

# **Attachment No. 3**

29 July 2022

To: Iowa Utilities Board, 1375 East Court Avenue, Des Moines, IA 50319

We write to express our opposition to issuing a permit for construction of the carbon dioxide (CO<sub>2</sub>) pipeline proposed by Summit Carbon Solutions, Navigator CO<sub>2</sub> Ventures, and Archer Daniels Midland partnered with Wolf Carbon Solutions. Our science-based objections are four-fold and can be summarized as follows: (1) Building CO<sub>2</sub> pipelines in Iowa would lead to soil degradation in the crop fields and timberlands of many farmers and rural landowners and the resulting soil damage would reduce crop yields in construction areas for multiple years. (2) Capture of CO<sub>2</sub> during ethanol production would have very minor effects on U.S. greenhouse gas (GHG) emissions. (3) The amount of CO<sub>2</sub> captured during ethanol production would be a tiny fraction of what would be emitted from vehicle tailpipes. (4) Allowing profits to accrue to private pipeline companies using eminent domain would be an unacceptable corruption of the ideal of private sacrifice for public good.

Here, we provide more detailed information from relevant scientific and engineering studies.

Three companies—Summit Carbon Solutions, Navigator CO<sub>2</sub> Ventures, and Archer Daniels Midland partnered with Wolf Carbon Solutions—currently seek to build hundreds of miles of pipelines through the fields and timberlands of dozens of Iowa counties to carry CO<sub>2</sub> captured at ethanol manufacturing plants and perhaps, later, other industrial facilities. The CO<sub>2</sub> would be buried underground for permanent storage or used for ‘enhanced oil recovery’ by injecting it into oil wells. These activities are intended to reduce the discharge of CO<sub>2</sub>, a greenhouse gas, into the atmosphere and slow the rate of climate change. Carbon dioxide is only one of the greenhouse gases of concern, but for the U.S., it comprises 79% of total GHG emissions when gases are considered based on their global warming potential (U.S. Environmental Protection Agency 2022). Substantial payments from taxpayers via the federal government would be given to CO<sub>2</sub> pipeline owners as part of a funding package for climate mitigation.

Building pipelines requires substantial disruption of the soil and vegetation in farm fields and timberlands. Crop yields can suffer for multiple years since soil heals slowly from the wounds inflicted by excavation, compaction, and back filling. ***A recent study conducted by Iowa State University scientists found that corn and soybean yields were reduced 15% and 25%, respectively, in the field zone affected by oil pipeline construction (Tekeste et al. 2021).*** Farmers are aware of this and consequently are reluctant to allow degradation of their land by pipeline construction. Given the link between land health and farm productivity and the paucity of relatively undisturbed forests and grasslands in Iowa, it would seem that a very large benefit to the public should accrue to offset the damage incurred from building private CO<sub>2</sub> pipelines through the fields and timber of hundreds of Iowa citizens.

About 15 billion gallons of ethanol are produced annually in the U.S., with the 42 plants in Iowa generating nearly 30% of that total. During the production of ethanol, CO<sub>2</sub> is emitted from the fermentation process and from the combustion of petrochemicals used to generate process

heat. Fermentation is responsible for about 75% of the total CO<sub>2</sub> emissions from a corn grain ethanol facility (Hornafius and Hornafius 2015). The gas stream emitted during fermentation is nearly pure CO<sub>2</sub> and relatively easy to collect. Based on engineering and chemical analyses, 2853 metric tons of CO<sub>2</sub> are produced per million gallons of ethanol generated from corn grain (Hornafius and Hornafius 2015). Not all that CO<sub>2</sub> would be economically feasible to capture and place in a pipeline, but for present purposes, we assume that all of it could be. Thus, if the U.S. ethanol industry manufactured 15 billion gallons of ethanol, there would be about 43 million metric tons of CO<sub>2</sub> that could be captured and prevented from entering the atmosphere. For Iowa, that would translate to about 12.8 million metric tons of CO<sub>2</sub>. (A metric ton is 2,205 pounds.) Those are large numbers, but they are small in comparison to the greenhouse gas emissions from vehicle tailpipes, from the entire U.S. transportation sector, and from the entire U.S. economy.

***Combustion of fossil fuels in the transportation sector comprised the largest source of greenhouse gas emissions in the U.S. in 2020*** (U.S. Environmental Protection Agency 2022).

