Carbon Capture, Utilization, and Storage (CCUS) Task Force Subcommittee Recommendations

INTRODUCTION:

As part of the near-term actions in its Greenhouse Gas Pollution Reduction Roadmap, Colorado identified the development and utilization of a Task Force as an important step to better understand the role that carbon capture, utilization, and storage (CCUS) may play in meeting the state's emissions targets. The evaluation included an assessment of existing initiatives and recent publications that analyze or identify carbon capture, transport, utilization, and storage opportunities in Colorado. In addition to the literature review, the CCUS Task Force broke into several subcommittees to evaluate various aspects of CCUS in Colorado. Specifically the subcommittees researched:

- **Opportunities:** Identify and evaluate the potential uses of carbon capture, transport, utilization, and storage.
- **Resources:** Evaluate Colorado's carbon capture, transport, utilization, and storage resources.
- **Issues to Consider:** Identify barriers, including economic, regulatory, legal, or other significant barriers to deployment of carbon capture, transport, utilization, and storage projects in Colorado consistent with achieving Colorado's emissions goals.
- **Environmental Justice:** Identify environmental justice impacts and opportunities.

Each subcommittee conducted research in each category and identified potential recommendations. The task force reviewed these, and developed this set of consolidated recommendations. It is important to note that these recommendations do not all have complete consensus from task force members.

The State of Colorado, in coordination with the Colorado School of Mines, hosted a virtual public engagement session on November 3, 2021 from 6:00 p.m. to 8:00 p.m. to review the CCUS Task Force's draft report and solicit feedback. This feedback, along with additional comments collected throughout the recommendation development process via the State of Colorado's CCUS Task Force publicly-facing website, have been reviewed and discussed by the Task Force.

Near-term Priority Actions:
There are a number of important areas that we recommend for legislative action that are necessary for deployment of CCUS in Colorado. As described below in more detail, we recommend that the legislature enable the Oil and Gas conservation Commission to seek authority from the US EPA for state regulation of Class Six CO2 injection wells, clarify the property rights for CO2 storage, address state authority over siting of CO2 pipelines, and create a process for long-term stewardship of CO2 storage sites. Since implementation of this legislation will likely take a period of years, it is important to move forward. In addition, we recommend that the state engage with other states in the region to plan regional deployment of CO2 pipelines.

It is also important for state agencies and the private sector to be prepared to respond to federal funding opportunities for CCUS and for direct air capture of carbon dioxide as the United States Department of Energy announces funding opportunities pursuant to the passage of the Infrastructure Investment and Jobs Act.

Finally, an important near term priority is to seek review of the CCUS report and recommendations from the Environmental Justice Advisory Board, and consider input from this review in shaping further action on CCUS.

Discussion of the role of CCUS in Colorado:

CCUS may be able to play an important role in achieving that state's goals for economy-wide GHG reduction. It is important that CCUS be both enabled and appropriately regulated to ensure long-term storage of CO2, and be deployed in ways that address equity and community concerns. Public policies, investments, and other incentives or drivers for CCUS should complement the build-out of non-GHG producing alternative solutions to decarbonize hard-to-reach sectors and industries. As described in more depth below, potential applications include firm zero carbon electricity generation to complement a primarily renewable grid, industrial decarbonization, and the potential use of direct air capture. There are at least two significant CCUS projects currently in early stage development in Colorado at the Holcim-Lafarge cement plant in Florence, and the power generation project on the Southern Ute Reservation.

CCUS should be deployed in ways that support new economic opportunities, and that build on existing economic strengths and infrastructure. This can include not only the opportunities associated with the deployment of carbon capture technology, but also with new opportunities for use of carbon. Some of the direct economic benefits of CCUS include private sector investment and employment for the construction and operation of CO2 transportation infrastructure, permanent storage facilities, and carbon capture retrofits. Economic opportunities also exist to use captured carbon to reduce carbon emissions in fuels and industrial processes, like cement production.

