increase cooperation on interstate projects through interstate compacts and other tools.
- In the West-wide energy corridor process, ask federal agencies to guarantee: ongoing, substantive, and meaningful state consultation; consideration of state plans, processes, priorities, and policies; and integration of other streamlining efforts.

Goal 5: Improve the United States electric grid's reliability and resiliency.

Changes in energy generation, distribution, and management are transforming the nation's electric grid. But these advancements also highlight the need for grid level investment, along with associated updates for electricity regulation and policy. To this end, the Governors establish the following objectives:

- Protect state authority to determine the type and amount of new generation facilities and the programs used to procure new generation, recognizing that each state has their own priorities and portfolios.
- Protect state authority to encourage continued operation of existing generation facilities through long-term contracts, retail utility contracting, or other incentives.
- Encourage regional reliability organizations, utilities, state agencies and public utility commissions to assess the provision of essential reliability services under future scenarios that include a changing resource mix in the West.
- Support grid operator situational awareness of distributed energy resources by promoting coordination between utilities and distributed energy resource developers.
- Preserve areas of exclusive state authority regarding distributed energy resources, including storage, and improve utility distribution systems planning for distributed energy resources to enhance grid reliability and resilience.
- Improve understanding of grid resources and services and the need for new power production facilities and transmission/distribution infrastructure through data, analysis, and coordination.
- Prepare for potential disruptions to the grid from wildfires, flooding, earthquakes, tornadoes, cyberattacks and other disturbances and emergencies, as well as increase the grid's ability to withstand and reduce the magnitude of such events.
- Enable utilities to take necessary actions to enhance grid reliability and reduce the threat of wildfires to and from electric transmission and distribution rights-of-way.

Goal 6: Protect western wildlife, natural resources and the environment, including clean air and clean water, and strive to reduce greenhouse gas emissions.

Western states have long assumed a stewardship role for the natural environment and have worked across state lines to protect air, land, wildlife and water. Western Governors are committed to ensuring that energy development is done in an environmentally responsible manner. To this end, the Governors establish the following objectives:

- Promote energy technologies and sources that lower emissions.
- Continue advancing air and water quality improvements and plans in each state and across state lines.
- Foster environmental cooperation that: protects the state-federal partnership; provides for sustainable environmental protection; is nimble and flexible; and ensures that state governments play a key role in regulation.
- Acknowledge that a productive economy and responsible development can support environmental protection by providing additional funding and opportunities for public-private partnership.
- Encourage technologies that reduce water consumption, prioritize water consumption for traditional activities (drinking water, agriculture, habitat conservation/restoration), and contribute to the responsible development of new energy resources.
- Achieve a balance between the responsible development of energy projects and wildlife conservation.
- Urge the federal government to identify and approve solutions for the long-term storage and permanent disposal of spent nuclear fuel and nuclear waste.
- Encourage the development and deployment of a full range of technologies that offer the potential for cost-effective reductions in greenhouse gas emissions from energy production and use, including carbon capture and storage, energy efficiency, zero emissions generation sources, and other emerging options.

Goal 7: Make the West a leader in energy education, technology development, research, and innovation.

Effective energy policy is facilitated by an understanding of a common set of impartial facts and scientific evidence. Furthermore, the advancement of technology will play a critical role in realizing a clean energy future. To this end, the Governors establish the following objectives:

- Leverage the vast expertise in the West's industry, academic institutions, and national laboratories to make the region an international hub for new energy technology research and development, as well as energy education.
- Encourage Congress and the Department of Energy to support and fund research, development, demonstration, and deployment of advanced energy technologies.
- Create public-private research and development partnerships among industry, academia, the national labs, and federal agencies to identify promising new technologies, including energy efficiency technologies that advance clean energy with reduced environmental impacts.
- Encourage market operators, reliability organizations, and utilities to appropriately share electric system operational data with researchers, educators, and entrepreneurs to promote

electric system innovation and technology development, while still safeguarding against risks to cybersecurity and physical security.

- Encourage training and education in energy-related fields and ensure there is an adequate workforce operating under the highest safety standards.
- Facilitate the creation of employment opportunities for displaced energy sector workers.
- Educate the public regarding: the role of energy in maintaining a high standard of living and quality of life; trade-offs and externalities associated with all types of energy development and consumption; the coexistence of a healthy environment and a thriving economy; and how federal policy on public lands impacts energy and infrastructure development.

Goal 8: Utilize an all-of-the-above approach to energy development and use in the West, while protecting the environment, wildlife and natural resources.

