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U.S. SENATE  
COMMITTEE ON ENVIRONMENT  
AND PUBLIC WORKS  
OVERSIGHT HEARING  
  
ENERGY AND ENVIRONMENTAL INNOVATION:  
WYOMING'S LEADERSHIP IN USING AND STORING  
CARBON DIOXIDE EMISSIONS

AUGUST 19, 2020  
10:00 A.M.

WYOMING INTEGRATED TEST CENTER  
12480 N. HIGHWAY 59  
GILLETTE, WY 82716

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1           CHAIRMAN BARRASSO: Good morning. I call  
2 this hearing to order and welcome everyone who's  
3 here. Please have a seat, make yourself at  
4 home, make yourself comfortable.

5           The Senate Environment and Public Works  
6 Committee is honored to convene today in Wyoming  
7 for a field hearing at the Wyoming Integrated  
8 Test Center.

9           And I really want to thank Senator Enzi, a  
10 Wyoming senior senator, he is the Chairman of  
11 the Senate Budget Committee. But most  
12 importantly, he is a former Mayor of Gillette,  
13 Wyoming. And I want to thank him for joining us  
14 here today.

15           And, Mike, we are normally Wednesday doing  
16 Wyoming Wednesdays in Washington with doughnuts  
17 and coffee and juice and everyone from Wyoming.  
18 And I guess, I wanted to get doughnuts, but they  
19 said due to Coronavirus, I couldn't have boxes  
20 of doughnuts here today. So we can't quite do  
21 Wyoming Wednesday. But it's a pretty good  
22 group.

23           SENATOR ENZI: It is, yes.

24           CHAIRMAN BARRASSO: Looking at all the folks  
25 who are here today.

1           Well, today we're here to discuss Wyoming's  
2 leadership in using and in storing carbon  
3 dioxide emissions. Just outside these doors is  
4 a world class facility where research is  
5 currently underway to study how we can create  
6 commercial value from carbon dioxide that would  
7 otherwise just go up into the atmosphere,  
8 located next to Basin Electric Dry Fork Power  
9 Station, and we were both here for the grand  
10 opening a dozen years ago.

11           The Integrated Test Center hosts research  
12 that will create new markets and new jobs in  
13 Wyoming. The center will research how to  
14 transform coal power plant emissions into  
15 building materials, like cement as well as  
16 alternative fuels.

17           Through our relationship with NRG Canadian  
18 Oil Sands Innovation, XPRIZE, the center will  
19 welcome five teams of researchers from around  
20 the world.

21           Last year I met with one of the finalist  
22 teams from Aberdeen, Scotland during a trip to  
23 their research lab. We had five senators that  
24 were on that trip, a bipartisan group, including  
25 Lisa Murkowski, the present Chairman of the

1 Energy Committee; Maria Cantwell, who has served  
2 as ranking member of that committee previously;  
3 Senator Sheldon Whitehouse from Rhode Island,  
4 and Joe Manchin from West Virginia.

5 It's not surprising that Wyoming can attract  
6 such top talent from around the world. Because  
7 in Wyoming, we're blessed with tremendous fuel  
8 resources, coal, natural gas, oil. And most of  
9 that coal comes from right here, Mike, in your  
10 home community of Campbell County.

11 The world-class researchers at this center  
12 will study how to transform the carbon dioxide  
13 from burning these abundant fuel resources into  
14 a host of new and innovative applications.

15 These new applications can be added to  
16 currently viable commercial uses for carbon  
17 dioxide, a process that many of us know as  
18 enhanced oil recovery. It's already being used  
19 in Wyoming. And with Randall Luthi here, it was  
20 being used when he was Speaker of the House of  
21 the Wyoming Legislature.

22 This is where carbon dioxide is injected to  
23 produce oil from older, more mature -- into  
24 older more mature fields. Once this process is  
25 complete, the carbon dioxide is then permanently

1 stored underground.

2 If we can harness carbon dioxide from power  
3 plants and other facilities, Wyoming has the  
4 great potential for even broader scale enhanced  
5 oil recovery.

6 Wyoming has abundant, deep saline  
7 formations. These formations can store carbon  
8 dioxide deep underground instead of being  
9 released into the atmosphere. Scientists from  
10 the University of Wyoming, many are here today,  
11 were conducting geologic testing in a formation  
12 just a short distance from this center.

13 As Chairman of the Environment and Public  
14 Works Committee in the United States Senate,  
15 carbon capture is one of my top policy  
16 priorities.

17 Two years ago, President Trump signed an  
18 extension and expansion of the 45Q tax credit  
19 for carbon capture facilities. Now we must make  
20 sure that that credit can be deployed and used  
21 to build new carbon capture projects.

22 In order to accomplish this goal, I have  
23 pushed the Internal Revenue Service, and  
24 specifically and directly the Secretary of the  
25 Treasury, to issue the much-needed guidance this

1 year. Also introduced legislation called the  
2 USE IT Act -- and that stands for Utilizing  
3 Significant Emissions and Innovative  
4 Technologies Act, USE IT Act -- to complement  
5 the 45Q tax credit. This bill ensures that  
6 Washington is a willing partner in the  
7 development of carbon capture projects.

8 The USE IT Act helps researchers find  
9 commercial uses for captured carbon dioxide  
10 emissions. It supports the use of carbon  
11 capture technology, including direct air  
12 capture.

13 The USE IT Act also directs the federal  
14 government to work with developers to expedite,  
15 not block, the permitting process. We know all  
16 too well that delayed permitting can kill  
17 important projects.

18 The USE IT Act also funds research such as  
19 the type of research occurring right here at the  
20 Integrated Test Center for carbon utilization as  
21 well as direct air capture.

22 The USE IT Act passed the Senate for a  
23 second time this summer after passing the  
24 committee I chair unanimously 21 to nothing.  
25 Last year, House Democrats blocked it from

1           becoming law. That was in the House, but we  
2           have unanimous agreement in the Senate. And I'm  
3           working to secure its passage into law this  
4           year.

5           Wyoming continues to be the leading state in  
6           the nation with regard to carbon capture  
7           research. So I'm so pleased that today's  
8           hearing can be held to shine a spotlight on the  
9           great work that is happening right here in our  
10          state.

11          I'd like to right now turn this over to  
12          Senator Enzi for any opening remarks he would  
13          like to make.

14          SENATOR ENZI: Thank you, John, and thank  
15          you for holding this hearing here. This is a  
16          very unusual testing center that will make a  
17          difference for the country. I thank you for  
18          your role in being the Chairman of the  
19          Environment and Public Works Committee that's  
20          infrastructure as well as environment.

21          And I know that you're in line to be the  
22          Chairman of the Energy Committee as well. That  
23          will definitely be a help to this entire  
24          process.

25          Besides that, of course, John is one of the

1           leaders in the Senate. He's one of the top --  
2           he's in the five people who get to make the  
3           important decisions for what we're going to do  
4           and how we're going to do it. And he does an  
5           outstanding job with that, as well as presenting  
6           the case to the nation. So I'm thankful for you  
7           doing this hearing. I know it will make a  
8           difference.

9           I want to also welcome everybody to Campbell  
10          County. Chairman of the county commission is  
11          here today, and others. And I used to be the  
12          mayor here. And you'll see the symbol for the  
13          city is the energy capital of the nation. And  
14          that's because in this county, we have more BTUs  
15          of energy than Saudi Arabia has.

16          And we can utilize it, or we can pass it  
17          over. And a lot of jobs rely on that, and the  
18          jobs are well-paying jobs. Thousands of people.  
19          And the state relies on the revenue, as do all  
20          of the entities of the state, from the energy of  
21          this area.

22          And they are noticing the lack of oil  
23          production at the moment. For the first time in  
24          over 130 years, there isn't a drilling rig  
25          operating in Wyoming. I think that's going to

1 affect airplanes at some point because they  
2 still can't run on solar.

3 But, so pleased that you're holding this. I  
4 want to thank all the witnesses to this  
5 important work to make this facility a success,  
6 and for the insights and experiences that you  
7 can share with us.

8 It's been great to work with Senator  
9 Barrasso as we try to incentivize growth in this  
10 industry through the 45Q tax credit and his USE  
11 IT Act.

12 For a long time we've said the people of the  
13 United States are the most innovative people in  
14 the world. And of course I like to think the  
15 people in Wyoming are the most inventive people  
16 anywhere.

17 And part of it is because of our distances,  
18 and we travel a lot. And when you're traveling,  
19 you think about other things, like what your job  
20 is and how much better it could be. And  
21 consequently, Wyoming per capita has more  
22 patents than any other state. And so, we're  
23 always thinking.

24 And of course we appreciate the University  
25 of Wyoming and community colleges who are taking

1 our young people and educating them to think  
2 that -- to increase their thinking ability from  
3 the way that they've grown up having to  
4 innovate. And we know that will make an  
5 important difference for the state.

6 And it is important, more important than  
7 ever that Wyoming and the federal government  
8 work together with the universities and with the  
9 private sector to invest in technology  
10 innovation in order to create a sustainable  
11 future, particularly for coal, but for all  
12 energy.

13 And I'll continue to support policies that  
14 help push this innovation forward and ensure  
15 that Wyoming remains the epicenter for these  
16 technologies.

17 And there are some really amazing things  
18 going on, not only here but at the university  
19 that will make a difference. At the university  
20 they've got one test center that's figuring out  
21 how to get oil out of granite, and I think they  
22 are making progress.

23 But we need to make sure that oil is still  
24 necessary and as clean as possible. And I have  
25 confidence that the innovation and inventiveness

1 of the Wyoming people and the people in the  
2 United States will make that happen.

3 Nothing that the federal government does is  
4 worth much unless there's talented and capable  
5 people on the ground to put the policies into  
6 action.