Industry: Industrial emissions are one of the five largest sources of GHG emissions in Colorado.[1] Total industrial emissions (excluding methane emissions from the oil and gas industry, which are separately accounted for) are on the order of 15 million tons per year, so CCUS could play a role for some fraction of this 15 million tons. HB 21-1266 requires the Air Quality Control Commission ("AQCC") to adopt regulations that will achieve a minimum of 20% emissions reductions from the industrial sector by 2030, below a 2015 baseline. The AQCC just concluded the first phase of this regulatory effort, requiring energy intensive trade exposed (EITE) industrial facilities (largely cement and steel manufacturing) to examine and adopt, as required by the Air Pollution Control Division, best available energy and emissions control technology. While there are multiple technologies that may play an important role in meeting those requirements, including process changes, electrification, energy efficiency, and use of hydrogen, CCUS may play an important role. The initial rulemaking for EITE industries was completed in fall 2021, and does require an evaluation of CCUS as part of the consideration of best available control technology; the AQCC will need to consider how to address CCUS for other industrial facilities in its follow-up rulemakings for the rest of industry pursuant to HB 21-1266. The AQCC should consider CCUS

[1] Colorado Roadmap identifies the four leading sources as transportation, electricity generation, oil and gas production, and buildings. In the Roadmap, the building sector includes both industrial energy use and emissions and non-industrial (i.e., residential and commercial buildings) energy use and consumption. On its own, industrial emissions would be a fifth leading source.

as a component and/or complementary strategy of the regulatory framework being established in Air Regulation Number 22[2] for industrial decarbonization pursuant to HB 21-1266, creating regulatory certainty for CCUS projects to proceed.

Electricity Sector: There is a legislative framework, set by House Bill 19-1261, Senate Bill 19-236 and House Bill 21-1266 that requires approval of utility plans that achieve at least an 80% reduction in GHG emissions below 2005 levels by 2030. Current plans from Colorado utilities achieve this by retiring coal generation and replacing it with wind, solar, and storage. The primary role for CCUS in the electric sector may be as one of a number of potential technologies to help reach the final 10% to 15% needed to fully decarbonize the sector. The modeling done by Energy and Environmental Economics (E3) for the Greenhouse Gas Pollution Reduction Roadmap ("Roadmap") found that retiring coal and replacing it with lower-cost renewables will allow the state to meet and exceed the 2030 target of 80% decarbonization but that as we move towards fully zero carbon generation additional technologies, especially firm dispatchable technologies, will be needed for the last 10-15% of electricity decarbonization, to complement variable renewables. Thus, this role of helping to complement a primarily renewable electricity system, as part of that last 10-15% of generation, is the potential role we see for CCUS in the electricity system. APCD and the Public Utility Commission (PUC) should consider CCUS as a complementary strategy to the use of renewable electricity generation, to provide firm low carbon generation, and should give clear guidance to utilities on emissions accounting for generation with CCUS in clean energy plans and electric resource plans.

Colorado's strategy for reducing Greenhouse Gas (GHG) pollution from electricity generation in Colorado does not include a role for coal with CCUS in Colorado. As of December 2021, every coal plant in Colorado, except for Comanche 3, is scheduled to be retired before 2030, and a settlement agreement awaiting action by the PUC would reduce Comanche 3's operations starting in 2022 and retire it by 2034.

Direct Air Capture (DAC): While DAC is a less mature technology, it has been highlighted by the Intergovernmental panel on Climate Change as an important technology for mitigating carbon emissions, and significant funding for direct air capture is included in the Infrastructure Investment and Jobs Act. The National Renewable Energy Lab, located in Colorado, is a leader in developing technologies for making use of captured carbon, through their Electrons to Molecules program, which focuses on using low cost renewable electricity and captured carbon to generate net zero fuels, chemicals and materials.

RECOMMENDATIONS

(L) Designates a recommendation that would potentially require legislation.

Environmental Justice

Continuing to develop and include environmental justice considerations into all CCUS policies and projects will be critical, especially as specific communities and projects are identified.

[2] 5 CCR 1001-26.

The CCUS Task Force has developed principles to guide community engagement processes and empower communities to shape CCUS policy. These principles are based on the state's "Climate Equity Principles" developed in the Climate Equity Framework, with additional detail specific to CCUS. Importantly, these principles are not exhaustive and should be adapted over time, in coordination with the Environmental Justice Advisory Board (and other relevant state resources under HB 21-1266), to meet community needs.

- ➢ Seek review of the CCUS report and recommendations by the Environmental Justice Advisory Board as allowed by C.R.S 25-1-134(2)(g)(IV)[3].

