

ROADS to REMOVAL

Options for Carbon Dioxide Removal in the United States



First-of-its-kind national study identifies county-by-county opportunities in all 50 states that, if fully implemented, could result in the removal of 1 billion metric tonnes of CO₂ and 440,000 new jobs.

Key Findings

North Carolina can remove CO₂ by capturing carbon from forest and agricultural wastes, and also in cropland soils. Keeping this carbon from returning to the air will mean less landfill and water runoff contamination, and incentives for small-scale farms.

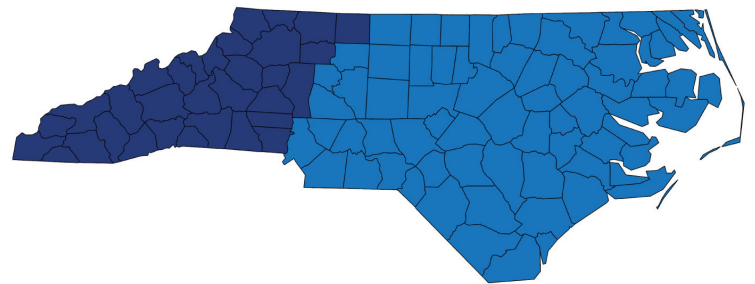
Near Term Opportunities

- The Coastal region of North Carolina has some of the highest potential for soil CO₂ removal in the USA.
- High potential for CO₂ removal through native tree planting (e.g. loblolly pine reforestation and afforestation) and converting harvested pine timber into carbon storage via innovative wood products, such as biochar and cross-laminated timber.

Longer Term Investments

- North Carolina has a high density of biomass available for biomass carbon removal and storage (BiCRS) from every sector—forestry, agriculture, municipal waste, and carbon crops (~ ½ tonne/acre per year).

NORTH CAROLINA OPPORTUNITIES



- Planting cover crops or perennial carbon crops can supply soil-based CO₂ removal (particularly in Northampton, Robeson, and Columbus counties)
- Abundant marginal land (not currently used for crops) can support pine plantations or native perennial grasses used for carbon removal
- Diverse biomass feedstocks can provide a consistent and predictable supply of biomass year-round for BiCRS (biomass carbon removal and storage)

BY THE NUMBERS – CO₂ Removal Capacity in North Carolina

Forest Management

In Southeast region
200M tonnes CO₂e removed by 2050

\$0.60 – \$2.20 /tonne CO₂e

Cropland Soil Management

1.7M tonnes CO₂ removed by 2050

< \$40/tonne CO₂

4.0M tonnes CO₂e by 2050
total climate benefit (avoided + removed)

Biomass Carbon Removal and Storage

20.4M/yr tonnes CO₂ removed (via gasification to H₂)

\$72.50/tonne CO₂

13.7M dry tonnes of biomass

Environmental, Equity and Energy Justice

In USA, NC has 2nd highest state for minority farm ownership

In USA, NC has 3rd highest state for CAFO density

By implementing methods that remove CO₂ from the air, communities big and small can create new jobs, improve air and water quality, increase our resilience to a changing climate, and protect life and property.

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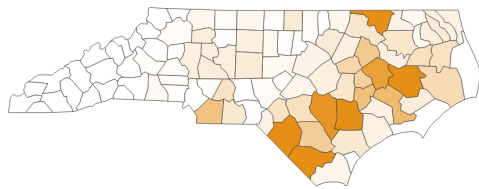