A diverse energy portfolio is essential to the provision of clean, affordable, secure, and reliable energy. Western Governors support a comprehensive energy portfolio, including: oil, gas, coal, nuclear, biomass, geothermal, hydropower, solar, wind, and conservation and energy efficiency. To this end, the Governors establish the following objectives:

- Reduce costs and risks for the environmentally sound development of all energy resources.
- Ensure competition in the market for all resources.
- Recognize the growing importance of consumer choice in driving energy policy.
- Support consumer choice of distributed energy resources to achieve affordability, environmental, and other objectives.
- Increase the development and use of alternative transportation fuels and vehicles, including the necessary infrastructure for those vehicles.
- Encourage innovation and application of energy storage, including pumped hydro storage, battery storage, and compressed air energy storage where cost-effective.
- Support the responsible and efficient development and use of traditional and renewable resources.
- Increase the amount of electricity generated from new, retrofitted, or relicensed hydroelectric facilities, including small, irrigation, and flood control hydropower projects.
- Restore financing for the geothermal exploration program financed by the Department of Energy.
- Accelerate the introduction of small modular reactors into the marketplace.



DENNIS DAUGAARD
GOVERNOR OF SOUTH DAKOTA
CHAIR

DAVID IGE
GOVERNOR OF HAWAII
VICE CHAIR

JAMES D. OGSBURY
EXECUTIVE DIRECTOR

April 24, 2018

Honorable John Barrasso
Chairman
Committee on Environment and Public Works
United States Senate
410 Dirksen Senate Office Building
Washington, D.C. 20510

Honorable Thomas R. Carper
Ranking Member
Committee on Environment and Public Works
United States Senate
456 Dirksen Senate Office Building
Washington, D.C. 20510

Dear Chairman Barrasso and Ranking Member Carper:

The U.S. is the global leader in carbon dioxide (CO₂) capture, utilization and sequestration (CCUS) research, development and deployment. Given the appropriate resources and regulatory environment, we will advance our technologies so that we can continue to use our abundant resources while minimizing our carbon footprint. Western Governors support the bipartisan Utilizing Significant Emissions with Innovative Technologies (USE IT) Act ([S. 2602](#)), which will facilitate development and deployment of CCUS infrastructure.

Western Governors have long supported advancement of carbon capture technology due to its environmental and economic benefits. S. 2602 directs the Environmental Protection Agency to support research on direct air capture and CO₂ utilization, with a focus on technologies that transform CO₂ into a product or product input with commercial value. The bill also clarifies that carbon capture and utilization projects and pipelines are eligible for the streamlined permitting process under the Fixing America's Surface Transportation (FAST) Act and directs the Council on Environmental Quality to develop guidance on reviews of CCUS projects and CO₂ pipelines.

Furthermore, WGA Policy Resolution [2017-01, Building a Stronger State-Federal Relationship](#), advocates for greater state representation on committees and panels advising federal agencies on scientific, technological, social, and economic issues. We are pleased that this bill requires the task force to include states (at their request) and to provide models for, and technical assistance to, states for CCUS projects and CO₂ pipeline regulation.

Thank you for your leadership in this area of crucial importance to our nation's economy, energy, and environment, as well as for your recognition that states have a critical role in promoting the development and utilization of carbon capture technologies. Please do not hesitate to contact us if we can be of further assistance.

Sincerely,


Dennis Daugaard
Governor of South Dakota
Chair, WGA


David Ige
Governor of Hawaii
Vice Chair, WGA

CALL (303) 623-9378
VISIT 1600 Broadway
Suite 1700
Denver, CO 80202

WESTGOV.ORG



August 30, 2019

The Honorable Adam Smith
Chairman
House Committee on Armed Services
Washington, D.C. 20515

The Honorable Mac Thornberry
Ranking Member
House Committee on Armed Services
Washington, D.C. 20515

The Honorable James Inhofe
Chairman
Senate Committee on Armed Services
Washington, D.C. 20510

The Honorable Jack Reed
Ranking Member
Senate Committee on Armed Services
Washington, D.C. 20510

Dear Chairman Smith, Ranking Member Thornberry, Chairman Inhofe, and Ranking Member Reed:

As representatives of the over 60 diverse companies, unions and environmental, energy and agricultural organizations participating in the Carbon Capture Coalition, we write in support of the Utilizing Significant Emissions with Innovative Technologies Act ([USE IT Act](#)) and request your help in securing the enactment of the USE IT Act as part of the final National Defense Authorization Act (NDAA). We have included the USE IT Act as a key part of the Coalition's consensus federal policy [blueprint](#), and its adoption is one of our top legislative priorities.

The USE IT Act was reported out of the Senate Committee on Environment and Public Works unanimously, only to have the Congressional session end prior to adoption by both chambers. The USE IT Act was subsequently included in the NDAA that recently passed the Senate. Companion legislation in the House currently enjoys similarly broad bipartisan support with 36 cosponsors, including 24 Democrats and 12 Republicans. It is time to pass this important and widely-supported climate and energy legislation, and the NDAA provides an appropriate opportunity to do so.

