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Four ways to deliver the high-quality carbon offsets the planet needs

While reducing carbon emissions will help us move towards net-zero targets and avoid catastrophic warming, it is critical for carbon dioxide (CO₂) to be removed from the atmosphere to compensate for sectors where decreasing emissions is more challenging. Now three oceanographers and an economist have come up with a sequence of four approaches to deliver the high-quality carbon offsets our planet needs.

Oceanographer Professor Philip Boyd, from the Institute for Marine and Antarctic Studies (IMAS) at the University of Tasmania, said even with full decarbonisation, billions of tonnes of CO₂ will need to be locked away annually – a tonnage equivalent to all of the food or concrete produced in the world each year.

“There are many ways to do this, from chemically extracting CO₂ directly from the air, to planting trees, and seeding the oceans with iron to stimulate the growth of photosynthesizing phytoplankton,” said Prof Boyd, who is the lead author of the Comment [published in Nature this week](#).

“This is where carbon removal offsets come into play, but these offsets need to be priced according to how much carbon is removed, for how long, and how reliably – so funding can be directed to the most effective climate solutions.”

University of NSW economist and co-author, Professor Richard Holden agrees. “A reliable market for high-quality carbon offsets is crucial to achieve net-zero targets, and designing such a market requires bringing science and economics together to marry technology with incentives.”

The authors propose four changes to ensure the carbon offsets market is effective:

1. **Price offsets according to quality** to promote high quality removal offsets that are durable, safe and verifiable, and to reward quality by using a carbon offset year as a market metric, rather than a single price for removing one tonne of CO₂
2. **Design incentives** such as taxes and subsidies to encourage the uptake of ‘blue-chip’ offsets that invest in durable, safe and verifiable technologies
3. **Adapt current observing networks** to achieve a globally consistent framework for robust monitoring, reporting and verification of carbon removal offsets
4. **Implement warranties** to ensure that the seller’s stated amount of carbon is removed reliably for at least the period claimed, and to account for risks around failing to remove enough carbon and unexpected side-effects.

“The coming 10 years are critical to develop and mature CO₂ removal technologies, to ensure they play a key role in supporting emissions reductions globally, so together they will reduce atmospheric carbon dioxide levels,” said IMAS oceanographer and co-author, Associate Professor Lennart Bach.

Pro Vice-Chancellor of Research at the University of Technology Sydney and co-author, Professor Christian Turney said researchers must step up now to help shape carbon-removal markets and be ready for the larger scale projects that will come online in a decade’s time.

“A clear, internationally agreed framework is critical if we’re going to incentivise and deploy the technologies capable of rapidly driving down carbon pollution and reduce the impacts of global heating.”

The authors are affiliated with the virtual Climate Recovery Institute (CRI) which will host the [Atmospheric Carbon Removal Summit 2023](#) in Sydney in September. The summit will bring together key players from industry, government, non-government organisations (NGOs) and finance to kick-start the development of an Australian carbon removal industry.

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