Written on 06 May 2025

2 minutes of reading

News

Fundamental Research

Economics | Economic modeling | Forecasting and scenario modeling

Following her PhD thesis at Imperial College London [1], Dr. Solène Chiquier has been sponsored by the CARMA Chair[1], hosted by IFP School, to conduct a postdoctoral research at the Massachusetts Institute of Technology (MIT), specifically working within the MIT Joint

Program on the Science and Policy of Global Change. This program focuses on interdisciplinary research combining science and policy to address global environmental changes.

Solène Chiquier

As a result of this research a paper was published [2]: in this study, Solène evaluates various carbon dioxide removal (CDR) strategies under various scenarios to achieve the climate goals of the Paris Agreement. The paper examines five **CDR approaches: bioenergy with carbon capture and storage (BECCS), afforestation/reforestation, direct air carbon capture and storage (DACCS), biochar, and enhanced weathering**. Using the MIT **Economic Projection and Policy Analysis** (**EPPA**) model, Solène and her co-authors assess the global and regional implications of these CDR strategies on land use, energy consumption, and policy costs.

Key findings from the study include:

- **Diversified CDR Portfolio** : implementing a mix of CDR approaches is the most cost-effective strategy for achieving net-zero emissions. This diversification reduces reliance on any single method, thereby minimizing negative impacts on land and energy resources.

- **Regional Customization**: the effectiveness of CDR strategies varies by region due to differences in technological, economic, and geophysical conditions. For instance, nature-based solutions like afforestation and reforestation are particularly beneficial in regions such as Brazil, Latin America, and Africa, where they not only sequester carbon but also preserve biodiversity and promote human health.

- **Timely Deployment**: delaying large-scale implementation of CDR strategies could lead to higher carbon prices and increased policy costs. Early and substantial deployment, supported by appropriate policy and financial incentives, is crucial to mitigate climate change effectively.

In summary, the study underscores the importance of a diversified and region-specific approach to CDR deployment, emphasizing that such strategies can achieve climate targets more sustainably and cost-effectively. It also highlights the need for prompt action to implement these measures to avoid escalating costs and climate risks.

[1] The aim of the CarMa chair is to advance knowledge and provide insights collaborating with a diverse group of partners from academia and industry. For more information, please visit the chair website.

This study is framed under the IFP School's Chair entitled "Carbon Management and CO_2 negative emissions technologies towards a low carbon future" (CARMA) supported by TotalEnergies OneTech in association with foundation Tuck.

References:

[1] Solène Chiquier, PhD Thesis, ***The Implications of the Paris Agreement on Carbon Dioxide Removal (CDR) - Techno-Economics, Potential, Efficiency and Permanence of CDR pathways***, Centre for Environmental Policy, Imperial College London, 2022.

[2] Solene Chiquier, Angelo Gurgel, Jennifer Morris, Yen-Heng Henry Chen and Sergey Paltsev, ***Integrated assessment of carbon dioxide removal portfolios: land, energy, and economic trade-offs for climate policy***, Environmental Research Letters, Volume 20, Number 2,
>> DOI: 10.1088/1748-9326/ada4c0

Scientific contacts: Maxime Schenckery, Carlos Eduardo Andrade Sandoval

YOU MAY ALSO BE INTERESTED IN

IFPEN and the SPLEEN PEPR
CarMa Chair: negative CO2 emissions by 2050
Carbon dioxide removal strategies: a diversified and region-specific approach
06 May 2025

Link to the web page :