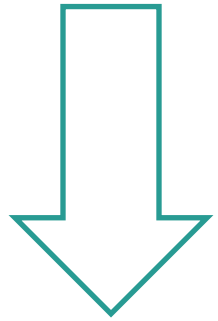
# Center for Carbon Removal



Carbon Removal Policy Options
May 11, 2017

www.centerforcarbonremoval.org
@CarbonRemoval

CENTER FOR CARBON REMOVAL

# About Us: Center for Carbon Removal

CENTER FOR CARBON REMOVAL

**We are a non-partisan, 501c3 organization advancing fresh solutions to clean up $CO_2$ from the air.**

**Mission:** to catalyze technology, policy, and financial innovations for atmospheric $CO_2$ capture and storage.

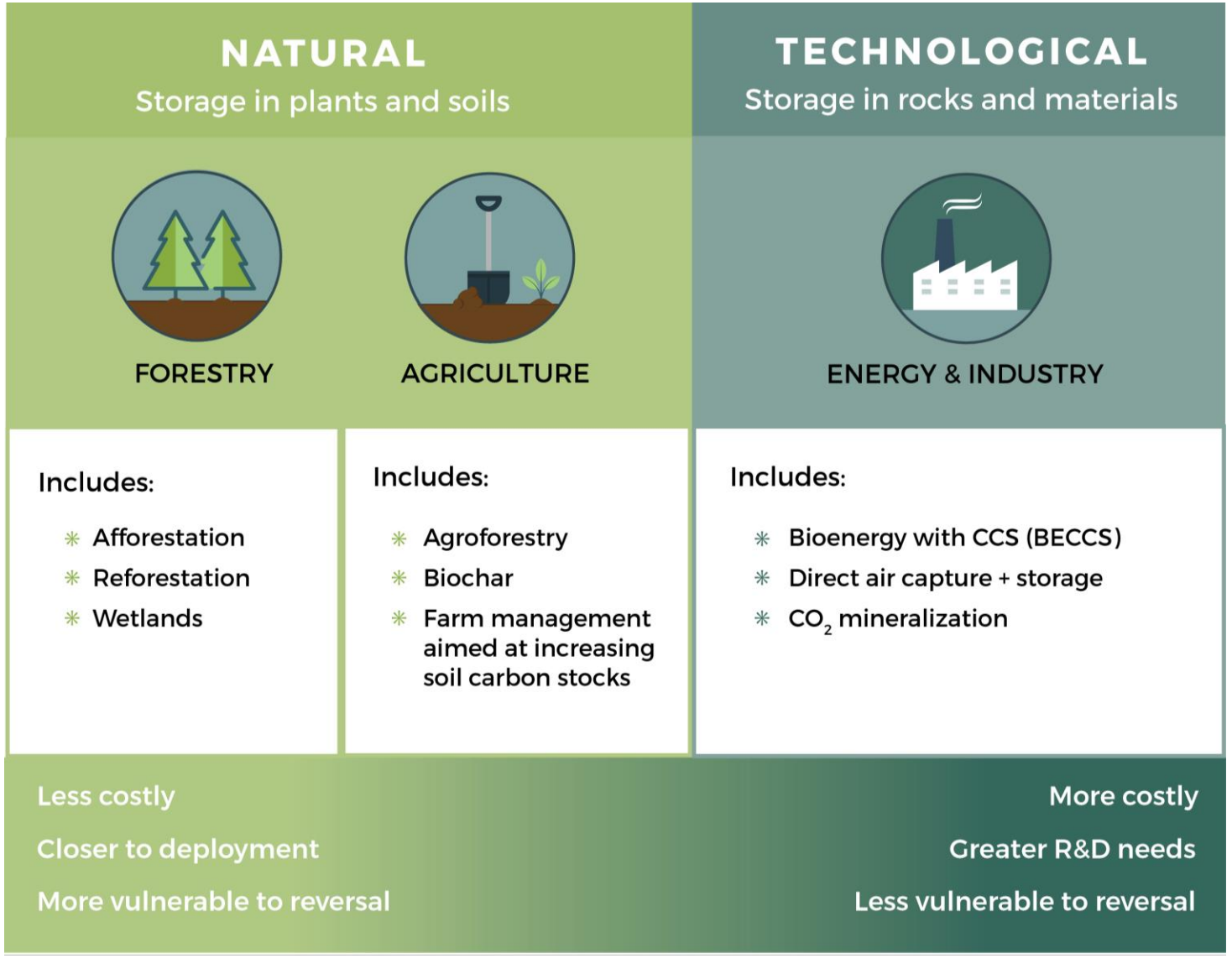
**Vision:** to see innovators develop and deploy carbon removal solutions across forests, agriculture, and industrial $CO_2$ technology that fuel economic growth and reduce climate risks.

**Headquarters:**
Oakland, CA

**Official academic partner:**
Berkeley Energy and Climate Institute (LBNL & UC Berkeley)

BECI
BERKELEY ENERGY & CLIMATE INSTITUTE
LBNL & UC BERKELEY

# Our approach: Advance a portfolio of complementary carbon removal solutions, as no “silver bullet” answer exists today.