7 And I'm looking forward to our discussion  
8 and learning more about how we can work together  
9 to continue advancing these technologies, and  
10 the ones that will come out of this.

11 I'm on the Health, Education, Labor and  
12 Pensions Committee, and one of the stunning  
13 things that I ran into there is that the average  
14 kid that's in junior high right now will have  
15 over 15 different occupations based on how  
16 technology is moving ahead. And what really  
17 stunned me was, 11 of those haven't even been  
18 invented yet.

19 So the world is going to change. We need to  
20 make sure we're educating our kids so that they  
21 take advantage of that change and make the  
22 change. And this is one of the places where  
23 that change can be made.

24 And so, John, I really appreciate you  
25 holding the hearing here and bringing to light

1           some of these opportunities that we have. And  
2           that's how we have to look at any problem, as an  
3           opportunity. So thank you, John.

4           CHAIRMAN BARRASSO: Well, thank you, Mike.  
5           And you know, you look around the room and talk  
6           about your time here as mayor, and my time in  
7           the legislature, your time in the legislature  
8           and now in the senate.

9           And I'm going to introduce our friend,  
10          Randall Luthi in a few moments as the Chief  
11          Energy Advisor to Wyoming Governor Gordon.

12          You know, you look, there's Jim Anderson, he  
13          was probably here in Gillette when you were  
14          mayor, and now you got -- and you will -- got  
15          reelected last night, you won your primary to  
16          the State Senate in Natrona County. So  
17          congratulations. I know it was a late night.  
18          Although the results on your race were in pretty  
19          early. Congratulations.

20          And you know, it's fun to have Rita Meyer  
21          here, former auditor. We have -- talk about  
22          leadership at the local level, we have Rusty  
23          Bell here from the county commission, and as a  
24          graduate of Leadership Wyoming, and all the  
25          activity there. And it's nice to have Ed Seidel

1 here, President of the University of Wyoming.

2 So we are represented all across the board  
3 with people committed to Wyoming and to the  
4 nation and to energy and the needs that we have  
5 and that we have the availability right here in  
6 Wyoming.

7 With that, I'd like to introduce, and it's a  
8 great pleasure to introduce, Randall Luthi, who  
9 is the Chief Energy Advisor to Wyoming Governor  
10 Mark Gordon. He's an attorney, a rancher,  
11 former Speaker of the Wyoming House of  
12 Representatives. He brought considerable  
13 insight and experience to the governor's office,  
14 and we're grateful for that.

15 Prior to joining the governor's office, he  
16 was President of the National Offshore Ocean  
17 Industries Association. So he knows lots about  
18 energy onshore and offshore.

19 He served in the Department of Interior as  
20 the Director of Minerals Management Service, and  
21 is Deputy Director of the Department's Fish and  
22 Wildlife Service.

23 Had the pleasure of serving with him in the  
24 Wyoming legislature for many years. Proud to  
25 continue to work with him on behalf of the

1 people of Wyoming.

2 And you testified last year at the Senate  
3 Environment and Public Works Committee.

4 Welcome here today, Randall.

5 MR. LUTHI: Well, thank you very much.  
6 Thanks for those kind words, Chairman Barrasso,  
7 Senator Enzi. On behalf of Governor Gordon,  
8 welcome home.

9 And Senator Enzi, this is like double home  
10 for you. You know, not only in the state, but  
11 as everybody has pointed out, but in Gillette as  
12 well.

13 You know, the work you both do in D.C. is so  
14 vital to the people of Wyoming. But it's your  
15 dedication to return regularly to the state to  
16 find out what is relevant is what keeps you  
17 well-grounded. And the Governor appreciates  
18 that. The people of Wyoming appreciate that.

19 Thank you for your efforts, particularly in  
20 this last -- this calendar year, as we have  
21 faced the oil wars, unwarranted market pressures  
22 on coal, and a pandemic. You know, we no longer  
23 muse in the governor's office about what else  
24 could go wrong, for fear that it actually will.

25 So on a more personal note, you know, I did

1           have truly the pleasure and honor to serve with  
2           both of you in the legislature. I recall you  
3           represented your districts with honor and  
4           distinction, and you've continued to clear that  
5           high bar in the U.S. Senate.

6           Mike, Senator Enzi, today has to be a little  
7           bit bittersweet for you. As you think about it,  
8           how long has it been since you haven't had your  
9           name on a ballot in the primary election?  
10          However, I'll bet you and Diana are already well  
11          in to making plans for doing something else for  
12          your next career. But again, thank you for a  
13          long, and I describe it as just, put your head  
14          down and work career of public service.

15          All right. Back to the business at hand.  
16          You have chosen wisely to hold a field hearing  
17          at the Integrated Test Center. This center  
18          represents innovation, cooperation, and hope for  
19          our future.

20          This center wouldn't be here except for the  
21          cooperation and the generosity of electric  
22          utilities, the State of Wyoming, the community  
23          of Gillette, Campbell County, U.S. Department of  
24          Energy, and in particularly those willing to  
25          push the envelope, such as XPRIZE participants.

1           You know, at a time when so many loud  
2           voices -- and I think it's the loud voices of a  
3           few, that are calling to remove fossil fuels  
4           from our energy portfolio, this center provides  
5           an opportunity to focus on the real issue. How  
6           do we prevent or remove CO2 from the atmosphere?  
7           What are the other uses of coal and CO2 that  
8           could benefit our economy and consumers?

9           This center proves to be essential to our  
10          future livelihood and economy. Its work is  
11          exciting and has the full support of the  
12          Governor.

13          Although I am not a witness today, the  
14          Governor certainly supports measures such as the  
15          USE IT Act. Wyoming has enacted key legislation  
16          to promote the CO2 capture. And as you all  
17          know, the ability to use those 45Q credits is  
18          what's going to be make that work.

19          Our legislature is also looking forward.  
20          Their almost two-year process to establish the  
21          Wyoming Energy Authority is complete or nearly  
22          complete. The Governor is committed to working  
23          with the WEA and support all forms of energy.

24          The ITC is essential in the Governor's  
25          energy and economic strategy. We are committed

1 to ensuring that the strengths of the Wyoming  
2 infrastructure authority and the Wyoming  
3 pipeline authority remain and are available to  
4 assist the stakeholders to those who generously  
5 invested in this one-of-a-kind center.

6 We do know there are challenges today, and  
7 there will likely be far more tomorrow.  
8 Political winds change directions like a pinball  
9 at an arcade. But we must all commit to a  
10 steady, sure-footed energy policy that provides  
11 stability, reliability, and availability of all  
12 energy resources.

13 So thank you again. And thank you for  
14 giving the governor's office a chance to welcome  
15 you, because there's -- you are always welcome.

16 The Governor looks forward to seeing both of  
17 you in the future. Thank you very much.

18 CHAIRMAN BARRASSO: Thanks, Randall. We  
19 really appreciate you being here, and all of  
20 your help and direction.

21 Now we are going to turn our panel of  
22 witnesses and I would invite the three of them  
23 to come up. And Randall mentioned the XPRIZE,  
24 and we're very fortunate to have with us the  
25 executive director, Dr. Marcius Extavour, who is

1 here overseeing and the executive director  
2 related to the Carbon XPRIZE. We're grateful to  
3 have you.

4 We also have Dr. Holly Krutka, who is the  
5 Executive Director of School of Energy Resources  
6 at the University of Wyoming, as well as Jason  
7 Begger, who is the Deputy Director of the  
8 Wyoming Energy Authority and the Managing  
9 Director right here at the Wyoming Integrated  
10 Test Center.

11 We're going to start with Jason. And Jason  
12 is the current Deputy Director, as I said, here  
13 through the Wyoming Energy Authority. Manages  
14 the Integrated Test Center. Grew up in eastern  
15 Montana, worked in Washington for a couple of  
16 members of Congress.

17 After his time there, he worked for the  
18 Petroleum Association for Wyoming, for Rio Tinto  
19 and that became Cloud Peak.

20 Graduated with a bachelor's degree from  
21 Montana State University; Master's in Business  
22 Administration from the University of Denver.

23 You were back in Washington to testify to  
24 the Environment and Public Works Committee.  
25 We're grateful for that. He and his family live

1 outside of Cheyenne. It's a pleasure to have  
2 you join us today. Please proceed.

3 We're going to ask all of you to try to keep  
4 your remarks to about five minutes so we have  
5 time for questioning.

6 MR. BEGGER: Thank you, Chairman Barrasso,  
7 Senator Enzi. I appreciate the opportunity to  
8 speak with you today.

9 As the Chairman said, my name is Jason  
10 Begger, and I'm the Managing Director of the  
11 Integrated Test Center. A little over three  
12 years ago, I had the opportunity to testify  
13 before this committee in your hearing room in  
14 Washington. So it's a great honor to have you  
15 out at our facility today.

16 The ITC is a private/public partnership  
17 between the State of Wyoming, Basin Electric  
18 Power Cooperatiave, Tri-State Transmission and  
19 Generation Association, and the National Rural  
20 Electric Cooperatives Association, also known as  
21 NRECA.

22 We have also had various in-kind  
23 contributions from Black Hills Energy and Rocky  
24 Mountain Power. The value of the private sector  
25 stakeholders is immeasurable as they have direct

1           experience with project management, technology  
2           review, and strong federal relationships.

3           This facility was authorized in 2014 by the  
4           Wyoming legislature, and what you see today has  
5           all occurred within the past six years. Through  
6           our coalition, we have constructed a facility,  
7           developed a communications plan, established  
8           business development strategies as well as all  
9           the necessary operational plans.

10          Through relationships with the Department of  
11          Energy's National Carbon Capture Center and the  
12          International Carbon Capture Test Center  
13          Network, we've been able to learn and share best  
14          practices. At the end of the construction, the  
15          facility came in 18 percent under budget, which  
16          provides additional funding for operations.

