

Can't we just remove carbon dioxide from the air to fix climate change? Not yet

August 4 2015, by John Shepherd



Trees remove carbon dioxide naturally: can we do better? Credit: Coconino National Forest, CC BY-SA

If we have put too much CO₂ into the air, wouldn't it make sense to find ways to remove it again? Well, yes: it would. But sadly it isn't likely to be

easy or cheap and, according to [new research](#), it isn't an adequate "solution" to the problems of climate change.

The possible "carbon removal" techniques are very diverse. They include growing trees on land or algae in the sea and capturing and burying some of the carbon they have taken from the atmosphere. There are also engineered solutions that "scrub" CO₂ directly from the air, using chemical absorbents, and then recover, purify, compress and liquefy it, so that it can be buried deep underground. That sounds difficult and expensive, and at the moment, it is.

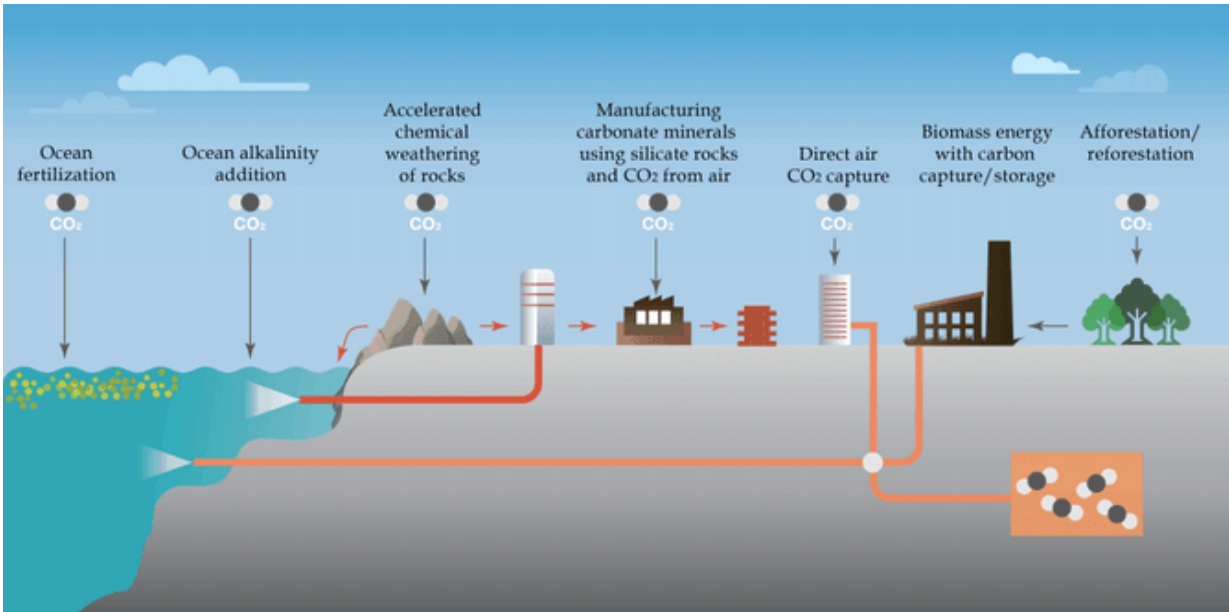
Both the UK [Royal Society](#) and the US [National Research Council](#) point out that doing it on a large enough scale to make a real difference would be hard. Nevertheless, a joint communiqué from UK [learned societies](#) recently argued that to limit global warming to 2°C we are likely to need CO₂ removal (CDR) rates in the latter part of this century that will exceed emissions at that time ("net negative emissions"). That will only be possible if we can deploy CDR technologies.

A new paper in [Nature Communications](#) shows just how big the required rates of removal actually are. Even under the IPCC's most optimistic scenario of future CO₂ emission levels ([RCP2.6](#)), in order to keep temperature rises below 2°C we would have to remove from the atmosphere at least a few billion tons of carbon per year and maybe ten billion or more – depending on how well conventional mitigation goes.

We currently emit around eight billion tonnes of carbon per year, so the scale of the enterprise is massive: it's comparable to the present global scale of mining and burning fossil fuels.

Carbon removal could potentially help to reduce problems such as ocean acidification. So a second paper in [Nature Climate Change](#) is also discouraging because it shows that even massive and sustained carbon

removal at rates of five billion tonnes a year or more would not be enough to restore anything like pre-industrial conditions in the oceans, if mitigation efforts were to be relaxed.



‘Negative emission’ technology comes in many forms. Credit: Caldecott et al / SSEE

Don't give up

Does all this mean that carbon removal is a blind alley, and that further research is a waste of time (and money)? Well, no. But it is nothing like a [magic bullet](#): this latest research should serve to prevent any unrealistic expectations that we could find a "solution" to [climate change](#), or that carbon removal is any sort of alternative to reducing emissions.

