

## Research Associate in Phytoremediation and Energy Recovery from Biowaste

### *Safely transforming phytoremediation crops into bioenergy*

Job Ref: REQ240485

As part of the University's ongoing commitment to redeployment, please note that this vacancy may be withdrawn at any stage of the recruitment process if a suitable redeployee is identified.

#### ***About the School of Architecture Building and Civil Engineering***

Research and teaching in the School of Architecture Building and Civil Engineering is driven by 80 academic staff, 34 technical and clerical support staff, 40 contract researchers and over 120 doctoral students. The School benefits by having academic staff from a wide variety of backgrounds, with a resulting rich diversity of perspectives. The undergraduate programmes include Architecture, Civil Engineering, Construction Engineering Management, Commercial Management and Quantity Surveying, Architectural Engineering and Design Management, Air Transport Management, and Transport and Business Management. In all courses, the academic content is directly aligned to the needs of the industry and there is a high level of sponsorship in our portfolio of programmes. Our record of graduate employment is second to none and we have been ranked 1st or 2nd in the National Student Survey for the last 6 years. Further information is available at: <http://www.lboro.ac.uk/departments/abce/>

The School of Architecture, Building and Civil Engineering delivers zero-carbon, resilient buildings, infrastructure and cities in a world under pressure from rising urban populations, ageing infrastructure, resource constraints and multiple hazards. In the 2021 Research Excellence Framework (REF), Loughborough University ranked second place for Architecture, Built Environment and Planning and the research undertaken in the School was rated 'world-leading'. The international standing of our research is exemplified by our growing portfolio of collaborations with other leading universities and research institutes worldwide. These include: the UNSW Sydney, University of California at Berkeley, MIT, Chongqing, Hong Kong, Iowa State, Oklahoma State, RMIT, Georgia State and Penn State.

We are equally proud of our collaborations with industry such as HS2, Mace, Skanska, Aecom, Arup, Willmott Dixon, BRE, Anglia Water and many others, as well as influential organisations such as the Construction Leadership Council (CLC), Constructing Excellence, BSI and others. Built Environment research is increasingly informing government policy through, for example, the Department for Business, Energy and Industrial Strategy and The Committee on Climate Change, and working with for organisations such as the NHS, HS2, Network Rail and others. For more on our research go to: <http://www.lboro.ac.uk/departments/abce/research/>

## Project Description

The newly funded Innovate UK project “Safely transforming phytoremediation crops into bioenergy” will run June 2024-May 2026, and it involves partners in the UK, UAE, and Indonesia.

This project will optimise technology to efficiently and safely produce biogas using plants grown on contaminated land. It supports the production of cost-effective and locally secure low-carbon energy for the energy-poor in countries affected by site contamination. The project also delivers co-benefits including reduced carbon emissions, valorising remediation activities, improving health, especially of women and children, restoring soils, create local economic development, in turn addressing Sustainable Development Goals 1, 5, 7, 8, 9, 10, 12, 13 & 15, and supporting compliance with the UN Minamata Convention on Mercury.

- The UK partner, Loughborough University, brings research expertise, AD capabilities, and all required lab equipment.
- The UAE partner, Zest Associates, brings cleantech commercialisation expertise, green finance expertise, start-up incubation experience and project leadership capabilities critical for successful delivery.
- The Indonesian partner, Nexus3, brings access to test sites, skills in site characterisation, toxics management, and testing the production of mercury-absorbent polymer locally, maintaining relationships with target communities, policymakers and local subcontractors.

The project tackles all three aspects of the energy trilemma by:

- Increasing energy security and access in rural areas producing biogas from plants grown locally on contaminated land
- Reducing the cost of energy by utilising otherwise unproductive land (eliminating the opportunity cost of biomass resources); and by leveraging additional income from carbon offsets and remediation services.
- Reducing greenhouse gas emissions by creating clean renewable bioenergy, supporting the avoidance of land conversion/deforestation for traditional fuelwood or charcoal, supporting soil stability and subsequent carbon sequestration, and displacing fossil fuel gas.

Producing and selling local sources of affordable, renewable gas in rural places improves energy access. Using biogas for cookstoves aligns with FCDO's "modern cooking" priority. Replacing wood/charcoal with biogas reduces time spent collecting fuelwood and brings better indoor air quality, both of which especially benefit women and girls. It also addresses FCDO's 'leave no one behind' policy by prioritising those with the least opportunity, including rural, fuel-poor people in low and middle-income countries in environments where agriculture has become unsafe due to contamination and who suffer from higher rates of disability due to mercury poisoning.

Loughborough researcher will work on decontamination of mercury polluted biomass and consequent energy recovery using the technology of Anaerobic digestion. They will work on improving state-of-the-art AD feedstock approaches by pre-treating contaminated feedstock with a polymer to remove and permanently immobilise mercury, improving biogas production efficiency. They will also work on improving state-of-the-art phytoremediation techniques by treating AD digestate with the polymer to solve the secondary pollutants challenge. The newly developed methodology will be tested against conventional methods and then applied in-field. The researcher is expected to closely work with overseas partners and make occasional trips to undertake field-work including sampling of contaminated plants and soil in Indonesia. To optimise phytoremediation process, they will also have to grow selected plants in lab conditions.

The Researcher will be supervised by the Loughborough-based project investigator. They are expected to be in frequent contact with other project- partners.

## Job Description

**Job Grade:** Specialist and Supporting Academic Grade 6

### Job Purpose

To conduct research in the area of Phytoremediation of mercury contaminated soil, and energy recovery from contaminated biomass using Anaerobic digestion.

To perform field sampling of contaminated soil and plants and their characterisation.

To optimise mercury extraction methods using novel polymers and conventional methods.

To use extensive instrumental analysis of the collected samples and to work on development of new methodology.