17          The ITC fills a very unique need within the  
18          United States. While developers have tested  
19          larger projects in the U.S., this is the only  
20          dedicated testing site... (Brief pause).

21          This is the only dedicated testing site that  
22          could host larger pilot and demonstration  
23          projects.

24          Currently, many DOE-funded projects must  
25          travel to Norway to scale up. The ITC provides

1 an opportunity to spend those U.S. dollars here  
2 at a substantially reduced cost, providing  
3 better value to our taxpayers.

4 We have worked hard to forge a strong  
5 relationship with DOE and last summer hosted  
6 Assistant Secretary for Fossil Energy, Steve  
7 Winberg. Senator Enzi at that time was able to  
8 join us for that tour out here.

9 We recognize that while we have a great  
10 facility, we need DOE support to fund the  
11 projects we ultimately want to test and host  
12 here.

13 One important lesson we've learned is,  
14 scaling up technology takes a long time. It  
15 takes years to move through the funding  
16 opportunities, the design, the fabrication, and  
17 finally testing. In order to see the real  
18 fruits, we need long-term commitments from the  
19 federal government to support testing.

20 Our testing partners need to know that  
21 they'll have the resources they need to  
22 methodically scale up and provide the types of  
23 technical assurances utilities need to feel  
24 comfortable commercializing the technologies.

25 The USE IT Act would greatly assist in this

1 area. Many but not all of our potential tenants  
2 are seeking federal funding, and whether or not  
3 they receive funding will determine if they can  
4 deploy on site.

5 Currently we have relationships with XPRIZE,  
6 which you'll hear about from Dr. Extavour, the  
7 Japan Coal Energy Center, also known as JCOAL,  
8 Kawasaki Heavy Industries, Columbia University,  
9 TDA Research, Membrane Technology and Research,  
10 Gas Technology Incorporated, Air Liquide, and  
11 the University of Kentucky.

12 With regards to the research community, we  
13 view them as partners not just tenants. One of  
14 the great benefits of the ITC is the blank  
15 canvas approach we can provide. We have ample  
16 physical space to host an array of technologies  
17 and add amenities as we grow.

18 We hope we can partner with our tenants to  
19 repurpose equipment that they may no longer need  
20 to provide expanded testing capabilities. A  
21 great example of this project is one that would  
22 grant their steam boiler to the ITC upon the  
23 completion of their test. Steam is an integral  
24 component of many carbon capture technologies  
25 that would be a valuable service to provide.

1           Lastly, I'd like to touch upon how Wyoming  
2 views the ITC as a lynchpin for broader economic  
3 technology and development. We have worked  
4 closely with Campbell County, the School of  
5 Energy Resources, the Enhanced Oil Recovery  
6 Institute, the Wyoming Business Council, and  
7 many others.

8           We make sure prospective tenants are aware  
9 of the expertise and resources within each of  
10 these organizations and how they may be able to  
11 best assist to make the Wyoming experience as  
12 seamless as possible.

13           A win/win for Wyoming is first developing  
14 these technologies that can be employed to  
15 preserve the economic value of the fossil energy  
16 industry, and then capturing the manufacturing  
17 and technology development that's perfected at  
18 the ITC.

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

21           CHAIRMAN BARRASSO: Thanks so much, Jason.  
22 We will get back to you with the questions in a  
23 few minutes.

24           But I'd like to turn to Dr. Holly Krutka,  
25 who is the Executive Director of the School of

1 Energy Resources at the University of Wyoming.

2 Immediately before joining the university,  
3 she served as Vice President for Coal Generation  
4 and Emissions Technologies at Peabody, the  
5 world's largest private sector coal producer.

6 She's held a variety of roles in the energy  
7 industry and has worked specifically on carbon  
8 capture during her career. But she's an  
9 innovator herself, and actually holds three  
10 patents. Holds a bachelor's degree and a Ph.D.  
11 from the University of Oklahoma in chemical  
12 engineering.

13 She's a native of Oklahoma, and we're so  
14 pleased that she and her family have chosen to  
15 make Laramie their home. You may proceed.

16 DR. KRUTKA: Thank you. Mr. Chairman,  
17 Senator Enzi, I appreciate the chance to speak  
18 with you today about the opportunities to  
19 support energy innovation right here in Wyoming.  
20 My name is Dr. Holly Krutka. I am the Executive  
21 Director at the University of Wyoming School of  
22 Energy Resources, or SER.

23 SER is focused on energy-driven economic  
24 development for the state of Wyoming, which  
25 means that we're focused on technologies that

1 will help support the needs of Wyoming and its  
2 energy customers.

3 If there's one thing you take from my  
4 testimony, let it be that Wyoming is an ideal  
5 place to drive innovation and deployment of  
6 climate-focused technologies, such as carbon  
7 capture, use and storage, because the state  
8 boasts vast fundamental subsurface knowledge,  
9 world-class research programs, the ability to  
10 execute large demonstration projects, and the  
11 will to drive technology development with the  
12 necessary policy support that can ultimately  
13 result in commercialization.

14 The University of the Wyoming boasts a  
15 world-class research program in the Center of  
16 Innovation for Flow through Porous Media, led by  
17 Professor Mohammad Piri. The Center is located  
18 at University of Wyoming's High Bay Research  
19 Facility, which contains more than 90,000 square  
20 feet that make up, to the best of my knowledge,  
21 the world's largest experimental research  
22 facility focused on flow through porous media  
23 and problems associated with applications in  
24 hydrocarbon recover, geologic sequestration of  
25 greenhouse gases and more.

1           It's been developed using more than \$100  
2 million of investment from the state of Wyoming  
3 and corporate sponsors. The Center provides  
4 imaging and flow capabilities at the atomic,  
5 nan, micro, and macro scales.

6           In the drive toward commercializing novel  
7 technologies, a commercial entity has been spun  
8 off and is offering services today.

9           SER and our project partners are reimagining  
10 the use of coal as we develop a thermo-chemical  
11 process that produces nonfuel and energy  
12 products from Wyoming coal to create products  
13 like soil amendments, building materials,  
14 asphalt replacements, electro-spun carbon fiber  
15 mats that can be used for energy storage and  
16 much more.

17           In addition, SER is developing a dry methane  
18 reforming catalyst that uses carbon dioxide and  
19 natural to generate syngas, which is carbon  
20 monoxide and hydrogen. Our current estimates  
21 are that this dry-methane reforming process  
22 could create hydrogen at half the cost of  
23 current steam methane reforming technologies.

24           This use for CO2 is an important component  
25 of the thermo-chemical process because it allows

1 all the products I mentioned to be created from  
2 Wyoming coal with most of the carbon locked up  
3 in the products and near-zero carbon footprint.

4 SER's Center for Economic Geology Research,  
5 or CEGR, is a group of applied geoscientists  
6 dedicated to developing opportunities to  
7 diversify Wyoming's economy and maintain  
8 competitiveness in a low-carbon energy future.  
9 It includes internationally recognized experts  
10 on the topic of CO2 geologic storage.

11 Funded by the Department of Energy through  
12 the Carbon Storage Assurance Enterprise, or  
13 CarbonSAFE Program, CEGR is investigating the  
14 commercial feasibility of geologic CO2 storage  
15 two million tons per years and a total of at  
16 least 50 millions tons of CO2, located right  
17 here at Dry Fork Power Plant.

18 This project, referred to as Wyoming  
19 CarbonSAFE, possesses favorable technical,  
20 economic, and policy attributes to advancing  
21 eventual commercialization of large-scale carbon  
22 capture and storage in a modern coal-fired power  
23 plant.

24 Another tool in Wyoming's CCUS tool belt is  
25 the Enhanced Oil Recovery Institute, or EORI.

1 EORI's mission is to facilitate a meaningful and  
2 measurable increase in recoverable reserves and  
3 production of oil and natural gas in Wyoming.  
4 While necessary to help drive state GDP, CO2  
5 enhanced oil recovery, or EOR, is also a  
6 commercial-scale climate change mitigation  
7 technology.

8 Historical storage of CO2 with EOR typically  
9 sequestered .2 metric tons of CO2 per barrel of  
10 oil produced. Today, with the current and next  
11 generation technologies being tested and applied  
12 in Wyoming, up to 0.5 metric tons of CO2 can be  
13 stored per barrel of oil produced, with the  
14 possibility of storing even more CO2 per barrel  
15 with further research.

16 These technologies can provide a three-fold  
17 increase in the amount of CO2 stored, while  
18 producing the same amount of domestic oil.

19 The final ingredient needed to commercialize  
20 CCUS and other environmentally focused  
21 technologies is the right policy framework.  
22 Wyoming has applied for, and should be the  
23 second state to receive Class VI well primacy,  
24 allowing the state to implement CCUS projects  
25 that are in its interests on a timeline that

1 works for commercial developers.

2 In addition, SER's recently launched Center  
3 for Energy Regulatory and Policy Analysis, or  
4 CERPA, is embarking upon a variety of  
5 interdisciplinary energy policy studies to focus  
6 on the state of Wyoming's economy.

7 CERPA is poised to begin an assessment of  
8 Wyoming House Bill 200, which established a  
9 nation-leading CCUS standard for electricity  
10 generation. Among other CCUS-related  
11 activities, CERPA is also preparing model CCUS  
12 agreements under the Wyoming CarbonSAFE project.

13 So in summary, while we face many challenges  
14 in the global energy sector and with widespread  
15 deployment of CCUS, Wyoming stands ready to help  
16 and has the necessary tools to make CCUS and  
17 other energy technologies a commercial reality.  
18 Thank you.