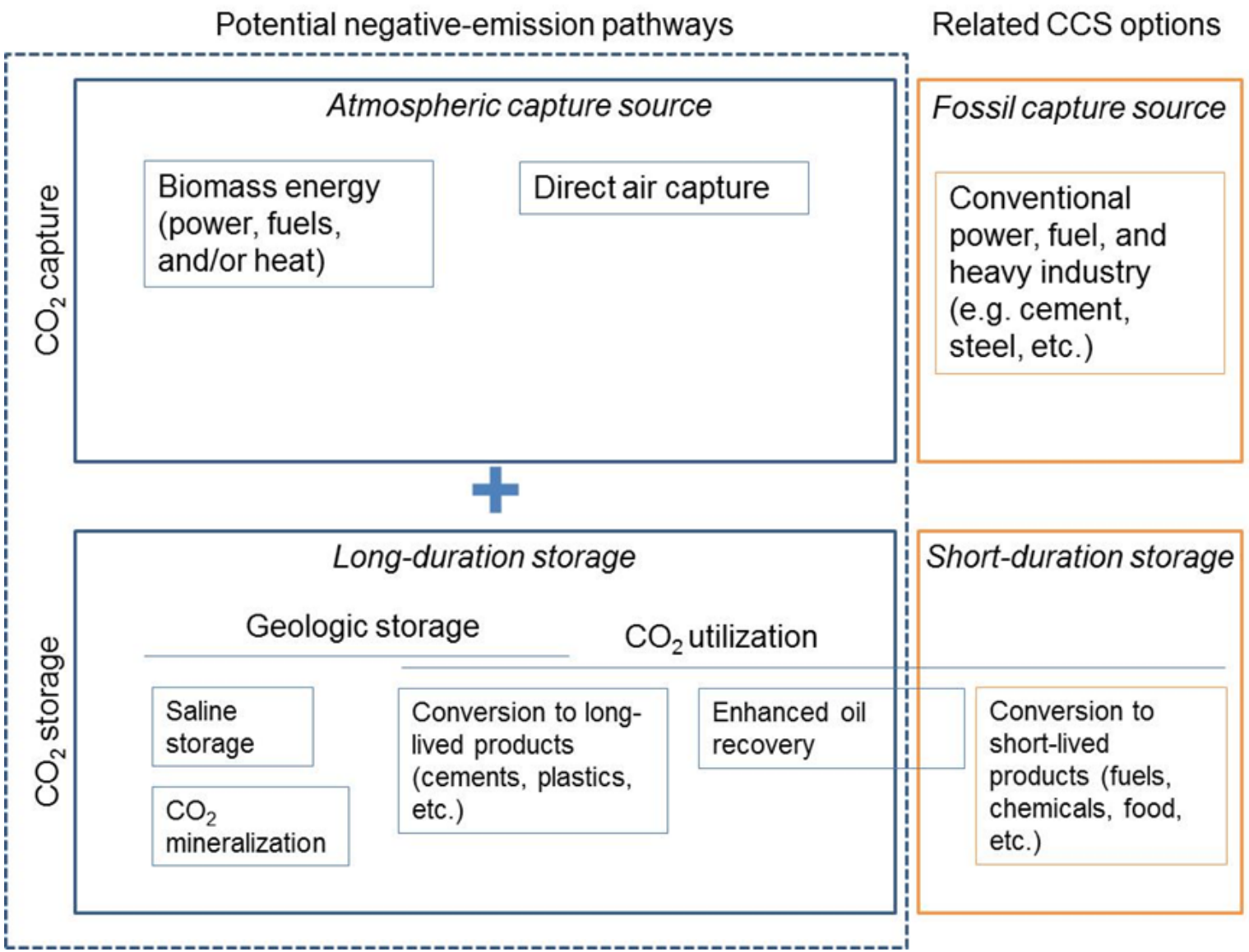


# Carbon removal solutions can expand the climate solution set



| | Forestry/Ecosystems | Agriculture | Energy / Manufacturing / Mining |
|---|---|---|---|
| | Natural Solutions | | Technology solutions |
| Traditional mitigation | Conservation | On farm GHG emission abatement | *Capture:* CCS on fossil fuels and other industrial stationary sources<br>*Storage/use:* Enhanced oil recovery, geologic formations (e.g. saline aquifers) |
| Expanded mitigation w/ negative emissions potential | Expansion and enhanced management | Soil carbon sequestration | *Capture:* CCS on bioenergy, direct air capture<br>*Storage/use:* utilization in long-lasting materials, geologic storage in underground reservoirs, and/or accelerated CO2 mineralization |

