

STATEMENT OF DR. MARK NORTHAM
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before the
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE

concerning the
“UTILIZING SIGNIFICANT EMISSIONS WITH INNOVATIVE
TECHNOLOGIES ACT”

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Introduction

Chairman Barrasso, Ranking Member Carper, and Members of the Senate Committee on Environment and Public Works, I am Mark Northam and I serve as the Executive Director of the School of Energy Resources at the University of Wyoming. Thank you for inviting me to testify on S. 2602, The Utilizing Significant Emissions with Innovative Technologies Act (USE IT). I came to university following 26 years in the oil and gas industry. Immediately prior to accepting my current position, I was employed by Saudi Aramco in Dhahran, Saudi Arabia, where I worked as a Research Science Consultant in the areas of Carbon Management and Technical Intelligence. Prior to joining Saudi Aramco, I worked for over twenty years at Mobil and ExxonMobil, holding a variety of research, operations, and management positions in the US and Europe.

I have had the privilege of working on carbon dioxide (CO₂) utilization and storage issues, technologies and policies for the bulk of my career. For example, I was a technology leader with the Sleipner CO₂ Storage Project in the Norwegian offshore from its inception. The Sleipner CO₂ Storage Facility was the first in the world to inject CO₂ into a dedicated subsurface reservoir for the purpose of storage. The Sleipner facility has captured CO₂ as part of the Sleipner area gas development since 1996. The captured CO₂ is directly injected into an offshore sandstone reservoir. Nearly 1 million tonnes of CO₂ is injected per annum and over 17 million tonnes has been injected since inception to date.

My work with Carbon Capture, Utilization and Storage (CCUS) continues through the present day at SER. We continue to conduct important research related to the geologic storage of CO₂ in saline aquifers, and to improve carbon dioxide-motivated enhanced oil recovery operations (CO₂-EOR). For example, SER is advancing two project sites in Wyoming under Phase I of the

U.S. Department of Energy's Carbon Storage Assurance and Facility Enterprise (CarbonSAFE) program, which has the aspiration of siting one or more large-scale integrated CCUS facilities throughout the United States by 2025. Our current work builds upon UW's prior CCUS research under the Wyoming Carbon Underground Storage Project, a pioneering three-year research project that thoroughly characterized two potential CO₂ storage reservoirs (the Weber Sandstone and Madison Limestone) on the Rock Springs Uplift in the southwestern corner of Wyoming.

Separately, and in conjunction with colleagues at West Virginia University, University of Kentucky and elsewhere, UW is pleased to play an integral role in DOE's Joint US/China Clean Energy Research Consortium (CERC) program. CERC is a multi-year DOE effort to foster collaborative research and development of CCUS and other clean coal technologies between the U.S. and China.

SER's work on ensuring a sustainable future for fossil fuels extends well beyond CCUS to fields such as carbon engineering. UW is well along in developing and advancing novel and innovative technologies related to the extraction and production of valuable non-Btu products from coal. The primary focus of this research is to advance coal utilization as a feedstock to manufacture and generate valuable non-Btu coal-based products such as carbon fiber and carbon-rich chemicals, agricultural supplements and building products. The manufacture of some of these coal-based products has the potential to be deployed as a pre-treatment before coal is combusted to offset the typically high costs associated with post-combustion carbon capture solutions. And some of these products – e.g., graphite and carbon fiber -- are predicted to be in short supply as the demand for lightweight materials, renewable energy and the like grows in the years ahead.

The State of Wyoming is an ideal jurisdiction to advance research and projects related to capturing and utilizing emissions of CO₂. For example, the Wyoming Legislature provided for the development of an Integrated Test Center (ITC) to serve as an operational test site for CO₂ capture and utilization technology developers. The Wyoming Infrastructure Authority led development of the site with the support of many private- and public-sector entities in Wyoming. The Gillette-based Integrated Test Center (ITC) will be inaugurated in May of this year. When operations commence later this year, it will deliver 20 MW-equivalent emissions stream from the coal-fired Dry Fork Station to test bays that will accommodate up to seven technology developers. The ITC will soon host five semifinalists of the coal-track of the \$20M NRG COSIA Carbon XPRIZE, a global competition to develop breakthrough technologies that convert CO₂ emissions from fossil-fuel combustion into products with the highest net value. Competitors in this program are developing processes that utilize CO₂ in the production of, for example, enhanced concrete, biofuels, nanotubes and fertilizers. In fact, the Carbon XPRIZE finalists will be announced Monday in New York City.

Wyoming is one of a handful of states with existing CO₂ pipeline infrastructure to serve an active CO₂-EOR industry. The state has also planned for future expansion of the network through ongoing efforts of the Wyoming Pipeline Corridor Initiative, primarily for providing CO₂ to parts of the state with significant demand but no supply.

Finally, Wyoming has enacted a body of laws and regulations to encourage and sustain the environmentally responsible siting and operation of CCUS-related projects in the State.

