
Demystifying Carbon Dioxide Removal

July roundup

Dear all,

Natural climate solutions have been in the headlines this month, with one article claiming that soils alone could store the majority of carbon needed to stay under 1.5°C. In this newsletter, we look at the status of soil carbon removals and other natural carbon solutions - although great in theory, challenges remain in practice.

This month also saw innovation in CDR's unlikely hero - concrete. Start-ups are taking different approaches to turn what has traditionally been one of the largest sources of global emissions into a carbon sink.

Lastly, we glance at the progress of CDR policy in different regions and the new CDR association that wants to make Germany a carbon removal leader.

As always, please feel free to share this newsletter with anyone who may be interested. You can [sign up here](#), or [click here](#) to see an archive of previous editions. Don't hesitate to get in touch if you have any questions, suggestions or feedback.

Till next time,

Victoria

victoria.kalyvas@gscnetwork.org

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Stat of the month:

USD 100 to 600

The anticipated [price range for direct air capture](#) by 2050, exceeding optimistic targets defined by countries like the US.



Can we bank on nature?

New data has brought renewed attention to soil carbon, with claims that using better farming techniques could store [31 billion tonnes of carbon](#) each year in soil. This is equivalent to around [80% of all global CO2 emissions released in 2021](#) and, as calculated by [the Guardian](#), would be almost enough to meet the [32 billion-tonne gap](#) between the annual carbon emissions countries have committed to by 2030 and those needed to keep warming to 1.5°C. According to [Downforce Technologies](#), which sells soil data to farmers and conducted the calculations (using methodology that has not been made publicly available), achieving this level of carbon sequestration would only require increasing the amount of carbon stored in half the world's agricultural soils by 1%. The study claims to have assessed the impact of different farming techniques, such as planting more cover crops, changing crop rotation, minimising tilling and planting more native grasses. However, it is also important to keep in mind that as climate change intensifies, soils will have [reduced capacity to act as sinks for carbon sequestration](#) at higher temperatures, according to the IPCC.

How much CO2 is actually stored in soils, how much could, in practice, be stored, and how to accurately quantify this is gaining the attention of politicians, academics and industry. In July, the US Department of Agriculture announced a [USD 300 million investment](#) to create a research network to monitor agricultural emissions and soil carbon. US senators have also [introduced bills](#) to facilitate the research needed to properly measure soil carbon storage and to support farmers in improving soil health. While better quantifying the amount of soil stored in carbon can make it easier for farmers to be rewarded for sustainable farming, the Associated Press highlighted concerns from academics that “even if farmers do get paid for storing soil carbon, it won't solve a bigger problem: that [carbon markets often don't work](#).”

A new paper assessing the prospects for designing “science-informed” soil carbon policies and programmes in the US suggested that soil carbon is “[not yet robustly quantifiable enough](#)” to be used in carbon trading and offset schemes. This is due to the still-evolving science of how to measure soil carbon, as well as the fact that soil carbon is variable, changes over time and its permanence is context-specific. The authors also raised concerns that using incentives like carbon markets [can contribute to a siloed approach to soil protection](#) that only focuses on CDR. In reality, the benefits of protecting soil health are much broader and interconnected with other components of nature restoration - including the way we manage forests.



"Findings could have consequences for BECCS that relies on wood - projects may no longer have net-negative emissions if this overlooked carbon cost is taken into account. "

A new study published in Nature finds that we have been [massively underestimating the emissions from harvesting wood from forests](#). The researchers estimate that between 2010 and 2050, emissions released from forest harvests amount to 3.5 to 4.2 billion tonnes of CO2 every year - around 10% of global emissions. The study challenges the common notion, used in life-cycle analyses of wood products and wood-based bioenergy, that new forest growth "cancels out" carbon losses from harvesting old forests. "For the most part, [people treat wood harvests as though they're not causing emissions](#)," said study co-author Timothy Searchinger, but the findings show that wood harvests exert "a really, really big carbon cost...and we're not paying attention to it". The findings could have consequences for bioenergy with carbon capture and storage that relies on wood - projects may no longer have net-negative emissions if this overlooked carbon cost is taken into account.

Ultimately, we should not be thinking of forests as part of a carbon removal equation, but as [providers of a huge range of benefits for biodiversity and people](#). This was one of the key outcomes discussed at the [Trees for Climate Change, Biodiversity and People](#) conference organised by the British Ecological Society this month. Speakers at the conference also highlighted how our relationship with forests has been reduced to [what humans can extract from the land](#), resulting in forests that lack ecological diversity and slower-than-required rates of tree planting. One team of researchers spoke to environmental scientists, local stakeholders and project funders to understand how to increase the supply of high-quality natural climate solution projects, such as forestry projects, that [deliver "win-win-win" outcomes for climate, nature and society](#). They found that there is a need to improve stakeholders' confidence in project viability and that success is ultimately dependent on [the support of local communities](#).