Combustion of a gallon of pure ethanol in a vehicle engine results in the release of 12.7 pounds of CO<sub>2</sub> from the tailpipe (Rosenfeld et al. 2018). Because ethanol has only two-thirds the energy content of gasoline and because of the configuration of most existing engines, the ethanol and gasoline are mixed, with E10 (i.e., 10% ethanol) being the most common version available at a filling station. Combustion of a gallon of E10 in a vehicle engine results in the release of 19.0 pounds of CO<sub>2</sub> from the tailpipe (Rosenfeld et al. 2018). According to the U.S. Energy Information Administration (2021), in 2020 U.S. motorists consumed 123.5 billion gallons of E10, which would have resulted in the release into the atmosphere of 1.06 billion metric tons of CO<sub>2</sub>. ***Thus, for the U.S., tailpipe emissions from using E10 in 2020 were almost 25 times greater than the 43 million metric tons of CO<sub>2</sub> that could potentially be captured at all the nation's ethanol plants.*** Increasing the amount of ethanol blended with gasoline up to 15% (i.e., E15) would shift that figure only slightly. It should also be noted that because of ethanol's lower energy content, miles per gallon values for ethanol blended with gasoline are typically 4-5% lower than for pure gasoline. Consequently, ***CO<sub>2</sub> emissions per mile traveled are as high or higher for ethanol blends than for pure gasoline.***

The U.S. transportation sector, including cars, trucks, and airplanes, discharged 1.57 billion metric tons of CO<sub>2</sub> in 2020. Total CO<sub>2</sub> emissions by all activities in the U.S. that year were an estimated 4.72 billion metric tons (U.S. Environmental Protection Agency 2022). Based on those values, CO<sub>2</sub> emissions from the U.S. transportation sector would be 37 times greater than what might be captured at ethanol plants, while CO<sub>2</sub> emissions from the whole U.S. economy would be 110 times greater. ***Thus, the process of capturing CO<sub>2</sub> at ethanol plants, transporting it by pipelines through Iowa and other states, and storing it underground would have trivial effects on our nation's CO<sub>2</sub> emissions.***

Given the damage to Iowa farmland soils and crop yields and the absence of substantial environmental benefits to the Iowa public associated with CO<sub>2</sub> pipelines, we strongly oppose the use of eminent domain to facilitate construction of these pipelines by private companies in

Iowa. Issuance of permits for CO<sub>2</sub> pipeline construction would be a betrayal of public trust and a corruption of the ideal of private sacrifice for public good. Permitting should be denied.

Sincerely,

Linda D. Appelgate— Retired USDA/NRCS Resource Conservationist

Laura Belin— Editor and publisher of Bleeding Heartland

Patricia Boddy— PE, Agriculture Engineer, former director of Polk County Conservation, former deputy and interim director of Iowa DNR

Christine Curry— Environmental/conservation Advocate

Mike Delaney— Professor Emeritus, Environmental Sociologist

Cornelia B. Flora— Distinguished Professor of Agriculture and Life Sciences Emerita, Iowa State University

Liz Garst— Conservation farmland owner

Neil Hamilton— Emeritus Professor of Agriculture Law, Drake University

Chris Henning— Prairie Skye Productions, Farm Owner and Manager, Environmental Advocate

Susan Judkins— Conservation Advocate

Matt Liebman— Professor Emeritus of Agronomy, Iowa State University

Mary Ellen Miller— Healthy Soils/Clean Water Advocate, Wayne County Soil & Water Conservation District Commissioner

David Osterberg— Professor Emeritus of Public Health, University of Iowa

Mark Rasmussen— Professor Emeritus, Iowa State University

Ralph Rosenberg— Former Executive Director, Iowa Environmental Council; Former Iowa State Representative and Senator

Larry A. Stone— Elkader, Iowa, Environmental Advocate, farmland owner

Tim Wagner— Iowa Coldwater Conservancy

## References

Hornafius, K.Y. and J.S. Hornafius. 2015. Carbon negative oil: A pathway for CO<sub>2</sub> emission reduction goals. *International Journal of Greenhouse Gas Control* 37: 492–503, doi:10.1016/j.ijggc.2015.04.007.

Rosenfeld, J., J. Lewandrowski, T. Hendrickson, K. Jaglo, K. Moffroid, and D. Pape. 2018. A Life-Cycle Analysis of the Greenhouse Gas Emissions from Corn-Based Ethanol. A report prepared by ICF under USDA Contract No. AG-3142-D-17-0161. [https://www.usda.gov/sites/default/files/documents/LCA\\_of\\_Corn\\_Ethanol\\_2018\\_Report.pdf](https://www.usda.gov/sites/default/files/documents/LCA_of_Corn_Ethanol_2018_Report.pdf).

Tekeste, M.Z., E. Ebrahimi, M.H. Hanna, E.R. Neideigh, and R. Horton. 2021. Effect of subsoil tillage during pipeline construction activities on near-term soil physical properties and crop yields in the right-of-way. *Soil Use and Management* 37: 545-555, doi:10.1111/sum.12623.

U.S. Energy Information Administration. 2021. How much ethanol is in gasoline, and how does it affect fuel economy? U.S. EIA, Washington. D.C. <https://www.eia.gov/tools/faqs/faq.php?id=27&t=10>.

U.S. Environmental Protection Agency. 2022. 1990–2020 National-Level U.S. Greenhouse Gas Inventory. U.S. EPA, Washington, D.C. <https://www.epa.gov/system/files/documents/2022-04/fastfacts-1990-2020.pdf>.