Subcommittee on Environment and Climate Change
Hearing on
"Clearing the Air: Legislation to Promote Carbon Capture, Utilization, and Storage"
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Mr. Jason Begger
Executive Director
Wyoming Infrastructure Authority

The Honorable John Shimkus (R-IL)

1. Would you elaborate how CCUS's current application with enhanced oil recovery (EOR) will establish a profit incentive that can eventually augment overall investment in other areas of CCUS?

   RESPONSE: EOR can provide a commercially viable revenue stream for CO2 utilization. An amine based carbon capture system costs in the range of $50 to $70 per ton. Market rates for CO2 for EOR are in the range of $25 to $35 per ton. The cost ranges are determined by a number of factors, including geography and infrastructure used. If you are able to capture CO2 for $50 and sell it for $35, plus realize the value of the produced oil, this would make the venture commercially profitable and the market will drive deployment.

   a. Would you elaborate why expanded pipeline infrastructure is necessary to take advantage of EOR and what that would mean both for energy production and driving down the costs for capture technologies?

      RESPONSE: Currently the existing CO2 pipeline network is small and very fragmented, linking mostly natural CO2 sources with EOR fields. The current pipelines are also geographically isolated in the southwestern and upper Rockies regions of the country. In order to manage CO2 from the very large industrial sources in the eastern and Midwestern U.S., pipelines will need to be built to link those anthropogenic sources with places with suitable geology for EOR or permanent geologic storage, which are often found in the southern and western U.S. If a coal power plant or ethanol plant in Illinois had a direct link to the EOR fields in Texas, those facilities could economically provide low carbon energy by adding carbon capture equipment.

2. How will expanded carbon-dioxide-EOR use decrease the greenhouse gas life cycle emissions profiles of produced oil and gas?

   RESPONSE: The CO2 used for EOR is eventually permanently sequestered within the oil field. CO2 is pumped into the oil field to re-pressurize the formation and push oil to production wells. Eventually the CO2 mineralizes in the formation and will become very stable and permanently immobilized. The amount of CO2 needed to

produce one barrel of oil depends entirely upon the flow dynamics and geology of the oil reservoir, but any ton of CO2 that is permanently removed from the atmosphere lowers the carbon intensity. If more CO2 is utilized than is produced from the oil from EOR, the process becomes carbon negative.

a. How will exports of EOR production effect the emissions profiles of other nations?

RESPONSE: If the U.S. is capable of supplying oil with a lower carbon footprint, it will lead to drastically decreased emissions profiles for importing countries. For example, the country of Japan imports nearly all of its oil with almost 90% originating in the Middle East. As a country that is very concerned about carbon emissions, Japan has an interest in lower carbon energy sources. If the U.S. was able to provide a lower carbon oil, countries such as Japan would be very interested. There could potentially be a market premium for lower carbon oil.

3. The New Source Review permitting requirements under the Clean Air Act are supposed to improve air quality, but often discourage efficiency and pollution control investments in our fossil electric generation fleet.

a. If U.S. policy should encourage the deployment of these innovative clean energy technologies, should it update New Source Review to help this to happen?

RESPONSE: I am not an expert in New Source Review (NSR), but in my experience working with utilities, most specifically Basin Electric as the host side of the Wyoming Integrated Test Center, the mere chance of triggering an NSR review stops common sense projects from occurring. An updated NSR would encourage new projects and plant updates that would have meaningful carbon reduction impacts.

b. How could New Source Review be improved to encourage continued investments in our coal, gas, and industrial fleets, such as carbon capture and enhanced oil recovery projects?

RESPONSE: Again I'm not an NSR expert, but utility engineers have told me that every power plant has a list of ten items that they would complete if NSR was not an issue. These updates would improve plant efficiency, therefore meaning more energy produced with the same fuel, meaning lower carbon output. One specific example given to me at a power plant was a pipe junction point that was determined to be a bottleneck. Increasing the size of that point would allow the materials to flow more easily, reducing the amount of energy necessary to push the materials, which would increase efficiency. However under the existing NSR program, increasing a flow is viewed as

increasing a source emission and would have required an NSR review. This project on its own wouldn't justify the NSR process, however, adding together ten such projects across a plant would provide meaningful and quantifiable efficiency improvements. For most, NSR is seen as something to be avoided at all costs and hinders common sense improvements.