19 CHAIRMAN BARRASSO: Well, thank you for your  
20 thoughtful testimony. We'll get to them in a  
21 moment.

22 I'm now delighted to welcome Dr. Marcius  
23 Extavour here, who is -- has a Ph.D. as well as  
24 a master of science in physics from the  
25 University of Toronto, where he explored the

1 quantum mechanics of light and matter near  
2 absolute 0. He also holds a bachelor of science  
3 in engineering science from the University of  
4 Toronto where he built a pancake-making robot.  
5 Pretty good.

6 Combined nano technology, nanomaterials with  
7 solar cells. You need to meet the president of  
8 the University of Wyoming who has a relativistic  
9 astrophysics Ph.D. on the collision of black  
10 holes. So between the two of you, I -- you  
11 know. Jim Anderson, be careful, you're in  
12 between the two of them.

13 (Discussion held off the record.)

14 CHAIRMAN BARRASSO: We are delighted you're  
15 here with us today, and in charge of the XPRIZE  
16 project. Please proceed with your testimony.

17 DR. EXTAVOUR: Thanks very much.

18 Mr. Chairman and Senator Enzi, and to the  
19 committee, it's a thrill to be here and a  
20 pleasure to have the opportunity to speak to  
21 transforming what we usually think of as a  
22 liability from the dark side into an asset.

23 My name is Marcius Extavour. I am the  
24 Executive Director of NRG COSIA Carbon XPRIZE,  
25 which is a \$20 million global incentive prize

1 competition to drive break-through innovation in  
2 exactly that, recycle CO2 into something more  
3 useful.

4 A really interesting part of that role is  
5 it's allowed me to get a front row seat to not  
6 just energy innovation, but carbon management  
7 innovation in particular.

8 If there's one thing you take away from my  
9 remarks today is that carbontech, which is the  
10 piece of jargon I'm going to use to describe the  
11 basket of technologies that we can use to turn  
12 CO2 into other materials and the materials  
13 themselves.

14 So that carbontech is a new technology  
15 space, it's an emerging space. It's quite  
16 young, but can be a really promising tool to  
17 decarbonize our existing energy sector to help  
18 us fight climate change and to support long-term  
19 and sustainable economic growth.

20 As has been mentioned before, I'm going to  
21 echo some of the testimony that my colleagues  
22 here, that the State of Wyoming really is  
23 extremely well-positioned, not just because of  
24 the ITC, to lead in this area and already  
25 demonstrating leadership here.

1           Now carbon dioxide is usually thought of, if  
2 we think of it at all, as a colorless, odorless,  
3 invisible gas, maybe a greenhouse gas. But we  
4 don't usually think about it as a valuable  
5 resource. In fact, it is and can be.

6           The global economy today is fundamentally  
7 based on carbon-based materials. You just have  
8 to look around the room to recognize that most  
9 of the stuff around us is made of carbon-based  
10 materials. And the big idea here is that we can  
11 make some or maybe even a huge fraction of those  
12 materials using abundant extra carbon dioxide.  
13 Fertilizers, paints, fuels, building materials,  
14 carbon anode fibers is wide range of materials  
15 we can pursue.

16           The science of converting carbon dioxide  
17 into any material has been well known and  
18 characterized actually for several decades. We  
19 know how to do this. The science is pretty well  
20 understood. The questions at the cutting edge  
21 now are about engineering, scale up, business,  
22 finance, and policy.

23           Yes, we can improve on the science. But  
24 there's also -- the field is now maturing and  
25 transitioning into broader questions. Not can

1 we do it, but how do we do it, and how do we do  
2 it in a way that makes economic sense, business  
3 sense, makes broader policy sense.

4 Carbontech, as I've mentioned, is a great  
5 opportunity to specifically generate revenue by  
6 harvesting a low value carbon dioxide feedstock.  
7 Carbon dioxide is -- there's basically no cost  
8 to emit it. There is a market price, but it's  
9 an incredibly low value feedstock.

10 Now, it's not free to convert it into other  
11 materials. It generally takes energy  
12 specifically. But whereas we typically focus on  
13 the costs of carbon emissions, carbontech is an  
14 opportunity to also focus on the value and  
15 opportunity that can bring.

16 As mentioned before, this is an early stage  
17 technology area, and how do we unlock this?  
18 Innovation. This is where the Carbon XPRIZE  
19 enters. The NRG COSIA Carbon XPRIZE was  
20 designed exactly to try to catalyze this type of  
21 innovation, and to drive the break-throughs in  
22 this space that can lead to benefits in this  
23 community, in the state, across the nation and  
24 the world.

25 The mission of XPRIZE is to try to help

1 solve big problems that can impact and benefit  
2 all of humanity. And certainly climate change,  
3 and the need to decarbon and transition and  
4 manage our energy systems and deal with our  
5 excess CO2 falls into that category.

6 The Prize launched in 2015, and is about to  
7 conclude next spring, spring of 2021, where we  
8 hope to announce some of the winners from some  
9 of the demonstrations we see outside today.

10 After evaluating and demonstrating -- or,  
11 witnessing demonstrations of dozens of  
12 technologies from around the world, we have now  
13 narrowed the competition down to ten finalist  
14 companies, some of whom have the opportunity to  
15 test at the ITC.

16 The ITC was chosen specifically as the  
17 testing ground, in fact the XPRIZE was an early  
18 partner in helping it get stood up along with  
19 the leadership of Governor Mead, Governor  
20 Gordon, the legislature of Wyoming, you folks  
21 here on this committee, in fact the broader  
22 Campbell County and Wyoming community, without  
23 which none of this would be possible.

24 I just cannot stress enough how important  
25 the ITC and an opportunity to test a small

1 industrial pilot is to the scale-up of  
2 innovation. Mr. Begger mentioned this earlier.  
3 You don't just come across facilities like this.

4 Carbontech, carbon recycling is not  
5 something you can build up in your garage. It's  
6 not two people with a PowerPoint slide. It's an  
7 industrial technology that requires safe  
8 operating, policy support, business partnership.

9 And this type of testing facility, which  
10 sort of lives between the university labs,  
11 research labs, and the commercial market, is a  
12 key piece of infrastructure. I really want to  
13 underscore that point. Facilities like ITC are  
14 unique in this space and absolutely crucial.

15 Now, I mentioned earlier that materials like  
16 concrete, gasoline, plastics, textiles, can all  
17 be made out of CO2. Generally speaking, making  
18 products out of CO2 can take a couple forms. We  
19 can make stuff we are already well familiar  
20 with, as I mentioned.

21 We can make fundamentally new materials that  
22 are barely in use today, but could be in broad  
23 use in the future, for instance, carbon fiber.  
24 Or, we can make better or lower-carbon versions  
25 of material we already have.

1           So I'll give an example. You'll see from  
2           the company called CT Concrete -- they will give  
3           us a tour a little bit later I know -- they make  
4           concrete. Concrete is not their innovation.

5           Their innovation is to use CO2 to make  
6           concrete, and to make that concrete lighter,  
7           greener, stronger, stiffer than it otherwise  
8           might be. So it's an example of a replacement  
9           material, a better version of something we  
10          already have. That just happens to be based on  
11          carbon.

12          Senator Enzi, you made a remark about jet  
13          fuel and liquid fuels earlier. That's another  
14          example. It is possible and people are already  
15          making jet fuel out of carbon dioxide. Is it  
16          better than existing jet? Jets fly the same,  
17          but the carbon intensity is much reduced.

18          Now we know that making industrial  
19          commodities out of CO2 is a great opportunity.  
20          It's an economic and business and technology  
21          opportunity. But there's something else I'd  
22          like to highlight, and that is making consumer  
23          products. This is kind of an interesting,  
24          emerging niche of this space.

25          I brought a handful of items to show and

1 tell which I can speak to you about later. But  
2 the interesting thing about consumer products is  
3 that it provides an opportunity to have a  
4 conversation with everyday people about the  
5 opportunity of what CO2 conversion would mean.

6 It's one thing to say we can make jet fuel  
7 or make concrete. The average person isn't  
8 really thinking about that in their daily lives,  
9 it's not relevant to our sort of our regular  
10 culture.

11 But making items like this hand sanitizer in  
12 front of me. How timely. This is actually made  
13 of recycled CO2. And this is something I think,  
14 especially at this moment, we can all relate to.

15 The other thing I think is really  
16 interesting about consumer products, of course  
17 need strong policy support, business support,  
18 and innovation of science and engineering. But  
19 we also need to support all of that conversation  
20 to permeate this conversation, this idea, this  
21 vision in the broader public.

22 And I think the consumer goods are not going  
23 to absorb all the emissions coming out of Dry  
24 Fork stations, they are not going to solve the  
25 problem on their own, far from it. But they are

1 an interesting entry point into this  
2 conversation, for what is a pretty abstract and  
3 new technology area, one that I think can be  
4 quite powerful to help carbonize our energy  
5 sector.

6 With that, I'd like to conclude. Thank you  
7 again for the opportunity to share these  
8 remarks. And I look forward to questions and  
9 discussion.

10 CHAIRMAN BARRASSO: Well, thank you to all.  
11 Will start with a series of questions. I'm  
12 going to pick up on something that you had said,  
13 but ask Holly the question, because you talked  
14 about Wyoming and what resources we have. And I  
15 think, Holly, you started by saying, If you take  
16 only one thing away from this hearing, I was  
17 going to ask you to go back to that specific  
18 sentence.

19 But it started with, Wyoming is the ideal  
20 place, if I got it right. So could you please,  
21 again, so that the press, they got the cameras  
22 going now, they need to hear this statement  
23 coming from you.

24 DR. KRUTKA: If there's one thing you take  
25 from my testimony, let it be that Wyoming is an

1 ideal place to drive innovation and deployment  
2 of climate-focused technologies such as carbon  
3 capture use and storage, or CCUS, because the  
4 state boasts fast fundamental subsurface  
5 knowledge, world-class research programs, the  
6 ability to execute large demonstration projects,  
7 and the will to drive technology development  
8 with the necessary policy support that can  
9 ultimately result in commercialization.

