Kansas–
Growing carbon removal and economic possibilities

Kansas is one of the states leading America in agricultural production, manufacturing, and logistics, which can provide key contributions to the development of carbon removal in the state and provide new opportunities for the state economy. Kansas also has a geology well suited for multiple types of carbon storage. Carbon captured from agricultural operations (such as feedlots), wastewater treatment plants, and other industrial processes has been successfully locked away underground for permanent storage, and demonstration projects that are removing carbon are already underway.

How It Works

Carbon dioxide removal can be done many different ways, using plants, rocks, or low-carbon energy approaches to remove carbon dioxide from the ambient air. This is distinct but related to carbon capture, which removes carbon from a concentrated point source, like flue gases from industrial processes.

The majority of land in Kansas is used for agriculture, providing abundant carbon removal possibilities and potential integration with farming, grazing, and livestock production. Land management and crop production can both benefit from enhanced rock weathering, in which certain types of ground rock, like local kimberlite[1], can be spread on farmland. This accelerates natural geologic processes that remove carbon while simultaneously replacing some soil amendments.

Kansas is also 4th in US for total biomass production[2], and while most is used for food and fuel, excess biomass residues like corn stover can be converted into biochar, bio-oil, or slurry, then stored or injected underground to stabilize the carbon in the plant matter. Charm Industrial has already stored bio-oil in Kansas, and carbon capture directly from industrial sources is already being used by biofuels producers.

Wastewater management in manufacturing (such as chemicals and plastics[3]) can also use carbon removal while improving process efficiency. There are several distinct ways to do these removals, such as adding minerals to reduce the acidity of wastewater, or storing the waste sludge to keep the carbon from returning to the atmosphere. For example, Vaulted Deep is storing non-hazardous organic waste from both municipal and agricultural sources deep underground permanently in the salt caverns of Hutchinson.

Kansas's leading wind energy generation and incentives for energy production[4] means that the state generates more electricity than it consumes:[5] a tremendous opportunity for low-carbon energy to power direct air capture (DAC) facilities that can remove carbon dioxide from ambient air, with the potential for 350 million metric tons of carbon dioxide removal each year by 2050.[6] The majority of Kansas sits over multi-state, underground geologic formations that store carbon. These formations, the Kansas Basins and Anadarko and Southern Oklahoma basins, have approximately 60 gigatons of technically accessible carbon storage capacity[7]. DAC projects could be sited to utilize the existing local expertise in injection wells[8] and minimize pipeline infrastructure.

How It Benefits Kansas

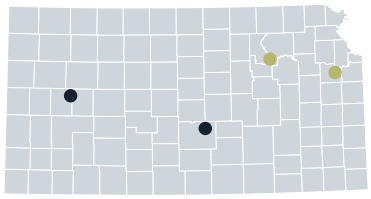
The fundamental strengths of the Kansas economy, particularly agricultural, manufacturing, and logistics, could all be accelerated through opportunities in carbon removal, diversifying markets with new domestic demand. Farmers who innovate with soil amendments and biomass production can bring in new sources of revenue[9] Optimizing the transport of biomass and mineral feedstocks would leverage the existing state transportation infrastructure.

Kansas has been rated highly for business friendliness and cost of doing business,[10] and carbon removal businesses provide an opportunity to bolster the state's economy, including significant job creation. DAC projects alone could create 213,000 jobs by 2050.[11]

Photo courtesy of Vaulted Deep.

Carbon Removal Companies and Research in Kansas

- Research
- Project



CRA MEMBER COMPANIES

CHARM INDUSTRIAL

vaulted deep

WHAT THEY'RE WORKING ON

Charm Industrial: In the process of standing up operations in western Kansas, where Charm will reuse orphaned and idle oil and gas wells to store bio-oil, which is produced from excess agricultural and forestry residues, underground. At the end of the bio-oil storage period, Charm plugs each well and conducts site restoration.

Vaulted Deep: Operates a carbon removal facility in Hutchinson, Kansas that permanently stores non-hazardous organic waste in deep underground salt formations. Since 2023, the site has created local jobs, reduced exposure to contaminants, and helped industries manage challenging waste streams.

Kansas Carbon Removal Key Institutions + Players

UNIVERSITY RESEARCHERS

Kansas universities and the Kansas Geological Survey are some of America's leaders in carbon injection and storage[12] in depleted oil fields, saline aquifers,[13] and other geological features. The University of Kansas has researchers investigating wastewater treatment[14] and carbon removal in buildings, including DAC integration into HVAC.[15] Kansas State is also doing noteworthy agronomy research on crop biomass utilization, fertilizer use, and soil carbon.[16]

MUNICIPAL ORGANIZATIONS

Hutchinson, Kansas is home to Vaulted Deep's waste management site that permanently removes carbon. The facility is saving money for early adopters like City of Derby, generating local jobs, and developing a template for other municipalities to follow.

KANSAS DEPARTMENT OF COMMERCE

The foundations of the Kansas economy can provide the means to build a thriving carbon removal industry, and the mission of the Department of Commerce to support new and existing businesses is well suited to help integrate carbon removal opportunities into the state.

BIOFUELS PRODUCERS

Ethanol producers that utilize carbon capture at their production facilities have begun investing in the infrastructure and permitting to store their carbon dioxide locally. Conestoga Energy,[17] PureField Ingredients, and Pratt Energy[18] all have permits submitted to the Environmental Protection Agency for wells that can safely and permanently store carbon dioxide. The biofuels industry has significant potential for new CCS projects, as Kansas already consumes 13 million kilowatt hours of bioenergy,[19] or the average annual electricity usage of more than 1,200 homes.[20]

POLICY LANDSCAPE (STATE)

Kansas has actively worked to reduce emissions from industry and energy production, with wind energy surpassing coal in 2019.[21] The 2007 Carbon Dioxide Reduction Act addressed considerations for carbon dioxide injection wells, and the Kansas State Corporation Commission created a fund to address expenses around carbon dioxide injection wells.[22]

Just this year, legislation was introduced to order a feasibility study on nuclear energy and potential inclusion of direct air capture. Kansas has also submitted a letter of intent to prepare for Class VI well primacy,[23] potentially accelerating the permitting process for injection projects.

Carbon Removal Alliance

1. Kansas Geological Survey
2. Kansas Commerce
3. Kansas Department of Labor
4. Kansas Commerce
5. Climate Policy Dashboard
6. Rhodium Group
7. U.S. Geological Survey Geologic Carbon Dioxide Storage Resources Assessment Team
8. Kansas Department of Health and Environment
9. Yale Center for Natural Carbon Capture
10. CNBC
11. Rhodium Group
12. National Energy Technology Laboratory
13. OSTI.gov
14. The University of Kansas
15. ibpsa.org
16. Kansas State University
17. Progressive Farmer (DTN)
18. NPR in Kansas City
19. U.S. Energy Information Administration
20. ElectricityPlans
21. Climate Policy Dashboard
22. Great Plains Institute
23. Great Plains Institute