Press release

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International study shows: Cascading wood use into bioenergy with CO_2 capture and storage can play a crucial role in achieving climate neutrality

A large-scale study has identified an effective way in which wood can be used to help achieve long-term climate targets. Led by researchers from the University of Galway in Ireland and experts from IEA Bioenergy, the study investigated how residual and waste wood can contribute to the permanent removal of carbon from the atmosphere through a combined use for manufacturing products and subsequent energy generation with carbon capture and storage (BECCS). The research findings were published as an open-access paper in Nature's Communications Earth & Environment.

The study underpinning this recently published article which was led by the University of Galway as part of the IEA Bioenergy project 'BECCUS' coordinated by the DBFZ, demonstrates that the combination of sustainable forest management, cascading wood utilisation and subsequent permanent carbon removal via BECCS (bioenergy with carbon capture and storage) can offer climate benefits. A key finding of the study is that the strategy of combining forestry with a 'cascading' use of wood products can play a decisive role in achieving climate neutrality targets and offers greater long-term climate benefits than the direct combustion of woody residues for energy production or unmanaged forests. The carbon footprint of bioenergy improves when it is combined with carbon capture and storage (CCS) to enable permanent carbon removal.

The research findings are particularly significant for EU countries that have made a legally-binding commitments to reach climate neutrality by 2050: "National climate neutrality targets cannot be met without large-scale carbon dioxide removal. Bioenergy with Carbon Capture and Storage (BECCS) provides one of the few scalable ways to deliver permanent carbon removal while also producing renewable energy." said Dr George Bishop, lead scientist on the study at the University of Galway.

One of the biggest challenges comes from sectors where deep emissions cuts are technically difficult and costly, such as agriculture as well as aviation and heavy industry. BECCS has been identified as a potential solution to this challenge. Christiane Hennig, co-author and scientist at the DBFZ: "The investigations and findings of this research help us understand the contribution that bioenergy, combined with carbon capture and storage as a carbon removal technology can make to climate protection in conjunction with the use of biomass for a bioeconomy."

General Management:
Prof. Dr. mont. Michael Nelles (scient.)
Dr. Christoph Krukenkamp (admin.)

Seat and competent court: Leipzig
District court of Leipzig HRB 23991

Chairman of the supervisory board:
Olaf Schäfer

Tax ID: 232/124/01072
VAT ID: DE 259357620
Deutsche Kreditbank AG
IBAN: DE63 1203 0000 1001 2106 89
SWIFT BIC: BYLADEM1001

However, large-scale deployment of BECCS infrastructure is expected to take decades. Rather than burning residual and waste wood immediately, these materials can first be used to manufacture products such as particleboard, according to the researchers involved in the study. This generates immediate climate benefits by replacing carbon-intensive materials like plastics, and buys time for the BECCS deployment. At the end of their service life, these wood products can be used for bioenergy generation combined with CO_2 capture. At the same time, new trees grow in sustainably managed forests and sequester carbon dioxide from the air, acting as a 'carbon sink'.

The study demonstrated that this combined cycle creates a durable carbon removal pathway, thereby supporting climate neutrality targets in countries around the world. Prof. David Styles, co-author and Professor of Agricultural Sustainability at the University of Galway: "The implication for policy is clear: to meet ambitious climate targets, governments must prioritise the development of permanent carbon dioxide capture and storage technologies and incentivise circular use of wood to prolong its lifespan as a carbon store. By integrating sustainable forest management with circular and cascading wood strategies and BECCS, the global community can ensure a more durable and resilient path towards climate stabilisation."

The research was supported by Ireland's Department of Agriculture, Food and the Marine through the INFORMBIO project, and by the IEA Bioenergy BECCUS Inter-Task Group, and was an international collaborative effort involving experts from Ireland, Sweden, Germany, Finland, the UK and Australia, and other leading institutions. The DBFZ has been leading the international IEA Bioenergy BECCUS Inter-Task Group together with the Swedish research institute RISE since 2022.

Further information and download the study:
https://www.nature.com/articles/s43247-026-03333-1
https://task40.ieabioenergy.com/inter-task-beccus-2-0/
https://www.universityofgalway.ie/about-us/news-and-events/news-archive/2026/march/new-research-shows-smarter-use-of-wood-can-help-cool-the-planet-1.html

Scientific Contact:
Christiane Hennig
Phone: +49 (0)341 2434-535
E-Mail: christiane.hennig@dbfz.de

Press Contact:
Paul Trainer
Phone: +49 (0)341 2434-437
E-Mail: paul.trainer@dbfz.de