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CARBON DIOXIDE REMOVAL WILL NEED TO SCALE FASTER THAN SOLAR TO MEET CLIMATE TARGETS

New global report warns of a 5 billion tonne carbon removal shortfall by 2050

Oxford, 02 June 2026: The 3rd Edition of the [State of Carbon Dioxide Removal report](#) finds that national pledges fall short of pathways limiting warming to 1.5°C this century by more than 5 billion tonnes of CO₂ per year by 2050. Closing this gap would require carbon dioxide removal (CDR) to grow at rates comparable to, or faster than, the most rapid clean energy transitions in history, including solar power and electric vehicles.

Cutting emissions remains the first and most important priority for tackling climate change. Most progress in limiting warming will come from reducing emissions, while CDR will help address emissions that are hardest to eliminate. However, for as long as any emissions continue, CDR will be needed to halt the rise in global temperature. Delaying emissions cuts by a decade, for example, would warm the planet by about 0.15°C and increase the need for CDR later this century.

Today, the world removes about 2.2 billion tonnes of CO₂ from the atmosphere each year, almost all of it through land-based actions such as restoring forests. Novel technologies that use machines or minerals to lock away carbon only account for around 0.1% of total removals – but have been growing at 40% per year. At the same time, activity behind the scenes is also growing; research funding, trial projects and startups focused on CDR have all increased, and investment in CDR now makes up around 3% of overall investment in climate tech, rebounding last year even as wider climate investment has slowed.

Despite this momentum, the authors warn that today's CDR system is fragile. In recent years, only about 20% of planned novel CDR capacity has actually been delivered, highlighting how challenging it is to bring new projects forward into operation. **Dr Morgan Edwards, Lead Author and Assistant Professor at University of Wisconsin-Madison said,** *"Growing investment in CDR will depend on expectations of future demand, but those expectations are fragile. Activity is highly concentrated in a small number of countries and approaches. That creates real vulnerability – local changes in policy or market signals risk slowing progress globally".*

The report also makes clear that there is no single solution. It looks at a wide range of ways to remove carbon dioxide from the atmosphere, with estimated costs ranging from under \$10 to over \$1,000 per tonne of CO₂, with conservative estimates for potentials for most methods around 1 billion tonnes a year. However, uncertainties remain about how much each option can really deliver sustainably and affordably, and how people will react to projects in their regions. Most people know little about CDR, and whether they accept it will depend on its impacts on who shares in the benefits.

The authors identify the time until 2030 as a decisive window. Edwards added, *"Novel CDR approaches are growing quickly but need to grow even faster significantly, while proving that they can*

reliably lock away carbon and provide clear benefits beyond climate, healthier soils or economic opportunities.”

Without faster cuts in emissions and stronger, more predictable demand for high-quality CDR, the gap between where we are and where we need to be will keep widening, making climate targets much harder and more expensive to achieve.

About The State of Carbon Dioxide Removal

The State of Carbon Dioxide Removal (SoCDR) is the first independent global assessment of CDR, convened by experts at the University of Oxford, German Institute for International and Security Affairs, Potsdam Institute for Climate Impact Research, University of Wisconsin–Madison, and University of Maryland. It tracks progress, identifies gaps, and provides clear insights to inform action through evidence. Learn more at www.stateofcdr.org.

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Defining CDR

CDR involves capturing CO₂ from the atmosphere and storing it durably on land, in the ocean, in geological formations or in products. Examples include reforestation, biochar, bioenergy with carbon capture and storage (BECCS) and direct air carbon capture and storage (DACCS). Some means of storage are longer-lasting and less vulnerable to reversal than others.

CDR vs CCS

CDR is not the same thing as carbon capture and storage (CCS). To count as CDR, a method must capture CO₂ from the atmosphere. While some CDR methods such as BECCS and DACCS will use the same CO₂ transport and storage infrastructure as CCS, CCS usually refers to a set of industrial methods for the capture of CO₂ from fossil sources.