

Additional Resources

Articles From Scientific Journal

1. Energy & Environmental Science, February 2021

Life cycle assessment of carbon dioxide removal technologies: a critical review

By Tom Terlouw, Christian Bauer, Lorenzo Rosa and Marco Mazzotti

ABSTRACT EXCERPT: A large number of prospective climate scenarios rely on Carbon Dioxide Removal (CDR) technologies to limit global warming below 2 °C. To date, however, a comprehensive understanding of the overall life-cycle environmental impacts of CDR technologies is missing. We present a critical review on conducted Life Cycle Assessments (LCAs) of a comprehensive set of CDR technologies: afforestation and reforestation, biochar, soil carbon sequestration, enhanced weathering, ocean fertilization, bioenergy with carbon capture and storage, and direct air carbon capture and storage.

2. Frontiers in Climate, January 2023

A review of commercialization mechanisms for carbon dioxide removal

By Conor Hickey, Sam Fankhauser, Stephen M. Smith and Myles Allen

ABSTRACT EXCERPT: The deployment of carbon dioxide removal (CDR) needs to be scaled up to achieve net zero emission pledges. In this paper we survey the policy mechanisms currently in place globally to incentivize CDR, together with an estimate of what different mechanisms are paying per tonne of CDR, and how those costs are currently distributed.

3. IOP Science, July 2021

Carbon dioxide removal technologies are not born equal

By Jessica Strefler, Nico Bauer, Florian Humpenöder, David Klein, Alexander Popp and Elmar Kriegler

ABSTRACT EXCERPT: Technologies for carbon dioxide removal (CDR) from the atmosphere have been recognized as an important part of limiting warming to well below 2 °C called for in the Paris Agreement. However, many scenarios so far rely on bioenergy in combination with carbon capture and storage as the only CDR technology. Various other options have been proposed, but have scarcely been taken up in an integrated assessment of mitigation pathways. In this study we analyze a comprehensive portfolio of CDR options in terms of their regional and temporal deployment patterns in climate change mitigation pathways and the resulting challenges.

4. Cleaner Engineering and Technology, June 2022

Technologies for carbon dioxide capture: A review applied to energy sectors

By Sílvia Vaz Jr., Ana Paula Rodrigues de Souza and Bruno Eduardo Lobo Baeta

ABSTRACT EXCERPT: The objective of this review is to survey the main carbon dioxide capture technologies under development for the energy sectors, especially for thermoelectric and bioenergy.

5. Nature, Vol. 616 April 2023

Carbon dioxide removal is not a current climate solution – we need to change the narrative

by David T. Ho

EXCERPT: I don't deny the need to develop CDR methods over the longer term. And I welcome governments committing much-needed resources to this area. After some small-scale demonstrations of "direct air capture" (DAC) technology, which suck CO₂ out of the atmosphere by chemical means, the 2022 US Bipartisan Infrastructure Law has devoted \$3.5 billion to developing four DAC hubs. But it's clear to me that deploying them to remove CO₂ from the atmosphere is pointless until society has almost completely eliminated its polluting activities.

Centers of Expertise

Drawdown Solutions Library

Looking for the less sexy but proven methods to reduce and prevent carbon emissions? Check out Project Drawdown's solutions library, which houses more than 90 categories of solutions to climate change that the science-driven nonprofit has concluded to be feasible and scalable. While building retrofitting and more efficient ocean shipping might not bring all the venture capitalists to the yard, this list is a comprehensive evaluation of strategies that work, but seldom get much media attention.

Carbon180 Policy Tracker

This site tracks federal proposed and passed legislation from the 116th to the 188th Congresses of the United States. The database is searchable by party sponsor and congressional chamber, as well as keyword tags.

American University Institute for Carbon Removal Law & Policy

The Institute for Carbon Removal Law and Policy is a research center in the School of International Service at American University, Washington DC. dedicated to evaluating and promoting sustainable carbon removal. The site is a good place to find academic research related specifically to policymaking around CDR, as well as to identify NGOs that are working on the issue. The site also includes a useful [explainer](#) that illustrates the basics of CDR and distinguishes it from carbon capture.

Articles about CDR from our panelists:

Yessenia Funes, Editor-at-Large, Atmos

[The Gentle Giant Storing Carbon](#)

[The Willow Project Would Be a Public Health Crisis for Alaska](#)

[Fossil Fuels Aren't the Answer to European Energy Crisis — Peace Is](#)

Nicholas Kusnetz, Writer, Inside Climate News

[Exxon's Long-Shot Embrace of Carbon Capture in the Houston Area Just Got Massive Support from Congress](#)

[Fossil Fuel Executives See a 'Golden Age' for Gas, If They Can Brand It as 'Clean'](#)

[Carbon Capture Takes Center Stage, But Is Its Promise an Illusion?](#)

[Carbon Removal Is Coming to Fossil Fuel Country. Can It Bring Jobs and Climate Action?](#)

[Occidental is Eyeing California's Clean Fuels Market to Fund Texas Carbon Removal Plant](#)

[Occidental Seeks Texas Property Tax Abatements to Help Finance its Long-Shot Plan for Removing Carbon Dioxide From the Atmosphere](#)

[Carbon Removal Projects Leap Forward With New Offset Deal. Will They Actually Help the Climate?](#)

[Proponents Say Storing Captured Carbon Underground Is Safe, But States Are Transferring Long-Term Liability for Such Projects to the Public](#)

Emily Pontecorvo, Founding Staff Writer, Heatmap News

[Stripe injects cash into 6 more carbon removal projects](#)

[How a small business in Arizona is helping decarbonize concrete](#)

[Meet the startup producing oil to fight climate change](#)

Other resources:

[CDR vs. CCS graphic](#)

[Carbon180's Removing Forward Executive Summary](#): This 2021 report from Carbon180 provides guiding principles for how to integrate environmental justice into the building of the carbon removal field and accompanying concrete policy recommendations for land-based and technological solutions. The report advocates implementing justice-oriented policies that support the wide, safe and fair development and deployment of carbon removal solutions that improve the well-being of communities. [Full report here](#).

[Principles for Thinking About Just Carbon Dioxide Policy](#) by David R. Morrow et al., 2021

[Carbon Removal Action Tracker](#) by American University

[Carbon180's CDR Deep Dives](#): Three-pagers that examine the social, economic and political landscapes of different carbon removal solutions

[A buyer's guide to high-accountability MRV](#): A blog post discussing what high-accountability monitoring, reporting and verification (MRV) for CDR actually means and how it can be a tool to build public trust and accountability.