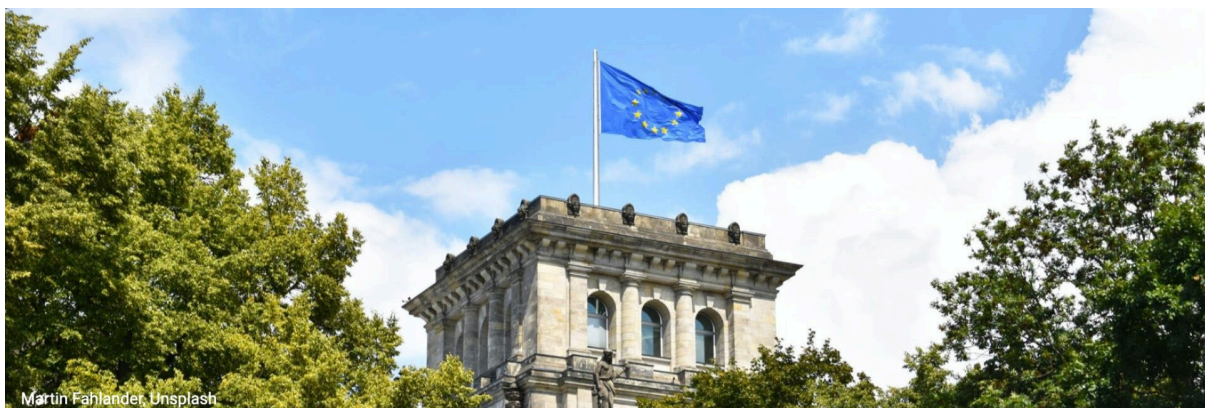


Concrete solutions

As the cause of [one-twelfth of global CO2 emissions](#), you would not expect cement to be called a 'climate solution'. Traditional methods of producing cement are highly polluting as they involve heating limestone, which contains high levels of carbon that is released as the mixture binds together. This is mixed with stone, sand and water to form concrete. However, companies have been developing new ways to make cement with fewer - and some claim negative - emissions. Start-up [Brimstone](#) uses a carbon-free silicate rock instead of limestone, which means no CO2 is released from the rock. Instead, the magnesium byproduct produced is able to [absorb additional carbon](#) from the atmosphere. This month it received third-party certification that its product is structurally and chemically the same as regular cement and meets one of the most commonly used business standards. According to Brimstone, it is the "[first carbon-neutral or carbon-negative cement](#)" to meet the standard. While this should help the company scale up faster, Brimstone is still a while away from commercialisation, with a pilot plant currently in the planning stage. And, as with many carbon removal claims, close inspection will be required to ensure that emissions from processes and transport do not outweigh the sequestered carbon.

Brimstone is not the only company venturing into carbon-negative cement. In Dublin, Silicate is giving ground-up excess concrete, which contains high levels of carbon-absorbing magnesium and calcium, to farmers so they can spread it on fields and [draw down CO2](#). The company says the technology currently removes around two tonnes of CO2 per hectare per year and could remove 100 to 250 million tonnes of CO2 in total per year once scaled-up. Halifax-based company CarbonCure Technologies has raised over USD 100 million for its approach that [injects CO2 into new concrete](#). This permanently stores the carbon in the concrete, helping to strengthen the concrete and reducing CO2 emissions released in the process by about 5%, according to [CarbonCure Founder Robert Niven](#). CarbonCure is one of the few companies in this already niche area that has already reached commercial levels, having supposedly sold [775 systems to concrete producers](#) since it was established in 2012.

Moving away from concrete to direct air capture (DAC), companies Octavia Carbon and Cella Mineral Storage have announced they will [build the first DAC plant in the southern hemisphere](#). The plant, called Project Hummingbird, will use geothermal energy from Kenya's Rift Valley to remove 1,000 tonnes of carbon each year - around a quarter of the capacity of the largest currently-operating DAC plant, located in Iceland. A key goal of Octavia Carbon is "to make [Kenya the world's \[most\] cost-effective hub](#) to build and deploy DAC machines by 2025." The cost-effectiveness of DAC is crucial to its expansion - however, a new paper suggests that the "[holy grail](#)" goal of getting the cost of DAC removals under USD 100 per tonne by 2050 [might not be feasible](#). Instead, researchers suggest that costs could drop to somewhere between [USD 100 and USD 600 per tonne by 2050](#) due to strategic deployment, but "to reach economically viable cost levels, strong and tailor-made policies will almost certainly need to be put into place."



Policy progress

Germany has launched its own national CDR association - the first national CDR association in Europe. The [Deutscher Verband für negative Emissionen e.V. \(DVNE\)](#), led by CDR tech infrastructure company Carbonfuture, plans to inform the public about CDR and coordinate the removals ecosystem in Germany, with the goal to turn Germany into a global CDR leader. As the largest economy in Europe, Germany could have a big influence on how other countries develop CDR policy. Germany has already announced plans to set CDR targets for 2035, 2040 and 2045, and is funding research projects for [terrestrial](#) and [ocean](#) removals.

