Demystifying Carbon Dioxide Removal

April roundup

Dear all,

The big news this month is that the European Parliament approved the rules for its carbon removal framework, and Climeworks announced it is expanding its business model to sell other types of removals. We take a look at a study calculating potential CDR funding needs in the US, as well as which countries are catching up to the US in CDR and which countries are being left behind. Lastly, we explore how researchers are planning to maximise carbon uptake in oceans and land more strategically.

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 previous editions. Don't hesitate to get in touch if you have any questions, suggestions or feedback.

Till next time,
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Stat of the month:

USD 100 billion:

the suggested amount of annual funding needed in the US for CDR by 2050 to meet climate targets.

Jeff Ma, Unsplash

EU policy watch

On 10 April, members of the European Parliament voted to approve a framework for certifying carbon removals. Once the new rules are approved by member states in the EU Council, they will soon enter into EU law. As we've hashed out in a previous newsletter, many groups have been vocal about the shortcomings of the framework as it currently stands. Mathieu Mal, policy officer for agriculture and climate at the European Environmental Bureau, said that how the rules are implemented will determine whether the framework is "a tool for greenwashing, ultimately further delaying climate action." Other NGOs, including CIEL, Bellona, Carbon Gap and Carbon Market Watch, have laid out what they see as shortcomings in the framework and their priorities for improvement.

An expert group met to discuss the framework a few days after the vote. While it is clear that certified credits can be counted towards meeting national climate targets in EU countries, whether these credits could enter the EU emissions trading system is under consideration. Some other key details – like the purpose of carbon removal credits – were not discussed. The framework could influence how carbon removals are certified internationally, but discussions indicate there will be a multi-year wait before the methodologies on how credits will be certified are confirmed, with EU credits likely only starting to become available by late 2026.

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Climeworks is shifting gears

Climeworks has begun to expand its business past direct air capture and into selling other types of carbon removal credits. 'Climeworks Solutions' is already in talks with over 30 customers, the first being luxury watchmaker Breitling. Arguably, valuable carbon credits are needed more for hard-to-abate sectors than luxury lifestyle brands. Giana Amador, executive director of the Carbon Removal Alliance, told Latitude Media that the pivot enables Climeworks to make the most of additional revenue streams and represents the company's "recognition that the carbon removal industry can't scale without more customers".

Adrian Siegrist, vice president of Climeworks Solutions, said that removals sold from other suppliers will have "the stamp of the Climeworks quality" and be "pre-vetted with a very, very selective vetting process." Still, having the same company responsible for both verifying and selling credits has raised concerns, as this could pose a conflict of interest. Erin Burns, executive director of CDR advocacy

group Carbon180, told Heatmap News that “high quality doesn't mean anything”, the more important question being how transparent the company will be about what the standards are.

Talking about transparency

Monitoring, reporting and verification company Isometric takes transparency seriously, verifying its first removal project and making the data on how the credits were measured publically available. The company aims to avoid issues in the carbon offset market that have resulted in the impact of offsets being overstated. “I don’t want someone to trust Isometric, I want someone to trust the data.” Isometric CEO Eamon Jubbawy told Bloomberg.

The company charges the buyers of credits for its services, instead of suppliers, resolving some of the “misaligned incentives” whereby suppliers were responsible for verifying their own credits. The next challenge will be “educating potential customers on the value of a high-quality removal and what that looks like,” according to Anu Khan of Carbon180.

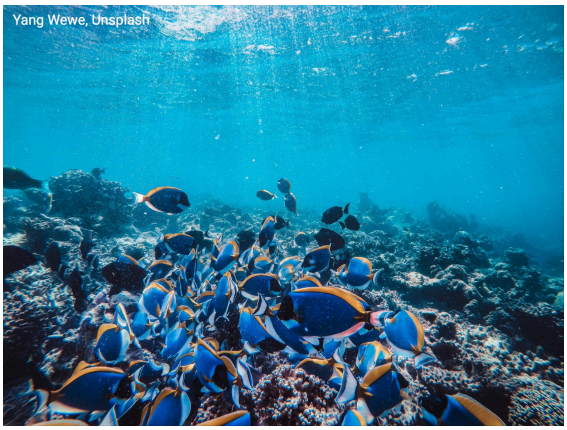
Can the US keep the top spot?

The US has made significant investments in CDR, with the federal government alone spending just under USD 1 billion per year on carbon removal research, development and deployment. However, a new report suggested this figure needs to increase to USD 100 billion per year for the US to decarbonise by 2050. The Rhodium Group, which wrote the report, found that “even with optimistic growth assumptions, voluntary markets alone are not enough” - meaning this 100 billion-dollar sum will have to come from government spending. Lead author Jonathan Larsen acknowledged that the current level of government spending is “nowhere near what's needed for CDR to play the role that people say it needs to play in solving climate change,” but he hopes these findings can help “reset the policy conversation” around CDR.