To liaise closely with project partners.

### Job Duties

- To develop of a methodology for mercury extraction from contaminated biomass and anaerobic digestate
- To run various instrumental analysis and process data
- To travel to international partners for sample collection, field work and analytical method optimizations
- To work collaboratively and effectively communicate research results with project partners
- To publish in the highest quality refereed academic journals
- Be responsible for conducting the day-to-day running of the project.
- To formulate detailed plans for the project based on broad guidance from the project team.
- To feed back to the project team on progress, to make recommendations for next steps.
- Write up regular progress reports and present outcomes to all Investigators and Collaborators.
- Travel to attend meetings and make presentations both within the project partners working group and to external stakeholders.
- To support the project team by enhancing relationships with existing collaborators and by assisting the establishment of relationships with new collaborators.
- To write research papers suitable for publication in high quality academic journals.
- To attend and contribute to conferences.
- To contribute to project promotion and public engagement events.
- Contribute ideas for new research and enterprise directions.
- Maintain confidentiality at all times and ensure that intellectual property (IPR) agreements are not violated.
- To assist the academic staff in the project team with the supervision of undergraduate MSc and PhD project work and day-to-day supervision and support of other researchers.
- Where appropriate, to deliver teaching, tutorial and laboratory sessions to students.
- Engage in training programmes in the University (or elsewhere) that are consistent with the needs and aspirations of the project and those of the Department.
- Undertake other duties as may be reasonably requested and that are commensurate with the nature and grade of the post.

### Points To Note

The purpose of this job description is to indicate the general level of duties and responsibility of the post. The detailed duties may vary from time to time without changing the general character or level of responsibility entailed.

## **Special Conditions**

All staff have a statutory responsibility to take reasonable care of themselves, others and the environment and to prevent harm by their acts or omissions. All staff are therefore required to adhere to the University's Health, Safety and Environmental Policy & Procedures.

All staff should hold a duty and commitment to observing the University's Equality & Diversity policy and procedures at all times. Duties must be carried out in accordance with relevant Equality & Diversity legislation and University policies/procedures.

Successful completion of probation will be dependent on attendance at the University's mandatory courses which include Respecting Diversity and, where appropriate, Recruitment and Selection.

## **Organisational Responsibility**

Reports to Dr Tanja Radu

## Person Specification

Your application will be reviewed with respect to meeting the essential and desirable criteria listed below. Your application will be reviewed against the essential and desirable criteria listed below. Applicants are strongly advised to explicitly state and evidence how they meet each of the essential (and desirable) criteria in their application. Stages of assessment are as follows:

- 1 – Application
- 2 – Test/Assessment Centre/Presentation
- 3 – Interview

### Essential Criteria

Area	Criteria	Stage
Experience	Background in Environmental Engineering, Chemical/Water Engineering, Botany	1,3
	Experience of sample preparation and running most of the following equipment: ICP-MS, Milestone DMA80 mercury analyser, BMP, GC, XRF, TOC/TN, and Spectrophotometry.	1,3
	Experience of analytical method development	1,3
	Experience in sampling soil and plant material	1,3
	Experience of Phytoremediation research	1,3
	Experience in running and monitoring Anaerobic Digestion	1,3
	Developing testing protocols for material (plant and soil) characterisation.	1,3
	Experience in metal extraction	1,3
	Authoring original work for academic journal papers, conference papers or technical reports	1
Skills and abilities	Ability to undertake the duties and responsibilities of the post	1,3
	Excellent written and oral communication skills	1,3
	Self-motivated with ability to meet deadlines	1,3
	Excellent interpersonal, and organisational skills	1,3
	Working knowledge of instrumental analysis (as above) and data interpretation	1,3
	Ability to work collaboratively	1,3
	Ability to write project reports and make technical presentations to industrial and academic research groups	1
	Knowledge of relevant Health & Safety issues	1
Training	Willingness to undertake appropriate further training and to adopt new procedures as and when required	1
Qualifications	PhD in Environmental Engineering, Chemical/Water Engineering, Botany	1
Other	Commitment to observing the University's Equal Opportunities policy at all times.	1,3
	Willingness to travel/ Able to travel Independently (national and international travel)	3

## Desirable Criteria

Area	Criteria	Stage
Experience	Developing proposals for funding from external agencies	1,3
	Working in a high quality academic research environment	1
	Experience in field work	1,3
Skills and abilities	Demonstrated ability to author original work, in the highest quality refereed academic journals	1
	A strong publication track record	1
	Report-writing skills	1,3
Qualifications	PhD in Environmental Engineering, Chemical/Water Engineering, Botany	1
Other	Occasional Travel	3

## Conditions of Service

The position is FULL TIME and FIXED TERM. Salary will be SSA (Research) Grade 6, £33,966 to £44,263 per annum, at a starting salary to be confirmed on offer of appointment.

The appointment will be subject to the University's Terms and Conditions of Employment for STAFF GRADES 1-5/STAFF GRADES 6 AND ABOVE, details of which can be found [here](#).

The University is committed to enabling staff to maintain a healthy work-home balance and has a number of family-friendly policies which can be found [here](#).

The University offers a wide range of employee benefits which can be found [here](#).

We also offer an on-campus nursery with subsidised places, subsidised places at local holiday clubs and a childcare voucher scheme (further details are available at: <http://www.lboro.ac.uk/services/hr/a-z/childcare-information---page.html>)

In addition, the University is supportive, wherever possible, of flexible working arrangements. We also strive to create a culture that supports equity and celebrates diversity throughout the campus. The University holds a Bronze Athena SWAN award which recognises the importance of support for women at all stages of their academic career. For further information on Athena SWAN see <http://www.lboro.ac.uk/services/hr/athena-swan/>