10 CHAIRMAN BARRASSO: That's our marching  
11 orders from here, and to us, Wyoming is the  
12 ideal place.

13 DR. KRUTKA: Yes.

14 CHAIRMAN BARRASSO: Jason, let's start with  
15 you. The USE IT Act would fund research such as  
16 that's occurring right now. The test center, of  
17 the key criteria to receive funding under the  
18 USE IT As, we talked, is having partnership with  
19 the group academic, University of Wyoming,  
20 commercial development, government.

21 How important have strong private  
22 partnerships, public partnerships been insofar  
23 as developing this integrated test center?

24 MR. BEGGER: Mr. Chairman, I think the  
25 partnerships that we pulled together here is an

1 ideal sort of model for what the USE IT Act  
2 does.

3 Earlier this year, the ITC, we received  
4 award from the international group, it was a  
5 carbon leadership Award, global award for  
6 innovative partnerships. And the strength in  
7 that is, really comes down to, at the end of the  
8 day, we need partners, we need customers for  
9 these technologies that are going to be  
10 developed.

11 And so, having Basin Electric and the rural  
12 electric cooperatives and Tri-State and everyone  
13 on board, they can look at something and go,  
14 Actually, that is something we would use, and we  
15 would commercialize and we would take forward.

16 And so, you know, without somebody who's  
17 going to take it to that next level, all you  
18 have is a really unique science experiment. And  
19 really, there's nothing wrong with those. But  
20 if we do want to commercialize, you need to be  
21 working with the end users. So I think that was  
22 a very important part of the partnership.

23 The other part is, I mean, you look at the  
24 power plant outside behind us. It was a  
25 \$1.4 billion asset. Clearly they are very good

1 at project management, procurement, you know,  
2 everything that it takes together to execute.

3 And by leveraging their expertise, you know,  
4 I mentioned how we were able to come in -- you  
5 know, this is a Wyoming thing that we're pretty  
6 proud of -- really under budget and ahead of  
7 schedule.

8 And that was -- not saying as the State of  
9 Wyoming we need to stand up our own team to do  
10 this. We're like, Hey, let's lean on these  
11 people that do this every day. And then they  
12 executed, you know, as promised.

13 CHAIRMAN BARRASSO: Dr. Extavour, just a  
14 couple things. One, just share -- I got the  
15 impression you're very optimistic about what  
16 we're doing here. So I was going to ask you to  
17 expand on little bit on that, and what  
18 commercial break-throughs remain really to be  
19 seen here.

20 And can you discuss the competitive process  
21 that was used to select the finalists. I know  
22 there are five here, I think there are five also  
23 in Canada, and just how that all is working.

24 A Yes, certainly. I will take the second part  
25 first. That way that this -- first thing I'll

1 say is this. It's important to remember the  
2 purpose of the competition is to try to  
3 accelerate the pace of innovation in this space.

4 Jason mentioned earlier that, you know, it's  
5 quite complex. It takes something from an idea  
6 through to an industrial technology that can run  
7 at scale safely and effectively for years. Even  
8 shaving a little bit of time off of that, money,  
9 as Jason alluded to earlier, is really helpful  
10 from everyone.

11 And the next prize is sort of a borderline,  
12 ludicrously extreme version of that. We set an  
13 extremely ambitious goal. Put it out to the  
14 world and say, Who can solve this problem?  
15 We're not sure who, but I bet someone can. And  
16 a cash prize might help drive that.

17 The call is open to anyone in the world.  
18 We've received dozens of submissions from around  
19 the world. We have an independent panel of  
20 judges, Dr. Krutka would be one of them,  
21 actually.

22 And they have down-selected by looking at  
23 performance data and evaluating the data that  
24 the team submit down to ten finalists, five as  
25 mentioned testing here, and five at a similar

1 facility also built around the same time called  
2 Alberta Carbon Conversion Technology Center.  
3 Key difference being it's fed by a natural gas  
4 plant, not a coal plant.

5 The teams are evaluated in three basic  
6 criteria. One, their economics. Does this  
7 process look like to become a sustainable  
8 business?

9 Two, environmental sustainability, which  
10 really boils down to, are you using more CO2  
11 than you produce? You can make hand sanitizer  
12 and produce CO2 in doing it. We're interested  
13 in actually reducing CO2 in producing it.

14 And third, engineering variables. Are you  
15 more efficient than your peers or not, which  
16 usually boils down to how efficiently, how  
17 little energy you can use to execute this  
18 process.

19 My optimism, I would call it data-driven  
20 optimism. This is a huge problem, but it's also  
21 an opportunity. I will say that there's a  
22 market opportunity and also a technology  
23 opportunity.

24 The market opportunity is that, I'll  
25 reference a figure here. Independent

1 not-for-profit called Carbon 180 did a market  
2 study. All right. What are all these CO2  
3 materials, what are we talking about, how can we  
4 get into these markets.

5 Just looking at known technologies today and  
6 known material markets actually circa 2017, they  
7 estimated that the total addressable market is  
8 \$1 trillion. That's a small number in the  
9 context of the global economy. It's a huge  
10 number in the context of making stuff out of  
11 CO2, which is a still a relatively young  
12 industry. So the market is there. I'm  
13 optimistic about that.

14 On the science and technology side, I'm  
15 optimistic, like, specifically the ability to  
16 produce existing materials in a cheaper and  
17 lower-energy way. Lower, lower energy.

18 And that -- to get into the science, that  
19 really has to do with sort of how little energy  
20 we can get away with using, but also in  
21 producing new materials that aren't quite yet  
22 abundant in the marketplace but could be.  
23 Things like proteins made of CO2. A bit of a  
24 weird concept, but that could be a future.

25 But also things like carbon fiber, which is

1 a niche. Expensive material used today,  
2 projections show it could be a much broadly  
3 cheaper, probably use cheaper material in the  
4 future.

5 The ability to make even a small a fraction  
6 of those materials using carbon dioxide  
7 emissions is a huge opportunity, which makes me  
8 optimistic.

9 CHAIRMAN BARRASSO: You want to ask more  
10 questions?

11 SENATOR ENZI: Thanks, John. I really  
12 appreciate the testimony of all of you again.

13 One of the things I like about a hearing is  
14 usually we can have the opportunity to, even  
15 after the hearing is over, we can ask more  
16 questions. And I'm an accountant, so I try not  
17 to be too technical in my questions. Just put  
18 the audience to sleep. I'm not very good at  
19 questions anyway.

20 All right. Jason I'll, start with you.  
21 Because of the pandemic, of course, there's a  
22 tremendous constraint on federal government,  
23 local government, state government. And one of  
24 the things we are discovering, of course, is  
25 that if the economy is not there, there's no

1 money.

2 But how can we ensure that every dollar  
3 that's invested in this carbon capture and  
4 research development goes as far as possible?

5 MR. JASON: Senator, that's a really, really  
6 good point. And one of the things that we've  
7 really prioritized is these partnerships, you  
8 know. You think about the Wyoming Energy  
9 Authority coming together. That has members  
10 from the School of Energy Resources, the  
11 Enhanced Oil Recovery Institute, the business  
12 council, those types of things.

13 You know, what we really want to do is make  
14 sure that we're all talking and, you know,  
15 sharing. And the worst thing we can do is  
16 duplicate what somebody else is working on. So,  
17 looking at ways to be as efficient as possible.

18 And that extends to our relationships, you  
19 know, on the national and international level.  
20 For example, the organization called the  
21 International Carbon Capture Test Center  
22 Network. There's 14 facilities globally that  
23 are working in this space.

24 And we share best practices to -- sometimes  
25 we share information about, you know, bad actors

1 that are -- you know, that are trying to, you  
2 know, play in the space. And so, you know, no  
3 reason to reinvent the wheel if people have  
4 already learned those lessons. So there's a  
5 huge focus on that.

6 You know, as an accountant, one of the  
7 things that we've been able to do and work with  
8 the Department of Energy, is the funding for  
9 this facility to build, you know, the bricks and  
10 mortar that we have here today, is \$15 million  
11 from the state of Wyoming, \$5 million from  
12 Tri-State, and \$1 million from NRECA.

13 Well, that is all non-federal money. So if  
14 it's accounted for and applied the right way in  
15 the same accounting language that the Department  
16 of Energy uses, it can be used as nonfederal  
17 cost-share on these projects.

18 So by tweaking our internal accounting  
19 systems, we basically found \$21 million to  
20 leverage against additional federal  
21 opportunities.

22 So we're really thinking about, okay, this  
23 is what we have, given the economic situation  
24 federally, you know, in the state and everything  
25 else, going back and asking for, you know, \$50

1 million probably isn't in the cards right now.  
2 So what can we do to stretch things the best  
3 that we can?

4 And the last area, and along those lines, is  
5 I'm kind of a -- it's also kind of a Wyoming  
6 thing. You don't need to build a Rolls-Royce  
7 when a pickup truck will work. You know, you  
8 look at this facility here. It's a modular  
9 facility that we were able to procure from, you  
10 know, oil services that were kind of moving on.  
11 We were able to make it ADA compliant. It meets  
12 every standard, but it wasn't a, you know, \$20  
13 million, you know, facility that had all the  
14 bells and whistles.

15 Not to say we don't want to get there, but  
16 what we want to do is kind of bit by bit, piece  
17 by piece, you know. This Company A is leaving  
18 behind their steam boiler. Hey, can we for a  
19 small fee take it over and just build capacity  
20 that way?

21 So we're really mindful about stretching the  
22 dollar the best, the furthest we can.

23 SENATOR ENZI: Thank you. Dr. Krutka, you  
24 mentioned syngas at half the cost. Can you go  
25 into a little bit more detail on how that --

1           what that is, how that works. I'm not a  
2           chemist.