Maintaining and increasing our efforts to reduce emissions is still the

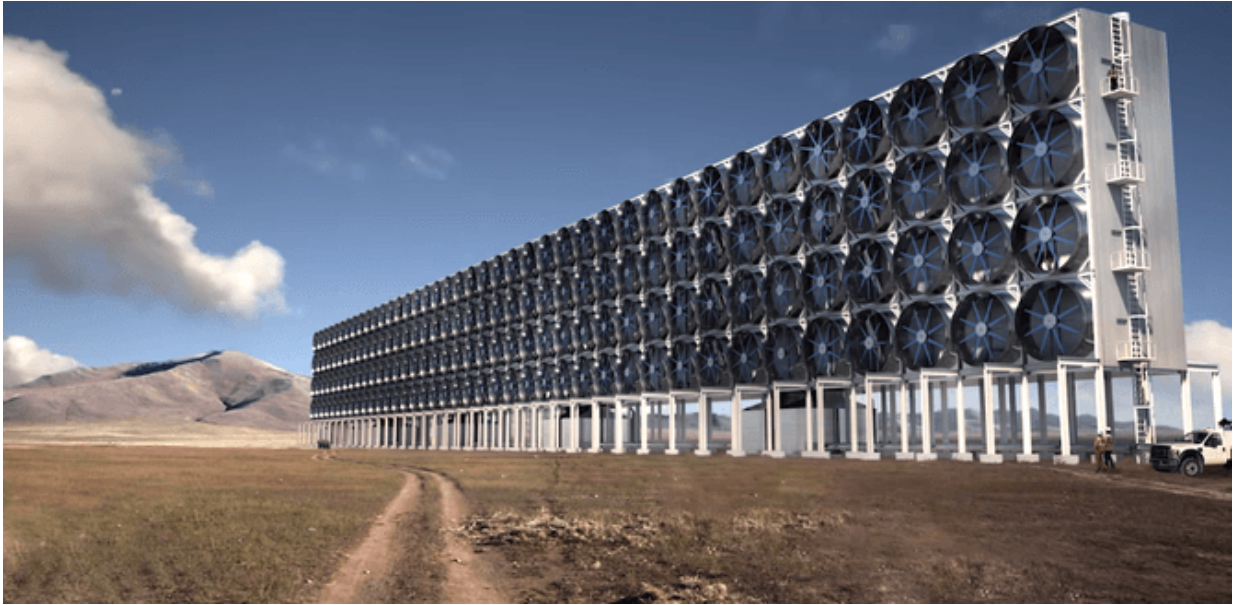
crucial top priority. But if we can develop removal methods that are safe and affordable, and that can be scaled up to remove a few billion tonnes per year, that would be useful even now, as it could augment those efforts to reduce CO₂ emissions (which is not proving to be easy either).

In the longer term, once we have eliminated all the "easily" fixed sources of CO₂ emissions, by generating more electricity from renewable sources and capturing carbon from power plants, we shall still be left with several intractable sources, including aviation and agriculture, that are exceedingly hard to abate.

It is then that we shall really need CO₂ removal, to take from the air what cannot easily be prevented from reaching it. And beyond that, should we eventually decide that the level of CO₂ in the air at which we have stabilised is too high for comfort, and should be reduced, carbon removal will be the only way to achieve that.

Massive scientific challenge

The low-tech biologically based removal methods are all going to be limited in their scale, not least by potential side-effects in the oceans and conflicts over alternative uses for any land required.



Is this the future? This US firm plans to capture carbon dioxide directly from the atmosphere. Credit: Carbon Engineering

However [several groups](#) are working on promising methods for direct (physical and/or chemical) [capture from the air](#), trying to reduce the energy, water and materials demands – and of course the costs – to acceptable levels.

In the longer term someone may find a suitable catalyst to accelerate the natural geochemical weathering processes that already remove CO_2 from the air (but much too slowly to cope with man-made emissions). That would solve the CO_2 disposal problem too, especially if we can avoid mining billions of tons of minerals to use as absorbent. But it's likely to take several decades to get from the lab to industrial-scale deployment – and none of these technologies will be deployed in practice until we have established a price on carbon emissions that makes them commercially worthwhile.

Carbon removal is not a magic bullet, but it is still a vitally important technology that we shall almost certainly need eventually. We should be researching it steadily and seriously, because it is going to take time and a lot of effort to develop methods that are safe and affordable and can be deployed on a massive scale.

So we should continue to research removal, not as a possible quick fix, but as a vital tool for the end game. It's a massive scientific and engineering challenge that really needs the sort of concerted effort that was devoted to going to the moon or building the Large Hadron Collider. And in my opinion it would be far more worthwhile.

John Shepherd is Professorial Research Fellow in Earth System Science at University of Southampton.

This story is published courtesy of [The Conversation](#) (under Creative Commons-Attribution/No derivatives).

Source: The Conversation

Citation: Can't we just remove carbon dioxide from the air to fix climate change? Not yet (2015, August 4) retrieved 16 April 2024 from <https://phys.org/news/2015-08-carbon-dioxide-air-climate.html>

<p>This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.</p>
--