

ENGINEERING BIOCHAR FOR NET ZERO: UK BIOCHAR RESEARCH CENTRE APPLICATIONS FROM CONSTRUCTION TO DIRECT AIR CO₂ CAPTURE

Speaker

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Abstract

The UK Biochar Research Centre (UKBRC) combines multiscale pyrolysis facilities with cross-disciplinary expertise to develop biochar as a versatile engineered carbon material for climate mitigation and environmental management. I will briefly introduce the Centre and its capability to tailor biochar properties through control of feedstock selection, pre-treatment, process conditions and post-processing, and show how this enables “fit-for-purpose” products for distinct applications.

Using examples from ongoing projects, the talk will cover biochar use in construction materials and 3D-printed components, biochar-polymer composites (including agricultural plastics), and advanced applications in electrochemical systems and energy storage. I will then discuss emerging work on biochar for CO₂ capture, spanning gas cleaning and flue-gas treatment through to conductive, structured biochars for electrified direct air capture (DAC) and integration with carbon capture and storage (CCS) value chains. Finally, I will highlight opportunities for sequential and cascading biochar use in bioenergy and waste-biorefinery systems, and their implications for robust, certifiable carbon dioxide removal.

Biography

Prof. Ondrej Masek holds the position of Personal Chair of Net Zero Emission Technologies at the University of Edinburgh, where his innovative leadership at the UK Biochar Research Centre (UKBRC) is setting new standards in the field of biochar production and development. With an 18-year career dedicated to advancing the thermo-chemical conversion of biomass and fossil resources into sustainable value-added products, Prof. Mašek's work is at the forefront of efforts to enhance energy efficiency, promote sustainability, and significantly reduce greenhouse gas emissions.

Since joining the University of Edinburgh in 2009, Prof. Mašek has co-founded the UKBRC within the School of Geosciences, establishing it as a leading institution in biochar research and application. His pioneering research is focused on converting biomass into biochar and its co-products, aiming at carbon sequestration and climate change mitigation while also improving agricultural productivity and resilience. Prof. Mašek is particularly renowned for his expertise in engineered biochar, where he applies advanced techniques to optimise its production and application, ensuring maximum environmental and economic benefits with minimal resource use.

Prof. Mašek's collaborative efforts extend far beyond the borders of the UK. He has led and participated in numerous projects in the UK, EU, and internationally. This global reach is a testament to his ability to forge strong partnerships with industry stakeholders ranging from innovative startups to international corporations. His scholarly contributions include over 200 peer-reviewed papers with over 11,200 citations, an h-index of 55, and an i-10 index of 128 (on Google Scholar). In 2023, he was recognised as a highly-cited researcher, placing him in the top 0.1% of researchers worldwide. This international recognition underscores his significant impact in the field and his potential as a valuable collaborator for international stakeholders.



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**Civil Engineering
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Room 3574 (Lift 27/28)**

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