Building on last year's landmark bipartisan reform of the federal 45Q tax credit to incentivize deployment of carbon capture, storage, removal and use, the USE IT Act will support research, development and demonstration of direct air capture technology and beneficial uses of carbon captured from industrial facilities and power plants that reduce emissions, as well as foster cooperative planning and permitting of pipeline infrastructure to transport carbon dioxide (CO₂) from where it is captured to where it can be safely and permanently stored or put to beneficial use.

The United States has the opportunity to lead the way in the productive and beneficial utilization of captured CO₂ and carbon monoxide as building blocks for producing low-carbon fuels, advanced materials, chemicals and other products that are critical to our nation's defense industry and to our continued technological leadership. Funding in the USE IT Act will help lay the groundwork for development of new technologies, industries, jobs and markets for captured carbon that expand beyond current use and geologic storage of CO₂ through enhanced oil recovery.

Thank you for your consideration of our request to retain the USE IT Act in the final NDAA to be considered by Congress. We stand ready to work with you to pass this important legislation and to answer any questions you might have.

Sincerely,



CARBON CAPTURE COALITION

Robert Cleaves
President
Biomass Power Association

Paul P. Koehler
Vice President
Pacific Ethanol

Michael Flannigan
Senior Vice President, Global Government Affairs
Peabody

Don E. Gaston
President and CEO
Prairie State Generating Company

Brad Markell
Executive Director
AFL-CIO Industrial Union Council

Rich Powell
Executive Director
ClearPath Action

Noah Deich
Executive Director
Carbon180

Jeffrey D. Brown
Principal
Brown Brothers Energy & Environment, LLC

L. Steve Melzer
Director
Melzer Consulting

Mark P. Allen
Vice President – Integrated Carbon Solutions
Accelergy Corporation

Tom Dower
Senior Director, Government Relations
ArcelorMittal

Laura Daniel Davis
Vice President, Conservation Strategy
National Wildlife Federation



Paul Doucette, General Manager
Global Industry Affairs and Stakeholder
Engagement
Baker Hughes, a GE Company

Jeffrey Bobeck
Director of Energy Policy Engagement
Center for Climate and Energy Solutions

Jon Wood
President
EnergyBlue Project

Steve Oldham
Chief Executive Officer
Carbon Engineering

Shannon Angielski
Executive Director
Carbon Utilization Research Council

Roger Johnson
President
National Farmers Union

Jesse Walls
Senior Director, Government Affairs
National Audubon Society

Sasha Mackler
Director, The Energy Project
Bipartisan Policy Center

Jason Albritton
Director of Climate and Energy Policy
The Nature Conservancy

John W. Schultes
Founder & CEO
New Steel International, Inc.



CARBON CAPTURE COALITION

James Slevin
National President
Utility Workers Union of America

Robert G. Mannes
President & CEO
Core Energy, LLC

Kurt Waltzer
Managing Director
Clean Air Task Force

Hunter Johnston
Counsel
Lake Charles Methanol, LLC

Adam Goff
Policy Director
8 Rivers Capital

Elizabeth Gore
Senior Vice President, Political Affairs
Environmental Defense Fund

John Risch
National Legislative Director
SMART-TD (UTU)

Cecil E. Roberts
International President
United Mine Workers of America

Heather Reams
Executive Director
Citizens for Responsible Energy Solutions

Mark P. Allen
President & Chairman
Algae Biomass Organization



CARBON CAPTURE COALITION

Cecile M. Conroy

Cecile Conroy
Director, Government Affairs
International Brotherhood of Boilermakers

Steven Krinsky

Steven Krinsky,
Senior Vice President
Jupiter Oxygen Corporation

Ari Bernstein

Ari Bernstein
Managing Principal
Greene Street Capital

Geoff Cooper

Geoff Cooper
President & CEO
Renewable Fuels Association

Roxanne D. Brown

Roxanne D. Brown
International Vice President At Large
United Steelworkers

Ian Davis

Ian Davis
Vice President of Governmental Relations
Occidental Petroleum Corporation

John Brekke

John Brekke
Vice President of Power Supply
Great River Energy

For:

Terrence Manning

Terrence Manning
CEO
Glenrock Petroleum

Brad Crabtree

Brad Crabtree
Director, Carbon Capture Coalition
Great Plains Institute



National Audubon Society
225 Varick Street, 7th Floor
New York, NY 10014
212.979.3196

February 27, 2019

Senator John Barrasso
Chairman
Senate Committee on Environment
and Public Works
Washington, DC 20510

Senator Thomas R. Carper
Ranking Member
Senate Committee on Environment
and Public Works
Washington, DC 20510

Dear Chairman Barrasso and Ranking Member Carper,

On behalf of Audubon's one million plus members, we would like to express our support for S. 383, the Utilizing Significant Emissions with Innovative Technologies Act (USE IT Act). This bipartisan legislation aims to facilitate additional research and development of carbon capture and storage technologies that reduce emissions.