Key principles that should be considered are:

- ➢ In order to mitigate harms and prioritize benefits, it is important to identify where locations of carbon capture, transport, and storage might affect Disproportionately Impacted (DI) communities, as defined in HB 21-1266, and to prioritize those community voices in decision-making.
- ➢ Governments and industries should pursue meaningful community involvement – early and often in all decision-making – to learn from and respond to community concerns
- ➢ Carbon reduction technologies like CCUS must not exacerbate existing harms in DI communities, and wherever possible, should reduce those harms
- ➢ CCUS deployment should prioritize environmental, health, and economic benefits in DI communities
- ➢ When CCUS is deployed at facilities, improvements should be made to the facilities to ensure that there is no increase, and where possible are decreases, in localized pollution in the communities where they are deployed, especially in DI communities

Coordination and Permitting with Federal Agencies & Regional Partners

As Colorado considers the role of CCUS in meeting its climate goals, it will be important to ensure that there is coordination and cooperation among state and federal agencies that have oversight of potential CCUS storage facilities or have regulatory responsibility for permitting or storage sites.

- ➢ **(L)** In accordance with the results of the Colorado Oil and Gas Conservation Commission ("COGCC") Class VI report to evaluate what resources are needed to ensure the safe and effective regulation of carbon sequestration, and after determining that the state has the necessary funding, regulatory capacity, and other resources for a robust implementation of Class VI, enable COGCC to seek primacy to administer the EPA Underground Injection Control (UIC) program Class VI injection well permitting program.
- ➢ Facilitate federal permitting with links and connections to appropriate federal agencies
- ➢ Convey the need for staff and resources for federal agencies and/or state agencies, if primacy is granted, involved in permitting CCUS projects in Colorado
- ➢ Pursue MOUs between state & federal agencies relevant to permitting CCUS projects in CO

[3] Three members of the task force (Environmental Defense Fund, Western Resource Advocates, and the Sierra Club) have stated that they do not support the CCUS recommendations unless and until the Environmental Justice Advisory Board has thoroughly reviewed and shaped the recommendations.

State Agency Permitting Process

To both ensure a robust regulatory framework and ensure that Colorado does not create unreasonable barriers to CCUS development, the Task Force looked at potential changes to legal and regulatory structures in the state. In addition, the Task Force identified COGCC as likely to play a role in helping to implement CCUS in Colorado. The Task Force considered the following potential actions.

- Assemble a flow chart with steps for state agencies to follow upon receiving a project application, including intended turnaround timelines for each step to ensure thorough and efficient handling of permit applications and environmental review by state agencies
- Designate a staff contact for CCUS permitting from relevant agencies to streamline project development activities.
- In addition to existing EPA seismicity evaluation requirements, consideration should be given to examining the possibility of smaller, less destructive earthquakes.[4]

- Assemble a working group made up of state agencies involved in CCUS project permitting and key federal and local agencies, ensure the working group engages with key stakeholders, and incorporate best practices for engaging disproportionately impacted communities as recommended by the Environmental Justice Action Task Force per HB1266.

- **(L)** Create legal and regulatory frameworks for the long-term stewardship and oversight of geologic storage sites.
- Through the new working group, create a reference list of CCUS permitting authorities and the responsibilities of each agency and assign a responsible party for website development and ongoing maintenance.
- Assemble a flow chart with steps for state agencies to follow upon receiving a project application, including intended turnaround timelines for each step
- **(L)** For all relevant state agencies, especially the agency selected to administer a state Class VI program, secure adequate staff and resources, to ensure sufficient expertise, knowledge, and personnel availability to process permit applications in a timely fashion and ensure the safe and effective regulation of carbon sequestration
    - In recognition of the expenses associated with securing the aforementioned staff and resources needed to establish and administer a safe and effective UIC Class VI program, the State should examine opportunities to obtain dedicated external funding. Though project-specific funding avenues such as permit and application fee requirements may be considered, additional consideration should be given to securing devoted class VI program funding recently made available to states through the passage of the Infrastructure Investment and Jobs Act.
- Adopt GHG accounting protocols for CCUS projects to appropriately account for these projects in assessing progress made toward state climate targets
    - This should include a review of the approach to carbon accounting used by the US EPA, the IRS in connection with tax credits, and other established accounting methodologies, and consideration of any modifications needed to reflect Colorado's needs.

[4] Environmental Defense Fund believes this recommendation should have more specificity, and should state that COGCC should adopt regulations that ensure geologic storage projects are sited and operated to avoid felt earthquakes in addition to those that may cause damage.

