

## CARBON CAPTURE

## Fermenting change

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Bioenergy with carbon capture and sequestration (BECCS) refers to a suite of technologies in which CO<sub>2</sub> produced from biomass during energy conversion is captured and permanently stored in a suitable geologic formation. One such technology involves capturing the CO<sub>2</sub> that is given off during fermentation when producing bioethanol from corn. This approach has lower CO<sub>2</sub> separation costs than many other BECCS technologies because a high-purity stream of gaseous CO<sub>2</sub> is produced. Though it frequently appears in climate change mitigation pathways, BECCS has not yet been widely adopted commercially. Now, Daniel Sanchez and colleagues across the United States and Austria use process engineering, spatial optimization and lifecycle assessment to investigate opportunities for commercially ready CO<sub>2</sub> capture at existing bioethanol production plants in the United States. They find that with supportive policy, bioethanol could be a low-cost entry point for CCS.

The researchers conclude that of the 45 MtCO<sub>2</sub> emitted by US bioethanol plants from fermentation each year, 60% could be captured and prepared for pipeline transport for under US\$25 per tCO<sub>2</sub>. Additionally, CO<sub>2</sub> abatement credits — such as the low-carbon fuel standards (LCFS) in California — priced at US\$90 per tCO<sub>2</sub> could promote 38 Mt of CO<sub>2</sub> abatement. This level of credit is within the range of the average monthly abatement credit price for California's LCFS. One of the issues for geologic storage of CO<sub>2</sub> from bioethanol plants in the United States is that typically the areas where biorefineries exist tend not to overlap with areas suitable for storage. However, the researchers find that if CO<sub>2</sub> sources can be aggregated into pipeline networks, costs can be minimized, and that sequestration incentives, which are analogous to existing CCS tax credits, of US\$60 per tCO<sub>2</sub> could encourage build-out of thousands of kilometres of CO<sub>2</sub> pipeline infrastructure, catalysing the growth of CCS in the United States.

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James Gallagher

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