3           DR. KRUTKA: Yeah. Sure. So thank you for  
4           the question, Senator Enzi. So syngas, what  
5           we -- we can, from coal -- let's see.

6           We have a thermo-chemical process that is  
7           designed to create unique products from coal.  
8           Most of the carbon is locked up in the coal, but  
9           some of it comes out in the form of CO2.

10          And so, there's lots of options. So you  
11          could do something like what we're talking  
12          about, the XPRIZE and use it. Or you could  
13          store it. And I want to give a shout out to the  
14          head of our CEGR group, Mr. Scott Klonen, over  
15          there.

16          And they are setting -- they the CarbonSAFE  
17          project right outside Dry Forks. So you can  
18          store it, or we have another potential use for  
19          it, which would be combine that CO2 with natural  
20          gas. And without getting too into the  
21          chemistry, what comes out of that, we have a  
22          catalyst that helps facilitate that reaction.  
23          And what you get out of that is carbon monoxide  
24          and hydrogen.

25          So it's the hydrogen that would be half the

1 cost of conventional hydrogen production  
2 technologies today. So the way you make them  
3 today is with C methane reforming and natural  
4 gas.

5 And so when you get syngas, which again  
6 carbon monoxide and hydrogen, you can do all  
7 kinds of things. You can make plastics, you can  
8 make anything that's made from carbon and  
9 hydrogen molecules.

10 One of the things we could also do is  
11 further treat that gas to have -- to separate  
12 the hydrogen. Then you have a clean fuel. And  
13 again, you can use the CO2, or you can store it,  
14 or you can use it for other things. But -- and  
15 then you would have hydrogen as a zero-carbon or  
16 low-carbon fuel source as well.

17 SENATOR ENZI: Thank you.

18 DR. KRUTKA: I'll draw a picture afterwards.

19 SENATOR ENZI: Ask you more about that then.  
20 Recoverable oil there is still in the ground if  
21 you want to go after it. Comment on that?

22 DR. KRUTKA: The amount of oil?

23 SENATOR ENZI: Yes. The original drilling,  
24 as I understand, it gets 20 percent.

25 DR. KRUTKA: Right. Yes. So, there's a

1           tremendous amount of work that can be done on  
2           this -- in this area. Even -- you know, you  
3           mentioned that Center of Innovation for Flow  
4           through Porous Media, they are focused on  
5           driving innovation to just squeeze more oil --  
6           understanding the fundamentals, so that they  
7           could squeeze more oil out of conventional and  
8           unconventional reservoirs.

9           I mean, there's also Enhanced Oil Recovery.  
10          But, there's a number of technologies. But  
11          you're right, they are so -- the vast majority  
12          of oil is left in the ground. And you know, in  
13          a world where there may be less permits coming  
14          out, you really need to -- and less drilling  
15          operations, we need to squeeze every last drop  
16          out of our existing operation.

17          SENATOR ENZI: Funded without federal  
18          dollars?

19          DR. KRUTKA: I believe -- I mean they --  
20          yes. The highway research facility was funded  
21          by the State of Wyoming and corporate sponsors.  
22          They do -- I believe they are a Sub ORD on a  
23          federal grant now. But that has nothing to do  
24          with the construction of the facility and the  
25          initial operations.

1           SENATOR ENZI: Thank you.

2           Dr. Extavour, I'm glad we're looking at some  
3 other uses for carbon. I am reminded of a  
4 Dilbert cartoon. Dilbert is given the  
5 assignment of eliminating CO2. And he says to  
6 the boss: You do know that we won't be able to  
7 grow any plants then?

8           And the boss says: So, we won't eat  
9 vegetables.

10          Well, the next day Dilbert has the machine  
11 that will do that. But he warns the boss, he  
12 says: Now, the really important part of this  
13 is, if you don't turn it off about three days a  
14 week, people will die.

15          And then the next frame you see the janitor  
16 going over to this machine saying: Woops, this  
17 is unplugged.

18          So, glad that you're coming up with some  
19 valuable resources and encouraging people to  
20 come up with innovation. I know that they've  
21 challenged people with an XPRIZE to be able to  
22 pedal a bicycle across the English Channel. And  
23 sure enough, somebody did it. So challenge the  
24 American people, is what we need. But I think  
25 this XPRIZE competition demonstrates a variety

1 of applications.

2 How would you explain to the typical  
3 American consumer about the way this research  
4 would affect them? The kids in school?

5 MR. EX: Thank you for that question.  
6 First, I'll say I truly appreciate you bringing  
7 Dilbert into the conversation. I prepared for  
8 this hearing by reviewing my back catalog of  
9 Dilbert cartoons. I think I've actually seen  
10 that comic.

11 It's a funny thing when we talk about energy  
12 transition or even using CO2 materials, because  
13 in some way, you know, in this place we're  
14 privilege to have, for instance, electricity,  
15 it's basically on all the time. Sort of  
16 surprising if you flip a switch and the light  
17 doesn't come on in this part of the world.

18 When we talk about energy transition, we're  
19 sort of talking about replacing the back end  
20 without necessarily a lot of disruption for the  
21 user.

22 SENATOR ENZI: I guess what I was going for  
23 is more of the products that can be made. We  
24 can switch from the polyester that's already out  
25 of date to carbon.

1 DR. EXTAVOUR: Exactly. I think there is  
2 huge opportunity here. For some people it will  
3 be very inspiring. Just let's say, this  
4 polyester shirt was made out of recycled carbon,  
5 this one was made out of virgin oil and gas,  
6 let's say, that was drilled.

7 Some people just aren't going to care. They  
8 are just, you know, does the shirt fit, does it  
9 have the right color, do I like it or not. And  
10 that's totally fine.

11 There are some consumers studies show that  
12 will respond well to, Oh, this is a little bit  
13 more sustainable, or, Oh, this is made from  
14 material right in my home state, or, Oh, I  
15 really like that it's made out of CO2 materials.  
16 But that's probably a minority of people.

17 I think the thing that is really going to  
18 catch people is what a lot of people that are in  
19 the market are trying to do is produce something  
20 better. This polyester shirt, to give the  
21 example, will last longer, or hold its color  
22 better, or be cheaper because it's made of  
23 greenstock.

24 These materials are not really there today.  
25 But I think the promise of the opportunity is to

1 get there. So I think for the average person  
2 will be -- or let's say a consumer of a  
3 commodity, chemical, cheaper or better or lower  
4 CO2 footprint or all three.

5 SENATOR ENZI: Thank you. I'll turn it back  
6 to you.

7 CHAIRMAN BARRASSO: Holly, you mentioned  
8 permits and underground storage of carbon  
9 dioxide requires permitting under the federal  
10 Safe Drinking Water Act.

11 Wyoming recently applied for primacy so that  
12 we can issue the permits ourselves rather than  
13 having to go back to Washington and the U.S.  
14 Environmental Protection Agency. With Wyoming's  
15 own expertise, the state is expected to process  
16 permits I believe in a more efficient way than  
17 regulators at the EPA could.

18 So how important is really timely permitting  
19 to the success of some of these underground  
20 storage projects?

21 DR. KRUTKA: Thank you, Mr. Chairman. So  
22 while timely permitting is really critical, the  
23 priority has to be to ensure that the storage  
24 risks are, and the storage projects are  
25 conducted safely and securely to minimize

1 potential risk to human health and the  
2 environment. But we believe that here in  
3 Wyoming we can accomplish both.

4 It's vital for project developers that  
5 permits are not unduly delayed. Regulators with  
6 the best knowledge of local geology are here.  
7 That means, the Wyoming Department of  
8 Environmental Quality should be able to process  
9 the permits efficiently, while maintaining the  
10 safety and security of CO2 storage, and launch a  
11 widespread CCUS industry.

12 Time is of the essence for several reasons.  
13 Perhaps most importantly, the clock is running  
14 on the amended section of 45Q tax credits, the  
15 world's first incentive of this type to support  
16 CCUS.

17 And claiming these credits requires  
18 construction to start before 2024. And we need  
19 rapid deployment of that technology to reduce  
20 the costs associated with the technology and a  
21 phenomenon that's been demonstrated in countless  
22 clean energy technologies before.

23 So for many, many different reasons,  
24 permitting time is really critical.

25 CHAIRMAN BARRASSO: Jason, following up with

1           what she just said about the 45Q tax credits and  
2           that extension and expansion commercializing  
3           more carbon projects, how would the USE IT Act  
4           help complement the 45Q?

5           MR. BEGGER: Mr. Chairman, you know, in  
6           order for, I guess, simple economics for any  
7           project, you need to have a margin. And you  
8           know, for these early stage technologies, you  
9           know, that involves two things.

10           You know, one is, can you increase the  
11           profitability or bring down the costs? And you  
12           know, looking at what has happened in the  
13           renewable sector, you can say that's been a  
14           great success.

15           You know, the various tax credits to -- you  
16           know, to increase the profitability, coupled  
17           with the research that's been going on, and that  
18           needs to be -- or, could be replicated here in  
19           the carbon tax sector where you've got a tax  
20           credit like 45Q that provides a stable revenue  
21           stream to get us through these early stages  
22           where, at the same time, the resources made  
23           available through the USE IT Act provide some  
24           research dollars, you know, to try to bring down  
25           those costs, and hopefully improve the margin.

1           Can get to the point where, at some point  
2           they are just no longer needed. You know, we've  
3           kicked them out of the nest, so to speak.

4           CHAIRMAN BARRASSO: Dr. Extavour, the USE IT  
5           Act has a competitive price program, one  
6           spurring more research into direct air capture.

7           Bill Gates has said he doesn't want to get  
8           to a zero carbon footprint, he wants that  
9           machine, Mike, that you talked about, because he  
10          said he wants to remove from the atmosphere any  
11          carbon dioxide he's put in since Microsoft began  
12          in 1978. I think he's committed, he said he'd  
13          commit \$1 billion of his own money to that.