# Policies that help conventional CCS approaches can also advance "renewable CCS" solutions



# Carbon removal solutions can build off of existing climate policies



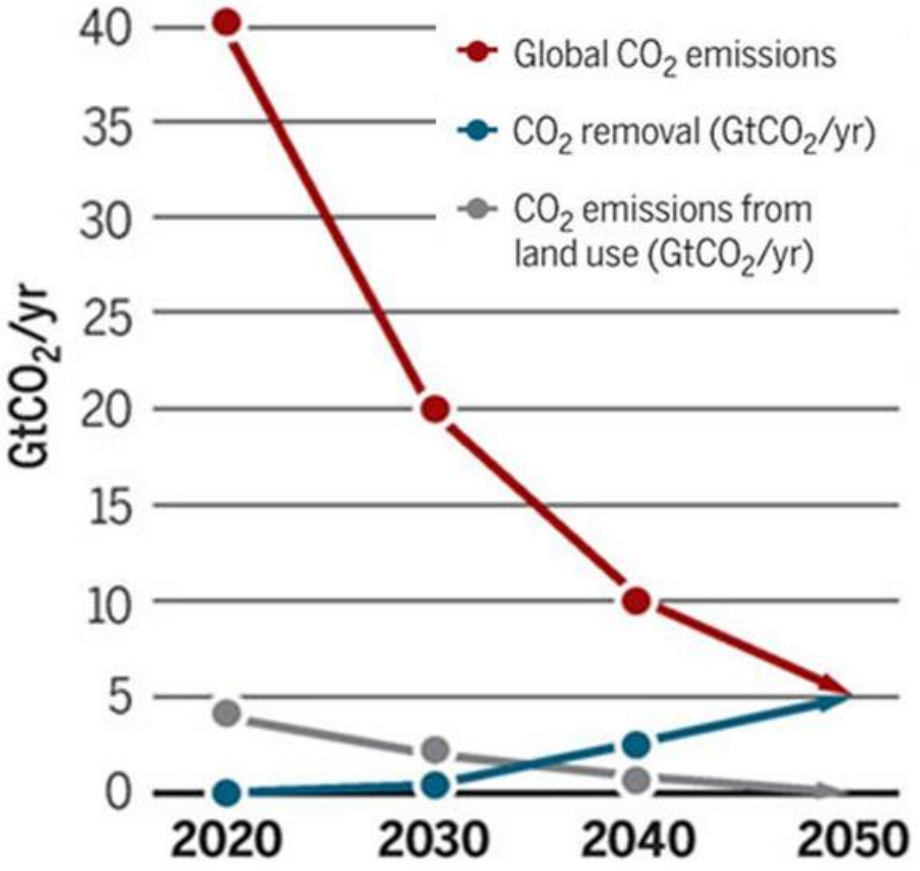
| | Forestry/Ecosystems | Agriculture | Energy / Manufacturing / Mining |
|---|---|---|---|
| | Natural Solutions | | Technology solutions |
| Barriers | • Difficult to monitor and verify biological carbon storage<br>• Weak incentives to change management practices to carbon sequestering options | | • High costs due to lack of technical and commercial demonstrations<br>• Few market incentives compared to fossil $CO_2$ capture tech. |
| Expanding existing climate policies | • Farm Bill changes (e.g. increasing conservation title funding, changing crop insurance to incentivize carbon sequestering practices, etc.)<br>• USFS Fire Borrowing legislation fix<br>• Clarifying and strengthening the "+" in REDD+ | | • Expand and increase 45Q tax incentives to cover carbon removal approaches<br>• Vastly increase DOE funding for Fossil Energy, EERE, Advanced Manufacturing, Office of Science, and ARPA-E basic and applied research for carbon removal tech |

# Examples of existing and proposed carbon removal policies around the world

| Geography | Solution Focus | Policy Type | Description |
|---|---|---|---|
| UK | All carbon removal | Research | ~$10M basic research program announced by UK NERC and BEIS |
| US | Direct air capture | Research | US DOE funded $3M for direct air capture research out of Fossil Energy Office |
| US | Direct air capture | Innovation | Senators Barrasso and Schatz introduced legislation for $50M innovation prize for air capture administered by DOE (not enacted) |
| US | Bioenergy + CCS | Deployment incentives | US DOE supported bioethanol + CCS project in Decatur, IL |
| US | Bioenergy + CCS | Deployment incentives | Senator Manchin introduced legislation for $100M+ in support for bioenergy + CCS demonstration (not enacted) |
| US | Soil Carbon | Research and Demonstration | Rep. Huffman's Healthy Soils and Rangeland Solutions Act legislation to boost soil carbon on Federal lands (not enacted) |
| US | Biochar | Deployment incentives | WECHAR program introduced in 2009 would have provided loan guarantees for biochar projects. (not enacted) |

# The policy grand challenge: we need faster, more ambitious climate action. How can carbon removal deliver both?

## Meeting climate commitments requires unprecedented action:




From Rockstrom et. al. in *Science*

## Carbon removal solutions can:

- ✓ Deliver large-scale negative emissions (the **blue** line)
- ✓ Expand the climate solution advocacy tent (to build support for achieving the **red** and **grey** lines) by creating economic opportunities for turning waste $CO_2$ into a valuable resource for our buildings, consumer goods, and soils that grow our food and timber

***To unlock this potential, we must start supporting carbon removal solutions today.***