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Collaborative Patterns and Drivers in Carbon Dioxide Removal Academic Studies

Romain Presty^{1,2,3,*}, Olivier Massol^{1,4,5}, Pascal Da Costa¹

¹ CentraleSupélec, Université Paris-Saclay, Laboratoire Genie Industriel, 3 rue Joliot-Curie, 91192 Gif-sur-Yvette, France

² Center for Energy Economics and Management, IFP School, 228 av. Napoléon Bonaparte, 92852 Rueil-Malmaison, France

³ IFP Energies nouvelles, 1 et 4 av. de Bois-Préau, 92852 Rueil-Malmaison, France

⁴ Department of Economics, City, University of London, Northampton Square, London EC1V 0HB, UK

⁵ Climate Economics Chair, Palais Brongniart, 28 place de la Bourse, 75002 Paris, France

Abstract

The successful implementation of large-scale carbon dioxide removal (CDR) initiatives requires the harmonisation of international supply chains. This team effort requires that potential participants exchange ideas and knowledge about CDR as they prepare to implement such large-scale projects. This study examines the academic research landscape on CDR using a bibliometric analysis coupled with econometrics. We examine academic literature data from 2013 to 2023 on 8 CDR technologies: bioenergy carbon capture and storage, direct atmospheric carbon capture and storage, biochar, soil carbon sequestration, afforestation/reforestation, ocean fertilisation, enhanced weathering and blue carbon. We present community networks of CDR literature at three levels: Country, Institution, Author, and analyse the structure of these networks. Coupling these data with macroeconomic and academic data, we perform an econometric analysis to understand the determinants of international CDR academic collaboration. Our goal is to create a map of the CDR research landscape and to provide information on factors that can promote and/or enable CDR collaboration, a necessary step for the deployment of large-scale negative emissions. Our results provide detailed information on the structures of CDR communities at different levels. We present characteristics of the observed communities and potential future links between them. The cooperation analysis shows that some countries are more open internationally, e.g. the UK has more international cooperation than China, despite the difference in the size of the literature. The econometric analysis shows efforts to include researchers from less developed, less climate and research friendly countries in partnerships, although more action is needed. Finally, we offer policy recommendations to promote necessary and efficient collaboration in academic research on negative emission technologies.