The USE IT Act builds on the successful reform and extension of the federal 45Q tax credit by establishing a prize program for early-stage direct-air capture research and demonstration to spur investment and innovation in this technology. Removing CO₂ directly from the atmosphere and developing viable mechanisms for permanent storage will be critical to achieving meaningful emissions reductions now and in the future.

Just like people, birds are facing a cascade of threats because of the changing climate. Rising seas and temperatures are shrinking and shifting the landscapes that sustain them. In 2014, Audubon published its Birds and Climate Change Report. The study shows that more than half of the bird species in North America could lose at least fifty percent of their current ranges by 2080 due to rising temperatures. These species include the Bald Eagle, the American Kestrel, and the Northern Harrier.

Audubon believes we need to pursue an array of common-sense, bipartisan approaches that reduce carbon emissions, and that carbon capture, utilization and storage is one of those elements. According to the Intergovernmental Panel on Climate Change, carbon capture and storage is vital to meeting mid-century goals for reducing carbon emissions.

Audubon appreciates the bipartisan leadership of Senators Barrasso and Whitehouse on S. 383 and we call on the U.S. Senate and House of Representatives to support a full range of policy solutions at the speed and scale necessary to address the threat of climate change. We look forward to working with you and members of the Senate Committee on Environment and Public Works to protect human health, as well as birds and the places they need, now and into the future.

Sincerely,

Jesse Walls
Senior Director of Government Affairs
National Audubon Society

Cc: Senator Sheldon Whitehouse



**INTERNATIONAL
BROTHERHOOD
OF ELECTRICAL
WORKERS®**

900 Seventh Street, NW
Washington, DC 20001
202.833.7000
www.ibew.org

LONNIE R. STEPHENSON
International President

KENNETH W. COOPER
International
Secretary-Treasurer

February 27, 2019

VIA EMAIL

The Honorable John Barrasso
Chairman
U.S. Senate Committee on Environment
and Public Works
410 Dirksen Senate Office Building
Washington, DC 20510

The Honorable Tom Carper
Ranking Member
U.S. Senate Committee on
Environment and Public Works
456 Dirksen Senate Office Building
Washington, DC 20510

**Re: Utilizing Significant Emissions with Innovative Technologies
(USE IT) Act**

Dear Chairman Barrasso and Ranking Member Carper:

On behalf of the approximately 775,000 active members and retirees of the International Brotherhood of Electrical Workers (IBEW), I am writing to express my support for federal legislation to facilitate the research and development of carbon capture, utilization and storage (CCUS) and S. 383, the Utilizing Significant Emissions with Innovative Technologies (USE IT) Act.

The IBEW represents hundreds of thousands of members who work in the generation, transmission and distribution of electricity in all 50 states. Our members are committed to ensuring communities in the United States can rely on a safe and resilient source of electricity while protecting our communities and natural resources from environmental degradation and climate change. IBEW members have worked countless hours installing and maintaining pollution control equipment in coal-fired powerhouses, steel mills, automobile manufacturing facilities, oil refineries, and other industrial facilities.

There is consensus among energy and climate experts, including the Intergovernmental Panel on Climate Change (IPCC) and the International Energy Agency (IEA), that CCUS technology is an essential tool in the effort to reduce carbon emissions, which is necessary to avoid the worst effects of climate change, while supporting energy security, protecting the existing energy infrastructure, and retaining and creating high-quality, family-supporting jobs that are critical to working families and communities.

The IBEW supports many of the policies proposed in the USE IT Act, including the creation of financial incentives for innovators to develop direct air capture technology, as well as clarification that CCUS projects and carbon dioxide pipelines are eligible for expedited permitting review established under the FAST Act. These policies, if enacted, will accelerate the development and deployment of CCUS technology and position the United States as a leader in this important field.

IBEW commends the leadership of Chairman Barrasso, Ranking Member Carper, and the other co-sponsors of the USE IT Act for coming together in






**INTERNATIONAL
BROTHERHOOD
OF ELECTRICAL
WORKERS®**

Mr. John Barrasso and Mr. Tom Carper
February 27, 2019
Page 2

bipartisan manner to introduce this legislation, which we hope will build on the success of the FUTURE Act and help retain and create thousands of jobs.

The IBEW looks forward to working with the United States Senate and the EPW Committee in finding solutions that will best balance our nation's economic, environmental and security needs.

Sincerely yours,


Lonnie R. Stephenson
International President

LRS:slv
Copy to All Members of the US Senate Committee on Environment and Public
Works





4245 North Fairfax Boulevard
Suite 100
Arlington, VA 22203
nature.org

Jason Albritton
Director of Climate and Energy Policy
703-841- 5300
Jason.Albritton@tnc.org

February 26, 2019

The Honorable John Barrasso
Chairman
Committee on Environment and Public Works
U.S. Senate
Washington, DC 20510

The Honorable Thomas Carper
Ranking Member
Committee on Environment and Public Works
U.S. Senate
Washington, DC 20510

Dear Chairman Barrasso and Ranking Member Carper:

On behalf of The Nature Conservancy, I write to express our support for S. 383, the USE IT Act, and applaud your leadership in introducing this bill. We also appreciate Sen. Whitehouse's tireless efforts to advance this legislation and are thankful to the many other members on both sides of the aisle who are cosponsors.