In the UK, a report by the UK Climate Change Committee to Parliament on progress in reducing emissions found while “the government has committed to sensible steps to put the UK on the path to becoming a viable place for engineered removals projects from the late-2020s, [action to support these intentions is overdue](#)”. There are no engineered removals projects currently operating in the UK. This could mean there is “[substantial risk](#)” that the UK will not meet its ambition of removing five million tonnes of CO₂ per year with engineered removals, with knock-on effects of not meeting its 2030 NDC, according to the report. Policy progress was also a topic of discussion between the [US and Egypt](#) during talks on cooperation for capturing and storing carbon, but mainly in the context of the oil and gas industry.

Policies around CDR might not only determine progress towards climate targets - they could also shape future litigation cases. A new report on [global trends in climate change litigation](#) predicts that “cases might also emerge around efforts to enhance the ocean’s capacity to remove carbon through ocean-based CDR techniques such as seaweed cultivation and enhancing ocean alkalinity.” While more private companies are cropping up to trial new ocean CDR approaches, there remains [serious concerns from scientists](#) on the potential impacts on marine ecosystems. In Australia, a [proposed amendment](#) to the Environment Protection (Sea Dumping) Act would regulate “marine geoengineering” by preventing studies and trials from taking place without a permit.



Our pick of the news

[Oil companies chase carbon removal cash](#) (Politico)

Several large oil and gas producers are financially supporting CDR projects, some of which are seeking the support of taxpayer dollars.

[The Three Biggest Letters in Carbon Removal Are MRV](#) (Bloomberg)

Monitoring, reporting and verification (MRV) is key to scaling up a robust and trustworthy CDR industry.

[A Stealthy L.A. Carbon Capture Startup Snags \\$80 Million From Big Oil And JetBlue](#) (Forbes)

Brace yourselves for more acronyms. A Los Angeles-based company is building a hybrid direct air capture (HDAC) system, which sucks up CO₂ and produces water as a byproduct - with the financial backing of big oil.

[Exxon to buy Denbury for \\$4.9 billion in carbon storage bet](#) (Reuters)

ExxonMobil has purchased Denbury, providing the company with the largest CO₂ pipeline network in the US. Read our analysis in this month's [oil and gas newsletter](#).

[Carbon credit dollars stir communities in Kenya](#) (New Internationalist)

The controversial Northern Rangelands Trust (NRT) scheme is seen as “innovative and beneficial by some and carbon colonialism by others.”

[Enhanced Geothermal Could Be A Missing Piece Of America's Climate Puzzle](#) (Forbes)

A different approach to geothermal could generate a lot of energy, and one company has plans to use it for direct air capture.

[Radical ways to fix the Earth: are they magic bullets or just band-aids?](#) (The Guardian)

Following the hottest recorded month on Earth, scientists reiterate that ending fossil fuel use is the “number one priority” to avoid the worst impacts of climate change.

[A new registry to unlock carbon removal](#) (Climate Tech VC)

New carbon removal registry Isometric hopes to establish a new approach for CDR that moves away from traditional carbon markets and prioritises scientific rigour, integrity and transparency.



Useful resources this month

Database: AlliedOffsets has put together a new database of over 500 CDR companies, with a focus on the universities that are leading research in CDR tech.

Study: An experiment to better understand the impact of increasing the ocean's alkalinity to boost carbon sequestration indicates there would not be any harmful effects on phytoplankton.

Blueprint: The Energy Futures Initiative has released a policy blueprint for responsible BECCS development in the US.

[Map](#): Mission innovation has put together an interactive map of all identified CDR projects around the world.

[Article](#): Researchers have summarised all the key points to get across when communicating effectively on CDR - which we hope are replicated in this newsletter.

[Report](#): Greenbiz has identified three trends in Microsoft's latest report analysing CDR purchases: Inclusion of ocean CDR, deployment of CDR where infrastructure can be built and momentum around storage projects.

[Announcement](#): BlueGreen Water Technologies has developed methodology to quantify how much carbon is sequestered by eliminating harmful algal blooms.

[Correspondence](#): Academic Rob Bellamy comments that it is misleading and problematic to split carbon removal into 'natural' versus 'technological' categories, as in the initial [UNFCCC information note](#) on removals.

[Review](#): Authors examine the results of over 180 publications to summarise evidence on the potential of macroalgal forest carbon sequestration.

[Product](#): An Excess Emissions Insurance product has been launched in the UK to help marine clients manage their environmental footprint with high quality removal and avoidance projects.

[Study](#): Sorry to end things on a low note, but a new modelling study has shown things may not just return back to normal if we remove carbon from the atmosphere after overshoot.

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Each month the demystifying carbon dioxide removal newsletter digs into the world of CDR to bring you the latest stories on everything from carbon credits and net-zero plans to nature-based solutions (NbS) and new technologies. Feel free to forward this email to your colleagues!

Contact me at victoria.kalyvas@gscnetwork.org

Mailing address
Neue Promenade 6
10178 Berlin
Germany

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