



Senate Environmental Resources and Energy Committee

Informational meeting on the deployment and utilization of carbon dioxide management technologies

Wednesday March 10, 2021 – 10:00 AM

Chairs Yaw and Comitta and members of the Senate Environmental and Energy Committee, thank you for the opportunity to testify today.

My name is Denise Brinley and I serve as Executive Director of the Pennsylvania Office of Energy – an office established in 2018 in the Department of Community and Economic Development. The focus of the office has been to work with private sector companies to maximize Pennsylvania’s economic opportunities across the energy sector. DCED is participating with DCNR and DEP in a CCUS Work Group established by the Wolf Administration in October 2019 to support emerging CCUS projects and the commonwealth’s climate mitigation goals.

Pennsylvania’s power production is unrivaled – made possible by energy diversity – coal, nuclear, natural gas, wind, solar and hydro – which enables us to maintain a formative position as the number one exporter of electricity in the United States.

As we know well, Pennsylvania is an energy-rich state with unparalleled natural resources that have made our commonwealth a stalwart of American industry, playing a formative role in every industrial revolution. We currently rank 6th in the nation in manufacturing jobs, representing a weighted share of 4.5% of the US total.¹

The combination of power production and industrial manufacturing also means we produce our share of carbon dioxide, currently ranking 5th in the country for CO₂ emissions.² The session today lies at the nexus of economy and environment – how to best position Pennsylvania for success, recognizing our unique assets and opportunities.

The Intergovernmental Panel on Climate Change (IPCC) and International Energy Agency (IEA) have both signaled that carbon capture, utilization and storage is a necessary technology that will enable decarbonization of one of the most difficult to address sectors – our global, national, regional and local industrial base. Nationally, industrial operations contribute approximately 22% of all greenhouse gas emissions³ (GHG), while Pennsylvania’s industrial sector GHG share is 31%.⁴ In order to sustain our current power production facilities and industrial base – and provide a robust pathway for growth – we



must focus on cost efficient, low carbon technologies that can provide the future power needs for our most vital industries.

The deployment of carbon capture, utilization and storage (CCUS) to date has been concentrated in the United States, which is home to almost half of all operating facilities. This is due in large part to the availability of an extensive CO₂ pipeline network and demand for CO₂ for Enhanced Oil Recovery (EOR), as well as public funding – most of which was introduced after the global financial crisis of 2008-2009. Facilities using CCUS technologies include fertilizer production, natural gas processing, hydrogen production, power generation, and ethanol production. None of these facilities are, however, in Pennsylvania.

Additionally, the private sector has announced several new CCUS investments. In April 2020, the Oil and Gas Climate Initiative (OGCI) – a group of 13 international oil and gas companies – announced it would invest in equipping a natural gas power plant in the United States with CCUS. A month later, Equinor, Shell and Total announced plans to invest more than \$700 million in the Northern Lights offshore CO₂ storage project in Norway. In July, Equinor announced it would lead a project – H2H Saltend – to produce hydrogen from natural gas with CCUS in the Humber region of the United Kingdom.⁵ These are noteworthy investments for Pennsylvania’s energy future.

CCUS is now being contemplated as a series of industrial “hubs” with shared CO₂ transport and storage infrastructure, which can improve the economics of CCUS by reducing costs through spreading the risk, infrastructure and financing with multiple users.

However, CCUS has not advanced as fast as needed – primarily because of economics and a “chicken and egg” dilemma. Any CCUS-industrial hub will require substantive investment in both carbon capture technology at a number of fixed facilities as well as pipeline infrastructure to connect the CO₂ to utilization or storage points. As a remedy for the impediments for deployment, the federal government has initiated the 45Q tax credit which has stimulated the development of some projects and the SCALE Act has recently been introduced in the United States House of Representatives which is intended to bridge funding gaps and shortfalls associated with pipeline infrastructure build out, but additional incentives will be required.

The Great Plains Institute recently commissioned the Rhodium Group to conduct a state-by-state analysis exploring the economic benefits of carbon capture retrofit opportunities at existing industrial facilities, as well as the expansion of CO₂ transport infrastructure.

The direct economic benefits considered include private sector investment and employment opportunities associated with the construction and operation of carbon capture retrofits.⁶ Their findings are as follows:

If all near to intermediate term opportunities in Pennsylvania are pursued, which includes eight industrial facilities across the commonwealth (steel, cement, refineries and ethanol):

- \$1.2 to \$1.8 billion in investment would be required to support these projects
- 355 to 540 jobs would be associated with carbon capture investment on average per year over the next 15 years
- 300 to 435 annual ongoing jobs would be required to operate carbon capture retrofits
- \$356 million in transport infrastructure would be required to support these projects.
- 150 jobs on average per year over a 15- year deployment period would be created by this scale of investment

Perhaps more importantly, deploying carbon capture in the near term, with these plants being in the forefront, ensures there is a market and economic value for the commonwealth's resource endowments in the long term, when carbon dioxide presents potential constraints to future industrial growth.

In closing, I would like to emphasize the importance of CCUS to maintaining, sustaining and growing Pennsylvania's competitive advantages in power and industrial operations. There are many places in the United States and the world that are creating the next generation of industrial infrastructure. There is no better place to do that than right here in Pennsylvania.

I would like to express my sincere appreciation for your time and attention in this hearing and am happy to answer any questions you might have.

¹ US Bureau of Labor Statistics (BLS)

²United States Energy Information Agency (EIA)

³Environmental Protection Agency (EPA), US Greenhouse Gas Emissions in 2018

⁴Pennsylvania Department of Environmental Protection, Pennsylvania Greenhouse Gas Inventory Report, 2020 (note: measured in CO₂ equivalents)

⁵International Energy Agency (IEA), "A New Era for CCUS"

⁶The Rhodium Group, The Economic Benefits of Industrial Carbon Capture, January 28, 2021