As a conservation organization whose mission is to protect the land and waters on which all life depends, we are committed to finding common sense solutions to some of nature's greatest challenges, including climate change. The Conservancy recognizes that carbon capture, utilization, and sequestration can play a role in meeting the long-term greenhouse gas reduction targets that science indicates will be necessary to avoid the worst impacts of climate change. We support efforts to ensure carbon capture is available as an effective tool for reducing greenhouse gas emissions while maintaining environmental safeguards.

TNC supports the passage of the USE IT Act and its efforts to advance carbon capture. By investing in research and development for carbon capture, and assessing its benefits and risks, the USE IT Act will play a critical role in helping these technologies come to market in an effective and responsible way.

We appreciate the bipartisan leadership on this issue and urge the Environment and Public Works Committee to support the legislation. We also look forward to working with other members of the Senate and the House of Representatives to move the USE IT Act forward so that it can be signed into law this Congress.

Thank you for your consideration of our views.

Sincerely,

Jason Albritton
Director of Climate and Energy Policy
The Nature Conservancy

cc: Senator Sheldon Whitehouse



HAL QUINN
President & CEO

April 9, 2019

The Honorable John Barrasso
Committee on Environment and Public Works
United States Senate
Washington, DC 20510

Dear Chairman Barrasso:

The National Mining Association commends you for your leadership in authoring and introducing S. 383, the Utilizing Significant Emissions with Innovative Technologies "USE IT" Act.

Global coal-fired power capacity has increased 62 percent since 2000 and, with that growing capacity, coal will continue to be a predominant fuel in the global energy mix.

Advanced coal technologies that increase efficiency and reduce emissions are being cost-effectively deployed around the globe as world coal consumption continues to grow. At present these technologies are being underutilized in the U.S., even while 67 percent of voters say the U.S. should be doing more to encourage their use here at home.

With smart incentives, such as those included in the "USE IT" Act, the U.S. could deliver both the fuel diversity and emissions reductions voters want by embracing innovation and encouraging the adoption of advanced coal technologies.

Specifically, we support provisions that promote further research and development of technologies that will convert carbon into products of commercial value. We also support the goal of reviewing and developing policy guidance to facilitate the permitting of the necessary supporting infrastructure including carbon dioxide pipelines.

The success of any effort to address the changing climate will rest with innovation and technology – utilizing both the technologies that exist today and investing in new technologies for tomorrow. The USE IT Act is an important step forward in advancing commonsense, meaningful action to reduce emissions globally. The U.S. has always been home to pioneering innovation and cutting-edge technologies; through the USE IT Act, we can help bring important carbon capture technologies to commercial reality, incentivize their use at home and export them to the rest of the world.

Thank you for putting forward this legislation.

Sincerely,

Hal Quinn

National Mining Association 101 Constitution Avenue, NW | Suite 500 East | Washington, DC 20001 | (202) 463-2600

CHAMBER OF COMMERCE
OF THE
UNITED STATES OF AMERICA

NEIL L. BRADLEY
EXECUTIVE VICE PRESIDENT &
CHIEF POLICY OFFICER

1615 H STREET, NW
WASHINGTON, DC 20062
(202) 463-5310

February 27, 2019

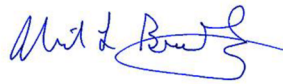
TO THE MEMBERS OF THE UNITED STATES SENATE:

The U.S. Chamber of Commerce supports S. 383, the bipartisan “Utilizing Significant Emissions with Innovative Technologies (USE IT) Act.” **Cosponsorship of this bill will be included in the “leadership” component of the Chamber’s “How They Voted Scorecard.”**

The USE IT Act would complement the recent expansion of the carbon capture, utilization and storage (CCUS) tax credit by fostering increased collaboration between governmental and non-governmental entities involved in the construction and development of CCUS facilities and carbon dioxide pipelines. It would also advance research opportunities for carbon utilization and direct carbon capture. Together, the provisions in the USE IT Act would enable continued progress on issues such as technology development, energy infrastructure buildout, and the associated regulatory framework that are necessary for widespread deployment of key CCUS applications.

The Chamber has long supported the potential for CCUS technologies to result in innovative, scalable solutions to reduce carbon emissions and preserve the affordability and diversity of our energy system. The USE IT Act advances this goal and ensures that the United States maintains an all-of-the-above energy strategy well into the future.

