

Research Associate Low Temperature Heat Recovery and Distribution Network Technologies (LoT-NET)

Job Ref: REQ190403

As part of the University's ongoing commitment to redeployment, please note that this vacancy may be withdrawn at any stage of the recruitment process if a suitable redeployee is identified.

Project Description

Loughborough University (CREST) in collaboration with Warwick University, the University of Ulster and London South Bank University have been awarded funding from the ESPRC for a programme grant Low Temperature heat Recovery and Distribution Network Technologies, (LoT-NET). The need to move to low/zero carbon heating is recognised to be a key requirement for achieving the UK's goal of an 80% reduction in greenhouse gas emissions by 2050. Heating and cooling produces more than one third of the UK's CO₂ emissions and represent about 50% of overall energy demand. BEIS have concluded that heat networks could supply up to 20% of building heat demand by 2050. The aim of LoT-NET is to prove a cost-effective near-zero emissions solution for heating and cooling that realises the huge potential of waste heat and renewable energies by utilising a combination of a low-cost low-loss flexible heat distribution network together with novel input, output and storage technologies. LoT-NET will analyse how waste heat streams from industrial or other sources feeding into low temperature heat networks can combine with optimal heat pump and thermal storage technologies to meet the heating and cooling needs of UK buildings and industrial processes. Heat networks have previously used high temperature hot water to serve buildings and processes but now 4th generation networks seek to use much lower temperatures to make more sources available and reduce losses. LoT-NET will go further by integrating low temperature (LT) networks with heat pump technologies and thermal storage to maximise waste and ambient heat utilisation.

The main areas of research to be undertaken at Loughborough are

1. To develop a spatial and temporal simulation tool that can cope with dynamics, scale effects, efficiency, cost, etc. of the whole system of differing temperature heat sources, distribution network, storage and delivery technologies and will address Urban, Suburban and Exurban areas.
2. Development and analysis of thermal energy storage materials and systems at different scales, (large centralised to small distributed) and storage durations (daily to inter-seasonal). Identification and prototyping designs for alternative heat distribution media and heat capture from waste heat or low temperature heat sources. Determine the preferred combination of heat capture, storage and distribution technologies that meets system energy, environmental and cost constraints.

Job Description

Job Grade: Specialist and Supporting Academic Grade 6

Job Purpose]

The Research Associate will be involved in the development and validation of a spatial and temporal simulation tool for low temperature district heat networks that can cope with dynamics, scale effects, efficiency, cost, etc. of the whole system of differing temperature heat sources, distribution network, storage and delivery technologies and will address Urban, Suburban and Exurban areas. In addition, they will work with academic partners and other team members to determine the preferred combination of heat capture, storage and distribution technologies that meets system energy, environmental and cost constraints.

Job Duties

- To be responsible for conducting the day to day running of the project.

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

- Characterise sources of low/zero carbon heat suitable for use with low temperature networks classified based on magnitude and temperature of available heat, ease and cost of heat capture and utilisation, variation in heat availability with time, future availability and potential for storage and upgrading.
- Assess heat demand profiles for a range of domestic and non-domestic buildings and develop a method/model for predicting representative spatial and temporal heat demand profiles for heat networks.
- Validate model predictions against available heat load data from existing district heat networks.
- Develop a flexible dynamic modular software tool that allow options for low carbon district heating systems to be evaluated that can incorporate and model heat capture from a wide range of different low/zero carbon sources, thermal energy storage systems, heat upgrading technologies and demand profiles.
- Develop a method and model for combining heat demand profiles and low carbon heat source profiles for selected areas to illustrate spatial and temporal coherence over different areas and time periods and enable the magnitude and distribution of thermal storage requirements to be assessed and displayed in an appropriate way.
- Apply the developed models to a minimum of three different representative case study areas to assess the viability of low temperature heat networks.
- Develop a set of minimum criteria/characteristics in terms of available heat sources and demands for low carbon district heating development
- Apply developed criteria to a selection of potential UK sites.
- Identify optimal operational and control strategies for low temperature district heat networks for a range of operating conditions.
- To assist in the dissemination of results arising out of the project.
- To travel to collaborators' locations within the UK and potentially overseas to report on the progress of the project.
- To provide feedback to the project team on progress and assist in preparing interim and final project reports.
- To work as a committed member of the project and university team.
- To write reports, papers and make presentations to industry and academia.

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 Professor Philip Eames.

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 Engineering, Science, Data Analysis, Model Development or other suitable subject	1, 3
	Experience of designing and undertaking a complex programme of research work	1, 3
	Practical experience of analysing and working with large complex data sets	1, 3
	Practical experience of presenting complex data in an easily accessible format	1, 3
	Experience of developing and using detailed simulation models of complex multi variable problems.	1, 3
	Experience of having produced technical reports and / or guidance materials on engineering or science topics	1, 3
Skills and abilities	Knowledge of heat transfer and fluid mechanics	1, 3
	Knowledge of techniques for data presentation and analysis	1, 3
	Knowledge of techniques for simulating complex thermal energy systems	1,3
	Working knowledge of a range of software packages and excellent ability in a programming language	1, 3
	Excellent written and oral communication and IT skills	1, 3
	Self-motivated with ability to meet deadlines	1, 3
	Excellent interpersonal, and organisational skills	1, 3
	Ability to work independently and as part of a team, interacting with different academic and industrial partners	1, 3
	Ability to write project reports and make technical presentations to industrial and academic research groups	1, 3
	Knowledge of relevant Health & Safety issues	1, 3
Training	Demonstrate evidence of having undertaken further training	1, 3
Qualifications	PhD (or near completion)	1, 3
Other	Commitment to observing the University's Equal Opportunities policy at all times.	1, 3

Desirable Criteria

Area	Criteria	Stage
Experience	Current or recent relevant work experience at post-doctoral level in an academic or industrial environment	1, 3

	Experience of modelling district heating systems	1, 3
	Experience of developing and using complex and simple models for heat transfer and fluid flow	1, 3
	Experience of authoring original work for academic journal papers, conference papers or technical reports for industry	1, 3
Skills and abilities	Authoring original work, in the highest quality refereed academic journals	1, 3
	Ability to assist in teaching of undergraduate or postgraduate students	1, 3
	Previous experience of developing detailed models of district heat networks or thermal system components.	1, 3
	Previous experience of model validation and performance of a parametric analysis	1, 3
	Previous experience of producing reports	1, 3
	A strong publication track record	1, 3
Qualifications	A good honours degree in Engineering, Physics, or other suitable subject	1
Other	Travel / Able to travel Independently / Working patterns	1, 3

Conditions of Service

The position is FULL TIME (1 FTE) for 30 months in the first instance. Salary will be on SSA6 £30,395 - £39,609 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 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 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/>

Applications

The closing date for receipt of applications is **12 June 2019**