

Research Associate – the future of the gas network in a decarbonised UK

Job Ref: REQ230126

As part of the University's ongoing commitment to redeployment, please note that this vacancy may be withdrawn at any stage of the recruitment process if a suitable redeployee is identified.

School summary

Loughborough University's Centre for Renewable Energy and Sustainable Technology (CREST), in collaboration with the Universities of Nottingham, Birmingham and Portsmouth, has been awarded funding from the EPSRC for Project GasNetNew - The role of the gas network in a future decarbonised UK. Currently, the gas network delivers the vast majority of the energy used in the UK for heating buildings, which poses a major challenge to achieving our carbon reduction goals. This research will explore novel methods of providing low carbon heating to the UK's building stock, and their implications for the gas network. The aims of the work at Loughborough are to explore the use of TCES materials to provide low-carbon space heating and the possibility of using the gas network to supplement compressed air energy storage systems.

Hence, the main research activities to be performed at CREST relate to i) a major review and the subsequent identification of candidate TCES materials for domestic heating, ii) laboratory-based characterisation of selected TCES materials, iii) data analysis to establish the most promising materials for widespread use in space heating, and iv) a feasibility study of using the gas network to supplement CAES systems.

The successful candidate will have experience of thermal analysis and data analysis. They should be able to demonstrate an understanding of fundamental thermodynamic concepts and will be expected to write high-impact papers disseminating the project results. The project will comprise of a multi-disciplinary team of enthusiastic researchers working in CREST. As part of the project and the wider CREST environment, we will provide both training and mentoring opportunities to enable everyone in the team to unlock their fullest potential.

Job Description

Job Grade: Specialist and Supporting Academic Grade 6

Job Purpose

The Research Associate will primarily be involved in the design, building, instrumentation and testing of a lab scale Compressed Air Energy Storage (CAES) system, ultimately benchmarking the system operation in both isochoric and isobaric modes.

Job Duties

To be responsible for undertaking the main research activities as follows:

- Work with Dr Barbour and the wider research group at CREST.
- Perform a review of TCES materials for domestic use
- Perform thermal characterisation of candidate materials in the thermal characterisation lab at CREST.
- Model the use of TCES materials for standalone domestic heating systems using both existing and bespoke simulations in high level programming languages (i.e. Python, MATLAB).
- Model the use of TCES materials for heat-pump-coupled domestic heating systems using both existing and bespoke simulations.
- Perform thermodynamic analysis (energy and exergy) of compressed air energy storage systems across a range of scales
- Arrive at conceptual designs for the proposed systems.
- Assess designs with regard to large scale operation requirements.
- Perform cost-effectiveness calculations for preliminary designs.
- Disseminate results arising out of the project.
- Travel to collaborators' locations within the UK and report on the progress of the project.
- Provide feedback to the project team on progress and assist in preparing interim project reports.
- Work as a committed member of the project and university team.
- Present to industry and academia.
- Publish the outcomes of research in international journals and conferences.
- Assist in tutorials and laboratory sessions for students if needed.

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 Edward Barbour.

Person Specification

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 Mechanical/Chemical Engineering/Physics/Chemistry, or Science including heat transfer analysis.	1, 3
	Experience of successfully designing and undertaking a complex programme of experimental research work	1, 3
	Experience of using detailed simulation models	1, 3
	Experience of developing reduced order models	1, 3
	Experience of having produced technical reports and / or guidance materials on engineering or science topics	1, 3
	A journal and conference publication record commensurate with current career path and stage	1, 3
	Skills and abilities	Knowledge of thermochemistry, thermodynamics, heat transfer and fluid mechanics
Ability to use a wide range of appropriate engineering software including MATLAB or Python		1,3
Ability to design and manage the construction of experimental rigs		1,3
Ability to successfully undertake an extensive laboratory test campaign		1, 3
Previous experience of successfully undertaking a detailed experimental test campaign and data analysis		1, 3
Excellent written and oral communication, and IT skills		1, 3
Self-motivated with ability to meet deadlines		1, 3
Previous experience of model validation		1, 3
Ability to work independently and as part of a team, interacting with different academic and industrial partners		1, 3
Excellent interpersonal and organisational skills		1, 3
Training Qualifications		A good honours degree in Engineering, Physics, Chemistry or Materials Science, or other suitable subject
	Relevant PhD awarded or nearing completion in a relevant Engineering/science discipline (or equivalent experience)	1, 3

Desirable Criteria

Area	Criteria	Stage
Experience	Previous experience modelling compressed air energy storage systems	1,3
	Previous experience of thermal characterization (laser flash, HFM, DSC, etc)	1,3
	Practical experience of relevant experimental analysis techniques	1,3
	Previous experience of modelling thermal energy storage systems	1, 3
	Practical experience of thermodynamic analysis	1, 3
	Experience of authoring original work for academic journal papers, conference papers or technical reports for industry	1, 3
Skills and abilities	Ability to assist in teaching of undergraduate or postgraduate students	1, 3
	Working knowledge of a range of software packages	1, 3
	Knowledge of experimental techniques associated with heat transfer	1, 3
	Previous experience of model validation and parametric analysis	1, 3
	Previous experience of producing reports	1, 3
Qualifications	Relevant PhD in an Engineering discipline preferably related to thermal energy storage (or equivalent experience)	1, 3

Conditions of Service

The position is available either **full time or part time for an initial 24 month period**. Salary will be on Specialist and Supporting Academic Grade 6, £32,348 - £42,155 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 grade 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 are available at <http://www.lboro.ac.uk/services/hr/a-z/family-leave-policy-and-procedure---page.html>.

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

In addition, the University is supportive, wherever possible, of flexible working arrangements. We also strive to create a culture that supports equality 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/>