Testimony

I am pleased to testify today in support of the USE IT Act. My testimony focuses on the “Carbon Dioxide Utilization” section of Title I, which amends section 103(g) of the Clean Air Act to authorize the U.S. Environmental Protection Agency (EPA) to support certain CCUS-related research and development activities by the States, institutions of higher education and others. I conclude with some brief remarks regarding Title II that, in part, seeks to coordinate and simplify the federal and state requirements that apply to CCUS projects and CO₂ pipelines thereby facilitating and enabling development of needed facilities and infrastructure.

Title I, Carbon Dioxide Utilization. Title I of the USE IT Act in part authorizes the EPA Administrator to “carry out a research and development program for carbon dioxide utilization to promote technologies that transform carbon dioxide generated by industrial processes into a product of commercial value, or as an input to products of commercial value” (*USE IT Act, § 101*). The bill defines “carbon dioxide utilization” as “technologies or approaches that lead to the use of carbon dioxide” through: (1) the fixation of CO₂ through “photosynthesis or chemosynthesis, such as through the growing of algae or bacteria”; (2) the chemical conversion of CO₂ “to a material or chemical compound in which the [CO₂] is securely stored”; or (3) the “use of [CO₂] for any other purpose for which a commercial market exists” (*id.*). The EPA is to provide technical and financial assistance to certain eligible CO₂ utilization projects, with the eligibility criteria including access to an emissions stream from a U.S.-based stationary source that is capable of providing not less than 250 metric tons per day of CO₂.

I support these provisions. Not only do they create another source of critically needed federal funding for CCUS-related research and technologies, but also they potential apply to a broad swath of potential CCUS technologies. Eligible CCUS technologies include the “use of [CO₂] for any other purpose for which a commercial market exists”, which I interpret to include CO₂-EOR. CO₂-EOR remains the dominant customer of captured CO₂ in the United States, as recently confirmed by the National Coal Council.¹ Active CO₂-EOR projects exist in Wyoming, Texas, New Mexico, Colorado, Idaho, Montana, Kansas, Louisiana, Mississippi and Michigan. The Rocky Mountain region – Wyoming, Idaho, Colorado and Montana – contains an estimated four billion barrels of technically recoverable oil using CO₂-EOR.² Carbon dioxide remains in high demand for EOR throughout Wyoming, so the USE IT Act holds promise in leveraging this commercial demand to advance CCUS technologies and projects. The existence of a “shovel-ready” use for captured CO₂ can serve as a bridge to other markets for those early-adopters of carbon capture technologies.

Title II, Improvement of Permitting Process for CO₂ Capture and Infrastructure Projects. Title II of the USE IT Act –

✓ *First*, explicitly makes certain CCUS-related projects, including CO₂ pipelines, subject to the 2015 “Fixing America’s Surface Transportation Act or “FAST Act” (*Pub. L. No. 114-94*). The FAST Act seeks to streamline federal environmental review and permitting, and reduce bureaucratic redundancies for certain large infrastructure projects. For example, the FAST Act tightened the requirements that project opponents must follow under the National Environmental Policy Act, or NEPA, when bringing challenges; and

¹ “CO₂ Building Blocks: Assessing CO₂ Utilization Options” (NCC, August 2016).

² Jones, N., Cook, B., Whitaker, S. “CO₂-EOR in Wyoming: Project Review and Forecast of Potential” (Enhanced Oil Recovery Institute) (draft; available from author).

✓ *Second*, directs the Chair (Chair) of the White House Council on Environmental Quality (CEQ), in consultation with EPA, DOE and others, to prepare guidance: (1) to facilitate reviews associated with the deployment of [CCUS] projects and [CO₂] pipelines”; and (2) that identifies “current or emerging activities that transform captured [CO₂] into a product of commercial value, or as an input to products of commercial value” (*USE IT Act*, § 202). The guidance must address the panoply of federal laws that apply to such projects – including but not limited to NEPA, the Clean Air Act and the Safe Drinking Water Act (SDWA) – and must include the development of NEPA programmatic environmental reviews for CO₂ pipeline networks. The USE IT Act also directs the chair to form at least two task forces to perform various tasks, such as the development of common models for State-level CO₂ pipeline regulation.

I support these provisions, as well. In addition to financial challenges, CCUS projects face unfortunate headwinds caused by well-intended, but nonetheless, arguably, counterproductive federal policies. These policies include time-consuming reviews under NEPA, which is a specific challenge for states such as Wyoming that have significant areas of federal lands. The Underground Injection Code under the SDWA also arguably stands as an impediment to CCUS projects due to aspects of the Class VI CO₂ injection storage regulations that are difficult if not impossible for the private sector to utilize. Title II of the USE IT Act should go some way towards ameliorating these and related challenges facing CCUS projects and technologies.

Conclusion

This concludes my testimony. I am pleased to testify today in support of the USE IT Act. The ongoing federal role in supporting CCUS research at institutions of higher education is

imperative. Mr. Chairman and Members of the Committee, I would be pleased to answer any questions that you may have.