14          Can you discuss that whole concept and what  
15          you see coming down the line?

16          DR. EXTAVOUR: Yes, certainly. I think Bill  
17          Gates has it right. Microsoft famously made a  
18          commitment to remove the equivalency of  
19          emissions that company has produced. They are a  
20          software company, so they are not such an  
21          emissions maker.

22          On the other hand, no other company has made  
23          that commitment, period. And that's just here  
24          in the last few months here.

25          I think what he's describing is something we

1 fully agree with at XPRIZE. If you stack up all  
2 of our CO2 sources, some of them are easier to  
3 curtail than others. And the way this is going  
4 to go is, as we curtail emissions is, it's going  
5 to -- you know, we should start with the easy  
6 stuff. And then it's going to get a little  
7 harder, and a little harder, which means a  
8 little bit more and more expensive.

9 At some point we'll cross a threshold where  
10 it's cheaper and more effective to keep those  
11 sources online, and maybe just build another  
12 source that can actually sort of reduce the CO2  
13 emissions.

14 So, I think what Mr. Gates is thinking about  
15 is trying to focus on innovations, specifically  
16 the, I'm going to go and get it, and remove past  
17 CO2 emissions.

18 I'll share an analogy, if you don't mind.  
19 This is Klaus Lackner's from Arizona State  
20 analogy. It's akin to a trash cleanup problem.  
21 There's a pile of trash in a public park. Well,  
22 first thing you should do is not add more to the  
23 pile. That's reducing our existing emissions.

24 Even if you turn your emissions to zero, or  
25 greatly reduce them, you still have a trash pile

1 in the park. Someone is still going to go pick  
2 it up. We still have excess CO2 emissions that  
3 we're going to want to curtail. We are going to  
4 want to reduce what we can today. But going  
5 forward, we also may want to actually pull some  
6 CO2 emissions back out of the air or the  
7 atmosphere.

8 CHAIRMAN BARRASSO: He points out that the  
9 technology that can be developed places like  
10 here, could that be used worldwide, India,  
11 China, other locations --

12 DR. EXTAVOUR: Absolutely.

13 CHAIRMAN BARRASSO: -- that don't have the  
14 same commitment that we do here in Wyoming?

15 DR. EXTAVOUR: There's a tremendous  
16 opportunity not just for the State of Wyoming  
17 but the broader United States to be the leader  
18 in this technology area, and be the nation that  
19 can develop it and export it.

20 We -- we're confident that there will be  
21 demand for this technology. We are already  
22 seeing some demand expressed by companies like  
23 Microsoft and a handful of others.

24 At XPRIZE we have a competition now for CO2  
25 conversion. Thrilled to be able to have the ITC

1 as a partner in that. We hope to in the future  
2 launch a prize for exactly this, direct air  
3 capture and other means of remediating CO2,  
4 whether it's from agricultural land management,  
5 building a machine that sucks it out of the air,  
6 or any other method.

7 But I think you're exactly on the right  
8 track with that, and we support Mr. Gates in  
9 that.

10 CHAIRMAN BARRASSO: Additional questions?

11 SENATOR ENZI: Well, it's one for  
12 Mr. Begger. In your comments you said something  
13 about having to go to Norway to scale up. What  
14 -- I don't understand that.

15 MR. JASON: So Senator, right now if you  
16 want to test a project of a certain size -- so,  
17 in the United States, kind of the typical  
18 scale-up -- and I've got a great slide that  
19 shows a very small scale of a carbon capture  
20 facility in Columbia University. Looks like a  
21 pressure cooker.

22 Then sort of the next scale up is a  
23 skid-based system, which you'll see here today.  
24 And then the next level, sort of a pilot scale.  
25 And then hopefully a commercial scale.

1           But most utilities need to see something at  
2           the 10- to 20-megawatt equivalent to feel  
3           comfortable that systems integration and the  
4           scale-up actually are a reality.

5           So when these really small projects, they  
6           are a couple kilowatts. And so if you go to the  
7           National Carbon Capture Center in Wilsonville,  
8           Alabama, which is a DOE-funded facility, about  
9           the largest project they can host is about 1.5  
10          megawatts.

11          So if you're ready to take that next step to  
12          do a 10- or 20-megawatt size project, you either  
13          need to do a one-off deal with a power plant --  
14          and that has happened at times, you know. If  
15          you're a really well-known developer like, you  
16          know, GE or Mitsubishi or somebody like that,  
17          you have a lot of institutional reputation where  
18          you can call Southern Company or Excel.

19          But if you're a little developer calling,  
20          like, Hey, can I cut a hole in your billion  
21          dollar power plant, they are going to tell you  
22          to go away.

23          So, there's a facility in Norway called  
24          Mongstad that is -- it's a natural gas facility,  
25          but it's -- it's similar to the ITC in ways.

1           It's a wonderful facility. But it is the  
2           only facility of that size globally where you  
3           can sort of plug and play those larger  
4           technologies.

5           So we -- over the years, we have had a  
6           number of DOE U.S.-based technologies that have  
7           had to go to Norway to test simply because they  
8           didn't have infrastructure in the U.S.

9           So we've gotten positive response from  
10          Norway -- or, excuse me, from the Department of  
11          Energy when they come out here and look at this  
12          site, going -- there's someone specifically who  
13          has told me, Every time I go to Norway and I'm  
14          at -- you know, going out and I have to pay \$18  
15          for a cheeseburger, it just boils my blood.  
16          Because I know all of these tenants and all of  
17          these taxpayer dollars are paying \$18 for a  
18          cheeseburger. So I can come to Wyoming and, you  
19          know, spend \$6 for a cheeseburger.

20          So I think they are really excited to see,  
21          you know, how the XPRIZE tenants work. You  
22          know, TDA is our first one out here. To sort of  
23          see, okay, do these guys have this under  
24          control? Are they able to host some of these  
25          larger projects with the goal that at some point

1           they go, Yeah, we're sending all of our DOE  
2           stuff to Wyoming and not Norway.

3           SENATOR ENZI: And Dr. Krutka, I'm happy to  
4           see the partnership between the Department of  
5           Energy and the University of Wyoming on the  
6           CarbonSAFE program, and happy to have a leader  
7           in the Chairman Barrasso to the Department of  
8           Energy in support of that partnership.

9           Can you talk about the importance of this  
10          kind of research in helping scale-up commercial  
11          technology.

12          DR. KRUTKA: Right. So thank you, Senator  
13          Enzi, for that question.

14          And I think first of all we're very, very  
15          proud of the Wyoming CarbonSAFE project. We  
16          also have -- we have a great slide showing all  
17          the partners in and around the state of Wyoming  
18          and beyond that are participating in that  
19          project.

20          Of course, the most important partner is the  
21          Department of Energy. Especially for CO2  
22          storage, it is critical that we have these large  
23          DOE projects moving forward.

24          Like I said, there's five around the  
25          country. We feel very positive about the

1 Wyoming CarbonSAFE project for a lot of  
2 different reasons. And like I said, one of them  
3 is that we have the subsurface knowledge and  
4 properties that are going to likely make that  
5 successful.

6 But one of the things that you should know  
7 about working with the Department of Energy and  
8 doing a true research and development project is  
9 that we're able to really study things on a deep  
10 level. And we're able to look at a lot of  
11 details that need to be understood before we can  
12 launch CO2 storage on a large scale, to give the  
13 government or regulators the confidence that  
14 they can allow this technology before  
15 permitting.

16 The other thing we're trying to do with that  
17 project is make a glide path. So as industry  
18 picks up that technology and starts to deploy it  
19 more commercially, more widespread, you know, we  
20 want to make that path easier, especially here  
21 in Wyoming where we're focused.

22 So we're doing things like writing model  
23 contracts, right, which you wouldn't do if you  
24 were just binding it with a single corporate  
25 partner. We're going to be able to support

1 entities wanting to deploy carbon storage  
2 projects in Wyoming in the future as a result of  
3 that CarbonSAFE project.

4 SENATOR ENZI: Thank you. I'm encouraged by  
5 hearing. Just add a final comment, I do  
6 remember that General Electric was going to do  
7 the project in Wyoming several years ago, and  
8 they canceled it.

9 When we got ahold of them to find out why,  
10 they said with this de-emphasis, or actually  
11 criminalizing coal, who would we ever sell our  
12 technology to?

13 Well, I'm glad that we have this team of  
14 people across the United States, across Wyoming,  
15 that are trying to de-criminalize coal and show  
16 that it is essential to, in a lot of different  
17 ways, to our lives. So thank you for your  
18 testimony.

19 CHAIRMAN BARRASSO: Following up, just in  
20 terms of ways to store carbon dioxide, research  
21 being done with seismic testing that's occurring  
22 just a short distance from here, are there  
23 specific policies that you would recommend that  
24 Congress focus on to advance some large scale  
25 carbon storage?

1 DR. KRUTKA: Yeah. Thank you, Mr. Chairman.  
2 Thank you for all your past support of those  
3 policies. So, SER Center for Energy Regulation  
4 of Policy Analysis believes that federal policy  
5 regarding management of long-term storage and  
6 liability of CO2 is vital.

7 In addition, incentives remain critically  
8 important to ensure that CCUS will be widely  
9 deployed. From our perspective, R&D funding in  
10 commercial deployment incentives go hand in hand  
11 to reduce the costs of deploying CCUS now and  
12 long into the future.

13 For example, of course there's the amended  
14 45Q section -- or, section 45Q tax credit. It's  
15 vitally important. It's spurred interest so  
16 much since it was modified, but it should be  
17 extended, especially given the delay with green  
18 policing guidance. And again, thank you for  
19 your pressure to help get that guidance release.