While the US has been seen as a leader in CDR funding and policies, other countries, like Brazil and Canada, could be close behind. In Canada’s 2024 budget, a low-carbon fuel procurement program designed to reduce hard-to-abate transport emissions, equivalent to around USD 98.8 million, has been expanded to include CDR procurement. This is a similar approach to the one taken by the US Inflation Reduction Act (IRA). Additionally, CDR company Deep Sky is planning on establishing new carbon removal projects near Quebec, where there is access to cheap hydroelectric power.

A milestone has been reached in Denmark, where the government bought USD 166 million worth of carbon removals from three CDR companies in the biggest-ever government purchase of carbon removals.

As some countries start to scale up their CDR funding, a study found that there is a lack of evidence on the impacts and benefits of CDR in Africa, South America and Oceania, despite these regions being “considered essential for CDR deployment in mitigation pathways.” “The few studies that do exist mostly highlight negative aspects,” said lead author Ruben Prütz. The authors called for “urgent further investigation” to close the knowledge gaps in these regions.



> “Even with optimistic growth assumptions, voluntary markets alone are not enough.”

More ocean options

Last month, we wrote about a new plant being built in Singapore to take up carbon from the ocean - part of the continued global interest in ocean CDR. Another group of researchers are working on a similar approach to removing carbon, using electrochemical ocean alkalinity enhancement (OAE). OAE involves changing the acidity levels in the ocean to allow it to take up more carbon from the atmosphere. A key advantage to their approach is that it only needs seawater, electricity and specialised membranes to operate - not the ground-up minerals that are often used. To take up enough carbon via mineralisation to meet IPCC emissions targets, the researchers estimate that “the equivalent mass of roughly eight thousand Empire State buildings worth of alkaline substance would need to be added into the oceans each year starting by mid-century”.

The researchers aim to improve the current process by developing an ultra-thin membrane, to drastically reduce costs and resource needs, while also identifying optimal locations - such as in desalination plants. The research team built a small-scale system in 2015, but the project was shelved due to insufficient incentives for climate tech. It has only recently been restarted as funding was made available through the US IRA and the low-carbon fuel procurement program proposed in Canada.

As several start-ups began working on OAE, the researchers encouraged “cautious optimism” and “open communication” about their progress and the challenges faced. As always, NGOs cautioned against reliance on such approaches: “Moving seawater would require vast amounts of renewable energy that would be better used to displace fossil fuels in the first place,” CIEL’s Lili Fuhr told CNN.

Meanwhile, on dry land

- Scientists have found that estimates of carbon uptake from restoring tree cover may be 20-81% too high, as studies do not fully account for the fact that areas of land without tree cover reflect more light and heat away from the earth than forested areas, known as the albedo effect.
- The research on restoring tree cover contributes to findings from a few months back, which revealed that an area the size of France is threatened by inappropriate forest restoration initiatives. Many programmes include areas classified as non-forest systems, such as savannas and grasslands.
- A new study published in Science found that the “top two metres of soil globally holds about five times more carbon than in all the world’s terrestrial vegetation.” Additionally, around 1% of this carbon (equivalent to 23 billion tonnes), may be released over the next 30 years, with little-understood effects.

- New Scientist reported that "dusting farms with waste concrete could boost yields and lock up CO2", after a field trial in Ireland found climate benefits to spreading concrete dust over fields.
- Inside Climate News took a deeper look into the benefits of biochar - the "Low-hanging fruit" for carbon sequestration.

News in brief:

CO2 removal 'gap' shows countries 'lack progress' for 1.5C warming limit (Carbon Brief)
A new study in Nature Climate Change "quantifies the 'CDR gap' – the difference between the amount of CDR included in national climate plans and what would be needed to limit warming to 1.5C." The authors estimate that in 2050, this gap will be 0.4 billion - 5.5 billion tonnes of CDR per year.

Burying plant waste removes CO2 from the air. But can it scale? (Canary Media)
Start-ups like Graphyte are burying bricks of biomass underground to store carbon away. Some think this could be a waste of biomass that could instead be converted into other resources, like sustainable aviation fuel.


Fabien Barral, Unsplash

Useful resources:

Study: Cutting back on meat could help reduce reliance on CDR. According to a new study, models featuring a shift to plant-heavy diets show that limiting peak warming to around 1.5°C can be achieved by 2045 with less CDR, compared to maintaining current diets.

Explainer: Carbon Brief breaks down why some countries, like Germany, have plans for reaching 'net-negative' emissions.

Podcast: Mckinsey's podcast covering its report on scaling a gigaton industry has made rounds this month, but fails to emphasise the sustainability limits to CDR.

Paper: New proposals from the Science Based Targets initiative (SBTi) have caused quite a stir lately. A new paper written by IPCC scientists argues that the way we've been doing voluntary corporate climate targets is wrong, and governments need to step in to make sure we use best practices. They also suggest that "negative emissions may be funded externally by governments rather than companies individually to compensate for their residual emissions."

Model: A new study has shed light on the uncertainties in how the ocean would respond to iron fertilisation – uncertainties which would cause a huge variation in price, with estimates ranging from USD 7 to 1,500 per tonne of CDR (or even more when the costs of verification are included).

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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!

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