UNIVERSITY of GREENWICH

Information on Postgraduate Research Scholarship - Ref: Eng-PhD-03-25			
Faculty:	Engineering and Science	**Department:**	School of Engineering
Lead Supervisor:	Dr Nimisha Tripathi		
Project Title:	Multi-stage valorisation of plant-based biomass waste(s) using CO_2 mineralisation		
Project Description: (maximum 500 words)	The transition from fossil fuels to renewables involves the utilisation of biomass for energy (BtE) production. However, the economic potential of biomass feedstock is largely overlooked when used for BtE, as valuable materials present in the biomass are lost through combustion. Our proposal is to extract these valuable chemical (bioactive) components for potential use by industry e.g., pharmaceuticals or construction prior to combustion in a circular economic process step. The UK government requires new circular technologies to meet its decarbonisation goal and Biomass Strategy objectives. Thus, this proposed research aligns with UK policy on climate resilience and environmental sustainability. The proposed research builds on a recent 'proof of concept' experiment which showed there is potential to (i) extract high-value products from biomass, and (ii) utilise ash-derived minerals and CO_2 gas to develop low-carbon construction products. The proposed research aims to explore the opportunities to enhance the sustainability of BtE plants through waste utilisation, carbon footprint reduction and production of chemical of value. The key objectives are to: • Extract and characterise chemicals of value, e.g., secondary metabolites • Subject the post-extraction and combustion residue to CO_2-mineralisation • Manufacture construction materials from the CO_2-mineralised residues via CRM and test products for fitness for purpose • Evaluate/model the feasibility of the process for scalability within BtE operations In this research, biomass will be sourced from BtE plants/operations (e.g., DRAX, UK) for extraction of chemicals of interest. The secondary waste/residue (post extraction) will be characterised and further processed to obtain carbon-free ash-derived minerals, which will then be CO_2 mineralised using the 'point source' CO_2 gas. The mineralised products will be evaluated as cement replace materials		

	(CRM) and use in new construction products. Products will be tested for 'fitness for purpose'. The mass balance of the process will be modelled and life cycle analysed using standard methods. Due to the potential IP involved, the complete methodology has not been disclosed in this document. This research represents a circular and sustainable approach to harness multiple values from biomass, ash and CO_2 gas from BtE operations. By extracting high-value materials from biomass while simultaneously managing solid and gaseous waste in a novel way, the carbon footprint of BtE (approximately 18% of global CO_2 emissions) will be reduced. Preliminary mass-balance calculations indicate that 150 Mt of ash produced annually from waste biomass contains key CO_2-reactive minerals. Both direct and indirect CO_2 offsets arise from (i) utilising biomass waste and ash to permanently sequester the CO_2 gas (direct offset), and (ii) diversion of biomass ashes from landfill and new low-carbon construction materials to reduce environmental impacts of natural resource depletion (indirect offset). The sustainability benefits include: (i) Extraction of high-value materials (e.g., pharmaceutical grade chemicals) and production of low-carbon construction materials (ii) Waste valorisation, reduced CO_2 emissions, and (iii) New employment opportunities and savings on ash disposal cost. This scholarship is awarded competitively, and all applications are carefully reviewed. While we cannot guarantee an offer, we encourage strong candidates to apply.
Duration:	3 years, Full-Time Study or 6 years, Part-Time Study

Support available (subject to satisfactory performance):

A successful Home candidate will receive:

- A Full tuition fee waiver at the university Home-student rate for the specified duration of the scholarship

A successful International candidate will receive:

- A tuition fee waiver for 50% of the International-student rate for the specified duration of the scholarship.

Tuition fees are subject to annual increases.

This scholarship does not include funding for living expenses.

Person Specification of Essential (E) or Desirable (D) requirements:	
Criteria:	**E or D**
Education and Training:	
• 1st Class or 2nd class, First Division (Upper Second Class) honours degree or a taught master's degree with a minimum average of 60% in all areas of	**E**

assessment (UK or UK equivalent) in a relevant area to the proposed research project	
• For those whose first language is not English and/or if from a country where English is not the majority spoken language (as recognised by the UKBA), a language proficiency score of at least IELTS 6.5 (in all elements of the test) or an equivalent UK VISA and Immigration secure English Language Test is required, if your programme falls within the faculty of Engineering and Science a language proficiency score of at least IELTS 6.5 overall with a minimum of 6.0 in all elements of the test or an equivalent UK VISA and Immigration secure English Language Test is required. Unless the degree above was taught in English **and** obtained in a majority English speaking country, e.g. UK, USA, Australia, New Zealand, etc, as recognised by the UKBA.	**E**
Experience & Skills:	
• Previous experience of undertaking laboratory research (e.g. undergraduate or taught master's dissertation)	**E**
• Demonstrable understanding of relevant inorganic and organic chemistry,	**E**
• Good understanding and experience of essential instrumentation, e.g., XRD, XRF, GCMS, SEM and experience in chemical/reagent handling	**D**
• Experience of technical /scientific report writing	**D**
Personal Attributes:	
• Understands the fundamental differences between a taught degree and a research degree in terms of approach and personal discipline/motivation	**E**
• Able to, under guidance, complete independent work successfully	**E**
Other Requirements:	
• This scholarship may require Academic Technology Approval Scheme approval for the successful candidate if from outside of the EU/EEA	**E**
• The scholarship must commence before 15th July 2026 (offers will be withdrawn if this condition is not met)	**E**

Closing date for applications:	***midnight UTC on 20th February 2026***
For further information contact:	***Dr Nimisha Tripathi (n.tripathi@gre.ac.uk)***

Making an application:

Please read this information before making an application. Information on the application process is available at: https://www.gre.ac.uk/research/study/apply/application-process. Applications need to be made online via this link. **No other form of application will be considered**.

All applications **must include** the following information. **Applications not containing these documents will not be considered.**

- **Scholarship Reference Number (*insert reference*)**– included in the personal statement section together with your personal statement as to why you are applying
- **a CV including 2 referees** *
- **academic qualification certificates/transcripts and IELTs/English Language certificate if you are an international applicant or if English is not your first language or you are from a country where English is not the majority spoken language as defined by the UK Border Agency** *

**upload to the qualification section of the application form. Attachments must be a PDF format.*

Before submitting your application, you are encouraged to liaise with the Lead Supervisor on the details above.