Sincerely,



Neil Bradley



**Congressional
Research Service**

Informing the legislative debate since 1914

MEMORANDUM

March 20, 2018

To: The Honorable Sheldon Whitehouse
Attention: Aaron Goldner

From: Peter Folger, Specialist in Energy and Natural Resources Policy, [REDACTED]
[REDACTED]
Paul W. Parfomak, Specialist in Energy and Infrastructure Policy, [REDACTED]
[REDACTED]

Subject: Summary of telephone conversation regarding CCUS projects and CO₂ pipelines as covered projects under FAST-41 guidance

Per your request, this memo is a summary of our telephone conversation on Friday, March 16, 2017, discussing your questions about proposed legislative language (draft section 201) you provided to us. One of your questions was whether carbon capture, utilization, and storage (CCUS) infrastructure, and CO₂ pipelines, specifically, would be considered “covered projects” under P.L. 114-94, the Fixing America’s Surface Transportation Act, Section 41 (FAST-41), as provided on p. 18 of the January 13, 2017, guidance memorandum (M-17-14) from the Office of Management and Budget (OMB) for heads of federal departments and agencies.¹ You also asked whether the draft section 201 language was possibly unnecessary, given the description of covered projects in the OMB memorandum. The draft section 201 language you provided is as follows:

SEC. 201. INCLUSION OF CARBON CAPTURE INFRASTRUCTURE PROJECTS.

Section 41001 of the FAST Act (42 U.S.C. 4370m) is amended—

(1) in paragraph (6)—

(A) in subparagraph (A)—

(i) in the matter preceding clause (i), by inserting “carbon capture,” before “renewable or conventional”;

(ii) in clause (i)(III), by striking “or” at the end;

(iii) by redesignating clause (ii) as clause (iii); and

(iv) by inserting after clause (i) the following:

¹ The url you provided for the OMB January 13, 2017 memorandum is <https://www.permits.performance.gov/sites/permits.performance.gov/files/docs/Official%20Signed%20FAST-41%20Guidance%20M-17-14%202017-01-13.pdf>. FAST-41 refers to Title XVI of P.L. 114-94, Fixing America’s Surface Transportation Act (FAST Act).

“(ii) is covered by a programmatic plan or environmental review developed for the primary purpose of facilitating development of a carbon dioxide pipeline network; or”; and

(B) by adding at the end the following:

“(C) Associated definition.—For purposes of subparagraph (A), the term ‘construction of infrastructure for carbon capture’ includes construction of any facility, technology, or system that captures, utilizes, or sequesters carbon dioxide emissions and CO₂ pipelines.”

Per our telephone conversation, it is likely that CO₂ pipeline projects would be considered “covered projects” as defined and described in the OMB guidance, if they meet the standards and certain criteria outlined in that memo, because construction of “pipelines” is explicitly mentioned as one of the eligible categories of infrastructure under the Title 41, Section 41001(6) of the FAST Act:

The term “covered project” means any activity in the United States that requires authorization or environmental review by a Federal agency involving construction of infrastructure for renewable or conventional energy production, electricity transmission, surface transportation, aviation, ports and waterways, water resource projects, broadband, pipelines, manufacturing, or any other sector as determined by a majority vote of the Council that--

(i) (I) is subject to NEPA;

(II) is likely to require a total investment of more than \$200,000,000; and

(III) does not qualify for abbreviated authorization or environmental review processes under any applicable law; or

(ii) is subject to NEPA and the size and complexity of which, in the opinion of the Council, make the project likely to benefit from enhanced oversight and coordination, including a project likely to require--

(I) authorization from or environmental review involving more than 2 Federal agencies; or

(II) the preparation of an environmental impact statement under NEPA.

The above definition does not qualify the type of pipeline included (e.g., water, oil, etc.) so it appears that CO₂ pipelines would be included within the scope of the definition if they satisfy the other criteria set forth in the definition. It is also likely that CCUS infrastructure construction projects would be considered covered projects as a subcategory of conventional energy production infrastructure, to the extent they would support control of carbon emissions from electricity generation or would support oil production through CO₂ flooding in enhanced oil recovery. This latter classification would be open to some interpretation, however, so CRS cannot state definitively that it would apply.

FAST-41 and the OMB guidance January 13, 2017, memorandum include two categories or standards for inclusion as a covered project: “objective” standards and “discretionary” standards.² The objective standards are as defined above in Section 41001(6)(i). The discretionary standards are as defined in Section 41001(6)(ii), in particular a project likely to require (1) authorization or environmental review involving more than two federal agencies, or (2) preparation of an environmental impact statement (EIS) under the National Environmental Policy Act (NEPA).

² Per the January 13, 2017, OMB memorandum, “objective” standards mean the project (1) is subject to NEPA, (2) is likely to require a total investment of more than \$200 million, and (3) does not qualify for abbreviated authorization or environmental review processes under applicable law. The “discretionary” standards mean the project is subject to NEPA and the size and complexity of such a project make the project likely to benefit from enhanced oversight and coordination, requiring (1) authorization or environmental review involving more than two federal agencies, or (2) preparation of an environmental impact statement under NEPA.