20 Fixing other CCUS related incentives, for  
21 example, 48A, that would unlock funds that are  
22 already authorized by Congress. Of course we've  
23 already mentioned the USE IT Act which would  
24 help us advance things like direct air capture,  
25 but also get CO2 sources to sync. So, from the

1 producer to the storage location.

2 So beyond that, you know, there's a number  
3 of policies. I'll say clean energy technologies  
4 need more than one incentive to move forward.  
5 Fully agree with that, and that's why we're  
6 observers of the Carbon Caption Coalition, and  
7 members of the Carbon Utilization Research  
8 Council. Fully endorse the policies that  
9 they've been pushing forward as well.

10 CHAIRMAN BARRASSO: Turn to Jason right  
11 here. The Dry Fork Station is an example of a  
12 site where it's possible to use the storage  
13 capture right nearby for carbon dioxide.

14 But other sites require pipelines to get  
15 from site one to two, to transport it to where  
16 it's stored. So how important is a robust  
17 carbon dioxide pipeline network in order to  
18 really maximize the value of the volume that we  
19 can capture and use and store in Wyoming?

20 MR. BEGGER: Mr. Chairman, it's going to be  
21 critical, you know. In some cases, I've heard  
22 people say it's going to be almost equal to the  
23 build-out of the existing oil and gas pipeline  
24 network.

25 You know, maybe the most simple way to think

1 about it is, we're going to need a new national  
2 sort of interstate highway system for CO2  
3 pipelines. You know, it's kind of one of those  
4 chicken and egg arguments, where you don't want  
5 to build it until you know you have users and  
6 producers on one end. But you can't really  
7 identify those until somebody has built it.

8 But, you know, looking at how we're going to  
9 build them, what size they should be, where they  
10 should be located, are all critically important.

11 You know, one thing we all recognize in  
12 Wyoming, and they are somewhat baffled somewhat  
13 that other states don't recognize that, when you  
14 look at the land ownership issues in Wyoming,  
15 you know, you're not going to throw a baseball  
16 across the highway without probably a NEPA  
17 analysis.

18 So what can we do through things like our  
19 corridor initiatives, to identify the right  
20 places to put these things, the right size that  
21 they should be, and where they really need to be  
22 going.

23 So, it's a critical link to all of this that  
24 probably isn't discussed nearly enough.

25 CHAIRMAN BARRASSO: Mike, if you don't have

1 any other questions, I was just going to ask the  
2 three panelists to see if they had anything  
3 else.

4 I saw Dr. Extavour making notes and others  
5 have as well. See if there was anything we  
6 didn't ask that they may want to share with us.

7 DR. EXTAVOUR: Thanks very much for that,  
8 Mr. Chairman. I'll be brief. I just love to  
9 lend my voice of support to the USE IT Act. I  
10 applaud your effort. Thank you very much for  
11 nudging the secretary of the treasury for that  
12 guidance.

13 To be blunt, it cannot come soon enough. To  
14 give a practical example of I think how 45Q  
15 specifically can impact this space, we are going  
16 to have a look at some sort of early project  
17 developers outside of the ITC.

18 They are projects that are probably a little  
19 too small to take advantage of the tax credit.  
20 They also probably don't really have a tax  
21 liability to offset. However, what 45Q has done  
22 is entered -- has created a new class of people,  
23 which we need in the sector, which is the  
24 project developers.

25 They are not necessarily the power stations.

1           They are not the technology developers. They  
2           are the dispassionate people in the middle that  
3           say, Okay, I know how to scale up projects. I  
4           can combine three technologies and make a large  
5           project, and we can do the accounting and that  
6           project will benefit from 45Q.

7           I've got to know some of those folks over  
8           the last couple years since 45Q's passage.  
9           Unlocking the guidance will unlock their ability  
10          to help scale this technology, which is probably  
11          a path to scale these types of technologies.  
12          Thank you.

13          DR. KRUTKA: First of all, I just wanted to  
14          thank you for having me here today. And it's  
15          been an honor to be on a panel with Dr. Extavour  
16          and Mr. Begger. Really appreciate you bringing  
17          your attention to the subject.

18          I guess I'd just follow up on my comment  
19          that you had me read again, and just say, you  
20          know, we've been very focused on CCUS. It's a  
21          critically important technology for Wyoming and  
22          beyond.

23          The thing I'd add is I also think Wyoming  
24          has so much potential to be a leader in other  
25          energy technologies as well. So, like I

1 mentioned, coal to products, you know, we have  
2 centuries of reliable, secure coal that is one  
3 of the most affordable, if not the most  
4 affordable, fuel in the world right here. And  
5 we're probably sitting on some right now.

6 So, I don't want to dismiss that in the  
7 research programs that are trying to find uses  
8 for that, as well as we are working on new types  
9 of power plants. I mean, the sky is the limit.  
10 And I'm just so, so excited to be here.

11 And I hope that we all continue to see  
12 Wyoming as a leader in research for all  
13 different types of technologies. And thank you  
14 for your time.

15 MR. BEGGER: Mr. Chairman, again, I really  
16 appreciate the chance to speak with you again in  
17 front of your committee, and would always like  
18 to open the doors to anyone in D.C. and the EPW  
19 to come out here.

20 I think one of the things that people need  
21 to see is this power plant right behind us,  
22 because this is what a modern new power plant  
23 can look like and does look like.

24 And at a time when you're seeing rolling  
25 blackouts in California, it's, you know, coal.

1           There's a role for that. And there's a need for  
2           that.

3           And all the things that we're working on  
4           today are ways to ensure that we can still  
5           deliver that low-cost reliable power in ways  
6           that meet sort of a new societal standard for  
7           cleaning -- or, for clean energy.

8           You know, one of the things as we were  
9           building out sort of the, I guess, the business  
10          development aspects of the ITC, you know, trying  
11          to attract these people in, we started saying,  
12          Well, if you're coming in here, you should  
13          really talk of SER, tour the power plant and  
14          EORI, and all of these things.

15          One thing we realized after going through  
16          all that stuff is that, Wyoming is so perfectly  
17          and uniquely suited for a lot of reasons. You  
18          know, the world-class facility, the ITC, the  
19          only one of its kind in the U.S.

20          You know, the expertise at the School of  
21          Energy Resource, Department of Environmental  
22          Quality, you know, the great geology that we  
23          have, you know, I mean, that's something that a  
24          lot of places can't offer that. You know, a  
25          quarter-mile to the south here, we have a

1           10,000-foot well that looks like it's going to  
2           be awesomely suited for long-term geologic  
3           storage.

4           But then also scattered around us are a  
5           number of potential fields for enhanced oil  
6           recovery or production and those types of  
7           things.

8           But lastly, probably the most important  
9           thing, is this license to operate that we have  
10          within the state. That means we have political  
11          acceptance. You know, we see the folks in the  
12          room today in the audience. You know, clearly  
13          there's support from our elected officials to  
14          make this stuff happen, but also public support.

15          You know, we've been doing EOR and carbon  
16          management for years in the state of Wyoming.  
17          So there's that broad public support. And one  
18          of the tenants that is hopefully be coming up  
19          here, they are from the Bay Area in California.

20          And he told me, he goes, The one thing that  
21          we really like about is, you guys always find a  
22          way to get to yes. You know, we couldn't manage  
23          trying to permit this in California. We would  
24          get a hundred reasons why this won't work, as  
25          opposed to you will sit down with you and go,

1           Okay, here's the Clean Air Act, here's the Safe  
2           Water Drinking Act. Here are all the things  
3           that we need to do. But here's the glide path  
4           to get to yes. If you do these ten things, we  
5           can do this right here.

6           So people are thrilled that, you know, as  
7           the state government, we're not throwing up  
8           roadblocks. We're trying to help them get  
9           there.

10          So, you know, there's a lot of great things  
11          about what's happening in Wyoming. We think  
12          we're the perfect place to do that, and just  
13          sort of just the tip of the iceberg on what the  
14          stuff could look like.

15          CHAIRMAN BARRASSO: Anything else from your  
16          notes?

17          I'm just so grateful for all of you on the  
18          panel and for everyone who's attended. As you  
19          know, those that have testified in the past,  
20          there may be additional questions, written  
21          questions submitted. Been texting with Senator  
22          Carper from Delaware, who's the ranking member  
23          of the committee, is sorry to not be able to  
24          join us today. He had to be in Delaware to help  
25          nominate one of his old colleagues from the

1 Senate last night. So he had to choose.

2 I said, You missed the boat. You were on  
3 national TV, but you could have been in Gillette  
4 with us.

5 He'll come another day to examine and  
6 explore and visit and learn. But he's been very  
7 interested. And this has been a bipartisan  
8 effort, as you know, in the Senate, working  
9 together. And these things are coming out of  
10 the committee 21 to nothing. And there are  
11 conservative members of the committee and we've  
12 already seen it.

13 So there is a unified effort to make this  
14 work. We know we need all of the energy, the  
15 globe needs all of the energy. We want to make  
16 energy as clean as we can, as fast as we can,  
17 and new ways that don't raise costs for  
18 consumers. And getting back to, Wyoming is the  
19 ideal place.

20 So with that, I want to thank the witnesses,  
21 thank everyone else who's joined us, and with  
22 that, the hearing is adjourned.

23 (The proceeding concluded at 11:18 a.m.)

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## C E R T I F I C A T E

1  
2 I, Jacqueline K. Weller, Registered Professional  
3 Reporter, do hereby assert that said proceedings were  
4 taken by me stenographically and thereafter reduced to  
5 typewriting under my supervision; that the foregoing  
6 transcript is a true and accurate record of the  
7 proceeding to the best of my understanding and ability  
8 and conditions of the hearing.

9 Dated this 3rd day of September, 2020.

10 /s/ Jacqueline K. Weller  
11 Registered Professional Reporter  
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