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.

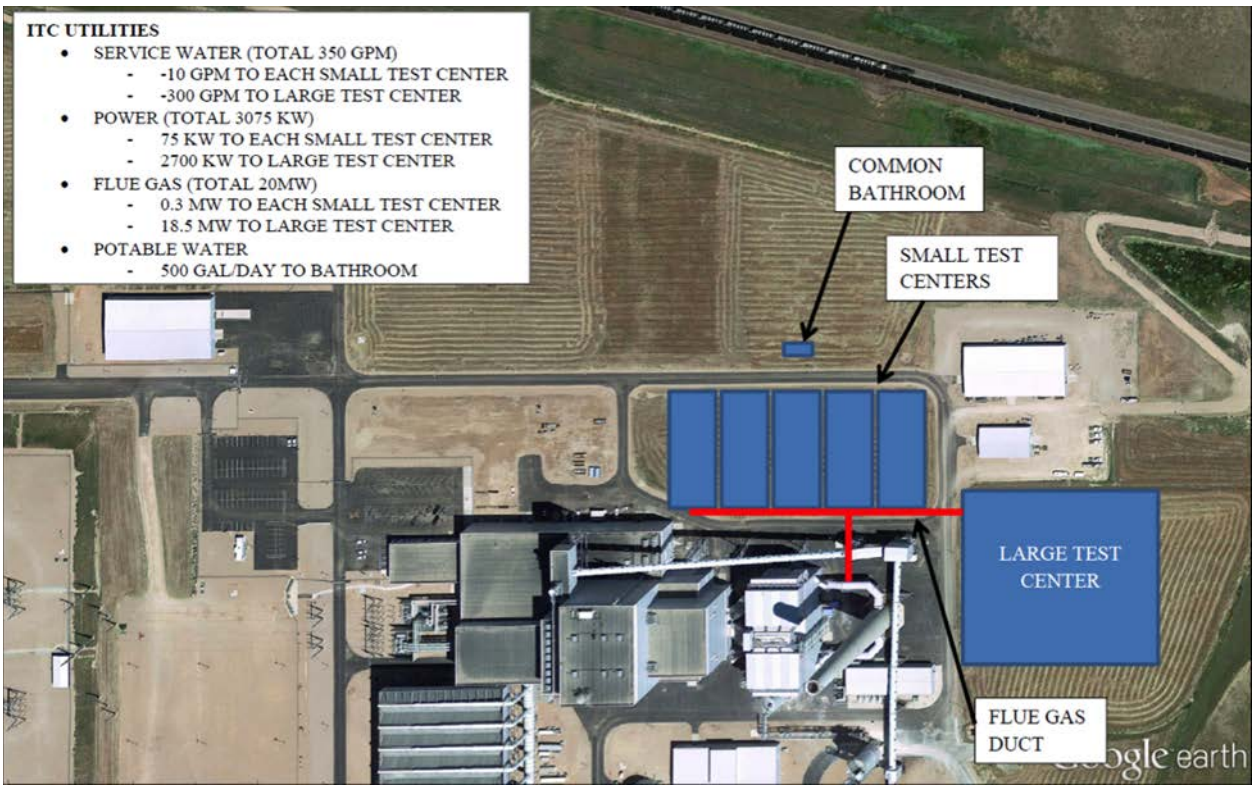
We have raised $21 million in funding, $15 million from the State of Wyoming, $5 million from Tri-State G&T, and $1 million from NRECA. $14.9 million has been budgeted for capital construction and approximately $500,000 for annual operating costs, providing us with the resources to construct and operate 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 XRPRIZE, 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.