Because the overall siting of CO₂ pipelines is under state, not federal, jurisdiction any federal agency involvement would be limited to those portions of the pipeline that would be under the jurisdiction of federal agencies. Examples of federal agencies from which permissions or reviews might be required include the U.S. Army Corps of Engineers (the Corps) for water crossings, the Bureau of Land Management for crossing most federal lands, and the U.S. Fish and Wildlife Service for portions that could affect endangered species. Depending on proposed location and route, it is conceivable that some proposed CO₂ pipelines would require review or permits from more than two federal agencies, but that others might require a review or permit from only one. It is also conceivable a CO₂ pipeline project might require review from only one federal agency and be subject to NEPA, but might not require an EIS. For example, a pipeline water crossing may be permitted by the Corps under nationwide permits without conducting an EIS.³ Thus, there is some question as to whether every CO₂ pipeline project would be considered a covered project solely under the discretionary standards.

The draft language you provided as section 201 amending the FAST Act would add certainty that CCUS infrastructure projects and CO₂ pipeline projects would be considered covered projects, if the language were enacted into law, and the specific project met the standards for eligibility. CCUS infrastructure and CO₂ pipeline projects considered covered projects under current law would still be considered covered projects if draft section 201 were enacted (i.e., section 201 would not affect eligibility for projects already considered covered under current law).

For further questions please contact the authors.⁴

³ For more information regarding the Corps' nationwide permits program, see CRS Report 97-223, *The Army Corps of Engineers' Nationwide Permits Program: Issues and Regulatory Developments*, by Nicole T. Carter.

⁴ Adam Vann, Legislative Attorney, contributed to this memorandum ([REDACTED]).

Mr. Sasha Mackler
Page 1

Subcommittee on Environment and Climate Change
Hearing on
“Clearing the Air: Legislation to Promote Carbon Capture, Utilization, and Storage”
February 6, 2020

Mr. Sasha Mackler
Director, The Energy Project
Bipartisan Policy Center

The Honorable Scott Peters (D-CA)

1. Given your testimony and your response to questions from Ms. Matsui that passage of the bill might encourage additional investment in enhanced oil recovery (EOR), how would the bill nevertheless reduce carbon emissions?

RESPONSE:

The USE IT Act supports the technology development of carbon utilization and removal. Given this, the impact of the bill will be greatest on driving down costs of capture – including direct air capture systems – which will have a direct impact on carbon emission reductions and help scale these technologies as a climate solution. CCUS, including direct air capture, is an essential addition to other climate strategies because we are unlikely to have cost-effective options for zeroing out all sources of emissions from all sectors by 2050. In fact, the IPCC has concluded that negative emission technologies, such as direct air capture, and CCUS will be needed to meet climate targets. Further, direct air capture has the potential to achieve needed carbon reduction as according to a recent modeling assessment, the potential for carbon dioxide removal and storage using the technology is between 16 and 30 billion metric tons per year (in the 2070 – 2100 timeframe) (Giulia Realmondo et al. “An inter-modal assessment of the role of direct air capture in deep mitigation pathways.” Nature Communications (2019) 10:3277. <https://doi.org/10.1038/s41467-019-10842-5>).

The USE IT Act is likely to have a small impact on incremental EOR investment (and other CCUS infrastructure generally). Because crude oil produced from EOR utilizing captured CO₂ has a lower carbon content when compared to a typical crude oil, the climate benefits from the USE IT Act are two-fold: (1) improving the technologies to support lower cost carbon capture in the future and increase the ability for CCUS to scale as a climate solution and (2) reduced emissions from oil as a result of production from capture and EOR as compared to traditionally produced oil (EOR with geologically-sourced CO₂, as well as non EOR oil). According to a Lifecycle Assessment published in Environmental Science and Technology (<https://pubs.acs.org/doi/abs/10.1021/acs.est.5b00700>), emissions from gasoline produced via EOR using CO₂ from CCS-enabled Natural Gas Combined Cycle power plant would be reduced by 72% on average relative to current baseline gasoline. Also, a study from the California Committee on Science & Technology estimates a 72% reduction in carbon

Mr. Sasha Mackler
Page 2

intensity from captured CO₂ and EOR: <https://ccst.us/wp-content/uploads/2015ccs.pdf>

The reduction in other emissions – including methane, NO_x, SO_x, unburnt hydrocarbons and particulate matter – have not been quantified to the degree that CO₂ has been. In particular the LCA published in Environmental Science and Technology quantifies total greenhouse gas (GHG) equivalents, so this takes into account the GHG potential of methane emissions. This study uses a full LCA accounting for reduction in emission from power plants during capture along with the emissions from the use of the gasoline from EOR. So, the calculated 72% reduction in GHG emissions accounts for elimination of emissions from the power generation which would occur to provide the CO₂ for EOR. Interestingly, both of these studies came to 72% independently. It is important to note that the Environmental Science and Technology published a range of reductions (50% to 140% reduction). And it would be different for different oil fields and different power plant sources of CO₂. This base-case number of 72% was calculated using standard models of Natural Gas Combined Cycle power plants published by NETL, and likely used freely available data on oil fields, possibly leading to similar numbers calculated.