- Enhanced Oil Recovery: CO2-EOR is a process in which carbon dioxide is injected into depleted wells, stimulating additional recovery of oil. CO2 is trapped and potentially stored underground long-term, but the recovery of additional fossil fuels will lead to CO2 emissions from use of these fuels. Accounting for the net impacts is very sensitive to assumptions made on whether the additional production simply replaces other production or leads to more total use of fossil fuels. Given these uncertainties, we recommend the APCD/AQCC adopt appropriate EOR-specific GHG accounting protocols which shall be utilized prior to EOR development to determine whether the proposed project will result in an overall GHG reduction for the purposes of meeting Colorado's climate targets. For electricity, the APCD and PUC should give clear guidance to utilities on emissions accounting for generation with CCUS in clean energy plans and electric resource plans.

State Incentives[5]

CCUS is an emerging technology that requires both a supportive legal and regulatory structure and may require additional financial support. As Colorado looks to decarbonize across all sectors of the state's economy, the focus of incentives for adoption or implementation of CCUS should be in sectors that may be hard to decarbonize without it.

- ➢ Any consideration of incentives should reflect careful analysis of federal incentives, including those available from the Infrastructure Investment and Jobs Act and any climate package included in the federal budget reconciliation process, and of the economics of CCUS implementation, in order to assure that the level of incentives is appropriate to spur beneficial CCUS investments, but is not higher than is needed. The state should focus on maximizing the use of federal incentives, and maximizing deployment of competitive federal funds to Colorado CCUS projects. Potential state incentives might include:
    - ○ Investment tax and production tax credits against state, county, or local taxes
    - ○ Direct grants for CCUS project developers
    - ○ Loans for CCUS activity
    - ○ Sales tax rebates or exemptions for capital equipment purchases
    - ○ Property tax abatements to attract development
    - ○ Potential use of reverse auctions
    - ○ Alignment with, or matching of, Federal RDD&D financial support for in-state projects
    - ○ Pathways for industrial sources and for electricity generation from natural gas
    - ○ Various pathways for low carbon emission hydrogen sources
    - ○ New carbon capture technologies that become viable in the future, including direct air capture

[5] One member of the task force, Environmental Defense Fund, has stated that they will not support state incentive recommendations until meeting parameters and processes defined by the Environmental Justice Advisory Board, and has stated that incentives for CCUS projects should include monetary support that flows directly to local communities rather than industry and investors alone. Environmental Defense Fund also opposes providing state financial incentives for CCUS projects at sources that are eligible for regulation under C.R.S. § 25-7-105(1)(e) but for which the AQCC has not adopted rules that require enforceable greenhouse gas emission reductions.

- Incentives should, at a maximum, be commensurate with actual costs and no higher, accounting for federal incentives
- All CCUS projects receiving state incentives should follow EPA or permitting state agency (should primacy be secured) guidelines and provide transparent and thorough demonstrations of secure storage of captured carbon
- Incentives should only be available for projects that, based upon state accounting protocols, achieve significant net GHG reduction
- All incentives should be limited to sources that are required by state regulation to report their GHG emissions

Siting of CO2 Pipelines & Projects

- **(L)** The task force supports the COGCC findings in its Nov 2021 report on a Class VI program regarding aggregating property rights**.** A mechanism should be adopted to combine subsurface property interests to enable large scale projects. Further analysis should be conducted, and projects should include community input.

- **(L)** The state should clarify pore space ownership as it is an important step toward the adoption and implementation of an effective CCUS program in Colorado.

    - In determining the extent of pore space rights, consideration should be given to whether pore space in saline aquifers should be a public good. (There is not consensus on the pore space in saline aquifers being a public good and the legal implications of this should be discussed further).
- Identify existing infrastructure right-of-ways and ideal locations for potential CO2 pipeline corridors to facilitate future deployment
- Establish a CCUS project permitting dashboard to compile in a single location all the relevant permitting requirements for Colorado CCUS project applicants
- Create a flowchart for project applicants to follow for implementing projects in Colorado
- **(L)** State should evaluate the benefits of classifying CO2 storage to be in the “public interest”. This designation can provide clarity in other state-level rulemakings, such as granting eminent domain authority for the construction of CO2 pipelines.
- Identify existing ROWs that could be used for CO2 pipeline deployment
- Inventory/map the current CO2 pipeline network in Colorado and combine with a map locating existing and potential geologic sequestration sites
- Encourage direct coordination between state and local governments for permitting and regulating CO2 pipeline construction and operation standards; **(L)** consider state level siting authority that appropriately addresses the concerns of local governmental bodies.
- Develop a regional CO2 transport Infrastructure Action Plan with surrounding states or join existing initiatives
- Where appropriate, make available Colorado’s land/mineral holdings for CO2 pipelines or injection