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COUNTY-LEVEL RESULTS



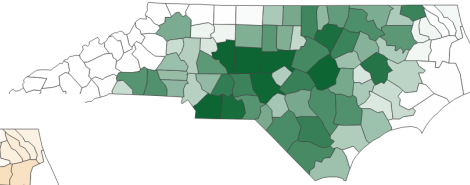
Cropland Soil Management



Tonnes CDR by 2050



Forest Management

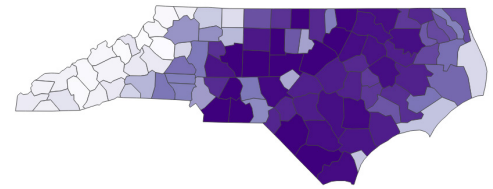


Tonnes CDR by 2050



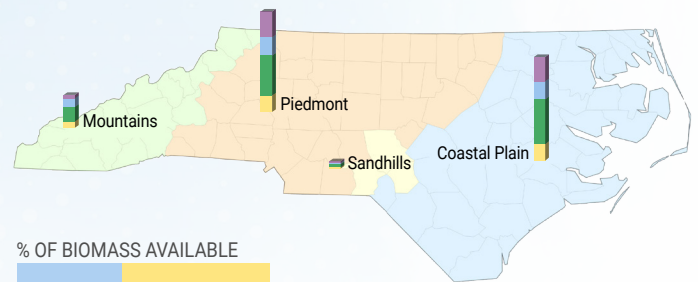
Environmental, Equity, and Energy Justice

CO₂ removal potential weighted by indices of Social Vulnerability and Environmental, Equity, and Energy Justice

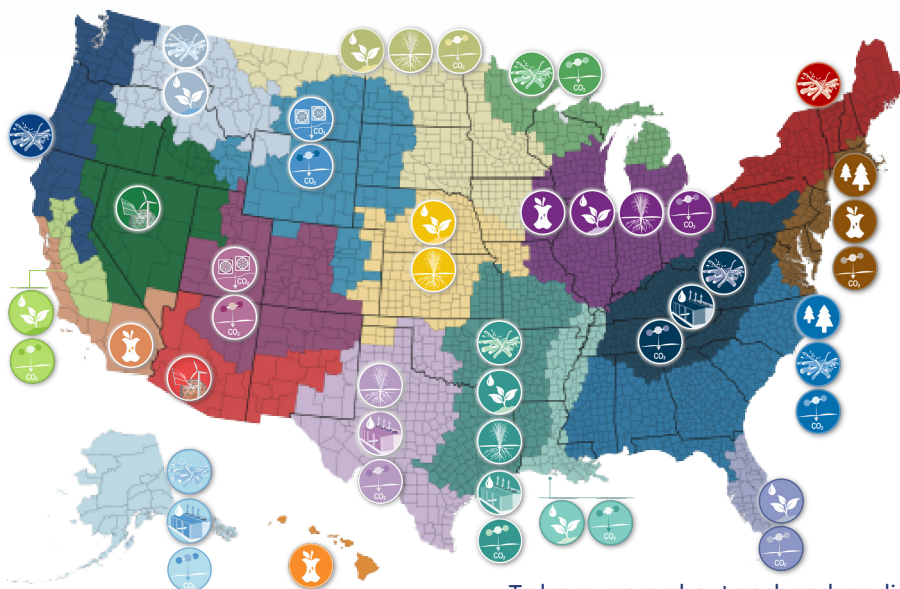
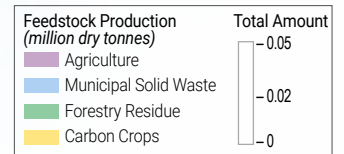
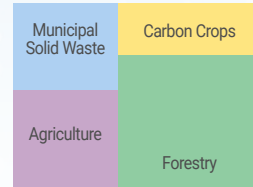


Sum of EEEJ-CDR opportunities
Low Opportunity High

- Eastern North Carolina can support small, family- and minority-owned woodlands and farms by investing in forestry and soil CO₂ removal practices.
- In southeastern North Carolina, repurposing crop and rangeland residues (currently burned) for BiCRS could improve air quality.
- Valuing the carbon removal of manures produced in high density confined animal feeding operations (CAFOs) can reduce water and air pollution risks.
- High quality geologic storage basins exist at the coast and offshore, but storage options are limited, as these areas underlie populous regions and protected ecosystems.



% OF BIOMASS AVAILABLE



Roads to Removal Partners:

- Lawrence Livermore National Laboratory
- Oak Ridge National Laboratory
- Lawrence Berkeley National Laboratory
- University of Texas at Austin
- North Carolina State University
- University of California, Berkeley
- Colorado State University
- Indiana University Indianapolis
- Yale University
- University of New Hampshire
- Iowa State University
- Michigan State University
- University of Pennsylvania

EVERY REGION HAS A STORY.

EVERY REGION HAS AN OPPORTUNITY.

To learn more about each carbon dioxide removal pathway go to Roads2Removal.org