Image: Eion operating on Mississippi farm

Mississippi–Past, present, and future carbon removals

Mississippi's natural resources, extensive university research, and carbon transportation infrastructure can shape the development of a significant carbon removal industry that brings benefits and economic gains in agriculture, manufacturing, and job creation.

How It Works

There are many ways to implement carbon removal that use different inputs like plants and rocks, or technical approaches that remove carbon dioxide from the ambient air. These removals are distinct from carbon capture, which captures carbon from an emissions source, like industrial processes.

Direct air capture (DAC) removes carbon dioxide directly from the atmosphere. To effectively provide removals, DAC must be powered by low-carbon energy or capture emissions from the power supply. DAC facilities can be co-located with energy production and carbon dioxide injection sites in order to minimize carbon dioxide transportation.

Carbon storage for DAC or biomass-based pathways can also utilize Mississippi's existing carbon dioxide pipeline infrastructure. Mississippi, along with several neighboring states, sits over the Gulf Coast Basin, an underground geologic formation that can be used to store carbon, and has the potential to store more than 1,450,000 million metric tons of carbon dioxide.1

Enhanced weathering, which speeds up the naturally occurring mineral storage of carbon using crushed rocks like basalt and olivine, can be deployed on farmland. The addition of crushed rocks can be also used in bodies of water or along coastlines to remove carbon. This can also be done in combination with coastline protection projects.

Another pathway involves residue and waste biomass from farmlands and forests that are stabilized to prevent decomposition, permanently storing the carbon captured by the plants when they were alive. The Lower Mississippi River and Southeast regions are estimated to have capacity for 20–60 million metric tons of biomass-based carbon dioxide removals each year without any changes to the amount of cropland used.2 Some biomass can also be used for bioenergy generation with carbon capture and storage (BECCS).

How It Benefits Mississippi

The economy of Mississippi, especially the state's agricultural and manufacturing sectors, could benefit from implementing carbon removal projects. Farmland management and crop production can integrate enhanced weathering, which can replace some soil amendments and increase productivity and soil health.

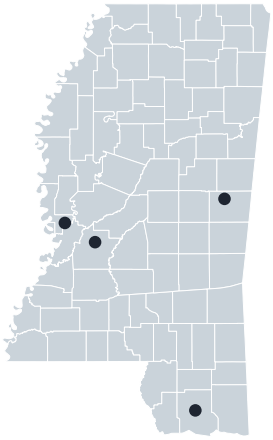
Waste and residue from forestry, agriculture, poultry production can become a new source of revenue for these industries when the biomass is stabilized and stored, converted to biochar for soil amendments,[3] or used for BECCS to produce bioenergy. Given that Mississippi consumes close to four times more energy than it produces, [4] opportunities to develop low-carbon bioenergy production can increase the state's energy independence.

Cities in Mississippi also utilize carbon removal, particularly in municipal wastewater treatment. Adding minerals like calcium carbonate during treatment or safely disposing of biosolids can keep carbon out of the atmosphere and manage challenging waste products. These types of projects have already been deployed in several states across America.

Manufacturing wastewater management can use a similar approach as municipal systems by stabilizing the carbon in waste sludge, like that resulting from paper and pulp, or by adding minerals to reduce acidity and reduce carbon in the wastewater. Carbon can also be captured from waste gases, and the Vicksburg Containerboard Mill is testing a new system with more than $300 million in funding from the Dept of Energy. [5]

In addition to benefitting existing industries, carbon removal can create a new industry and jobs. Deploying DAC in Mississippi has the potential to remove nearly 34,000 million metric tons of carbon dioxide each year and provide 24,000 annual jobs by 2050. [6]

Carbon Removal Companies and Research in Mississippi



- Project

CRA MEMBER COMPANIES

Eion

WHAT THEY'RE WORKING ON

Eion: Utilizing industrial-scale mining and agriculture supply chains to bring olivine to farmlands where it is applied to fields as a replacement for a common agriculture product. Eion operates on farmland in Raymond, MS to remove carbon and improve soil fertility.

Mississippi Carbon Renewal Key Institutions & Players

FARMERS AND LAND OWNERS

Agricultural projects are currently operating in Mississippi, including Eion's enhanced weathering project, and new opportunities are in development.

UNIVERSITIES

Carbon removal research at Mississippi universities covers a tremendous range of technology, industry, and impacts. The University of Southern Mississippi's (USM) School of Polymer Science and Engineering is researching technologies to capture, store, and utilize carbon dioxide removed from the atmosphere and ocean.[9] USM is also hosting carbon removal research as part of their Gulf Coast research [10] and Research Experience for Undergraduates projects.[11] The University of Mississippi has produced research on new materials to capture carbon and break down carbon dioxide.

Mississippi State University has decades of research on carbon sequestration and its impacts on agriculture, forestry, and aquaculture systems. That expertise has grown into research on new carbon capture technologies, the use of mass timber for net negative building materials, developing geologic carbon sequestration facilities, using carbon removal with municipal solid waste management, and the student-led Energy Club winning $250,000 in the XPrize competition. Other funding sources for these university research projects include the National Science Foundation, US Dept of Energy [12] and USDA National Institute of Food and Agriculture. [13]

POLICY LANDSCAPE

State:

- 2022 HB 1214 allows the Mississippi State Oil & Gas Board to oversee a state carbon storage program; [14] eminent domain was restricted in MS in 2011, so landowner engagement and approval is generally necessary for projects.
- 2024 SB 2059 classifies bioenergy from biomass as carbon negative if it includes carbon capture and sequestration.

Federal:

- Senators Wicker and Hyde-Smith both co-sponsored the CO2 Regulatory Certainty Act in 2019 regarding the secure geological storage of carbon oxide.
- Representative Trent has repeatedly cosponsored the Carbon Capture Act to extend and modify the tax credit for carbon dioxide (CO2) sequestration. [15]

Image: Eion operating on Mississippi farm

Carbon Removal Alliance

1. US Geological Survey
2. Roads to Removal
3. Fast Company
4. US Energy Information Administration
5. International Paper
6. Rhodium Group
7. The University of Southern Mississippi
8. National Energy Technology Laboratory
9. The University of Southern Mississippi
10. The University of Southern Mississippi
11. The University of Southern Mississippi
12. The University of Southern Mississippi
13. The University of Southern Mississippi
14. Mississippi Legislature
15. Congress.gov