Mr. Jason Begger
Page 1

**Subcommittee on Environment and Climate Change
Hearing on
“Clearing the Air: Legislation to Promote Carbon Capture, Utilization, and Storage”
February 6, 2020**

**Mr. Jason Begger
Executive Director
Wyoming Infrastructure Authority**

The Honorable John Shimkus (R-IL)

1. Would you elaborate how CCUS’s current application with enhanced oil recovery (EOR) will establish a profit incentive that can eventually augment overall investment in other areas of CCUS?

RESPONSE: EOR can provide a commercially viable revenue stream for CO2 utilization. An amine based carbon capture system costs in the range of \$50 to \$70 per ton. Market rates for CO2 for EOR are in the range of \$25 to \$35 per ton. The cost ranges are determined by a number of factors, including geography and infrastructure used. If you are able to capture CO2 for \$50 and sell it for \$35, plus realize the value of the produced oil, this would make the venture commercially profitable and the market will drive deployment.

- a. Would you elaborate why expanded pipeline infrastructure is necessary to take advantage of EOR and what that would mean both for energy production and driving down the costs for capture technologies?

RESPONSE: Currently the existing CO2 pipeline network is small and very fragmented, linking mostly natural CO2 sources with EOR fields. The current pipelines are also geographically isolated in the southwestern and upper Rockies regions of the country. In order to manage CO2 from the very large industrial sources in the eastern and Midwestern U.S., pipelines will need to be built to link those anthropogenic sources with places with suitable geology for EOR or permanent geologic storage, which are often found in the southern and western U.S. If a coal power plant or ethanol plant in Illinois had a direct link to the EOR fields in Texas, those facilities could economically provide low carbon energy by adding carbon capture equipment.

2. How will expanded carbon-dioxide-EOR use decrease the greenhouse gas life cycle emissions profiles of produced oil and gas?

RESPONSE: The CO2 used for EOR is eventually permanently sequestered within the oil field. CO2 is pumped into the oil field to re-pressurize the formation and push oil to production wells. Eventually the CO2 mineralizes in the formation and will become very stable and permanently immobilized. The amount of CO2 needed to

Mr. Jason Begger
Page 2

produce one barrel of oil depends entirely upon the flow dynamics and geology of the oil reservoir, but any ton of CO₂ that is permanently removed from the atmosphere lowers the carbon intensity. If more CO₂ is utilized than is produced from the oil from EOR, the process becomes carbon negative.

- a. How will exports of EOR production effect the emissions profiles of other nations?

RESPONSE: If the U.S. is capable of supplying oil with a lower carbon footprint, it will lead to drastically decreased emissions profiles for importing countries. For example, the country of Japan imports nearly all of its oil with almost 90% originating in the Middle East. As a country that is very concerned about carbon emissions, Japan has an interest in lower carbon energy sources. If the U.S. was able to provide a lower carbon oil, countries such as Japan would be very interested. There could potentially be a market premium for lower carbon oil.

3. The New Source Review permitting requirements under the Clean Air Act are supposed to improve air quality, but often discourage efficiency and pollution control investments in our fossil electric generation fleet.

- a. If U.S. policy should encourage the deployment of these innovative clean energy technologies, should it update New Source Review to help this to happen?

RESPONSE: I am not an expert in New Source Review (NSR), but in my experience working with utilities, most specifically Basin Electric as the host side of the Wyoming Integrated Test Center, the mere chance of triggering an NSR review stops common sense projects from occurring. An updated NSR would encourage new projects and plant updates that would have meaningful carbon reduction impacts.

- b. How could New Source Review be improved to encourage continued investments in our coal, gas, and industrial fleets, such as carbon capture and enhanced oil recovery projects?

RESPONSE: Again I'm not an NSR expert, but utility engineers have told me that every power plant has a list of ten items that they would complete if NSR was not an issue. These updates would improve plant efficiency, therefore meaning more energy produced with the same fuel, meaning lower carbon output. One specific example given to me at a power plant was a pipe junction point that was determined to be a bottleneck. Increasing the size of that point would allow the materials to flow more easily, reducing the amount of energy necessary to push the materials, which would increase efficiency. However under the existing NSR program, increasing a flow is viewed as

Mr. Jason Begger
Page 3

increasing a source emission and would have required an NSR review. This project on its own wouldn't justify the NSR process, however, adding together ten such projects across a plant would provide meaningful and quantifiable efficiency improvements. For most, NSR is seen as something to be avoided at all costs and hinders common sense improvements.