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**London  
South Bank  
University**

**London South Bank University  
The School of Engineering  
With London Underground Ltd  
Ref: LSBU/LU 010**

### **PhD studentship in sustainable heating systems**

Title: Heat FUEL (Heat from Underground Energy London)

#### **London South Bank University (LSBU)**

London South Bank University (LSBU) is a dynamic, inner-city university with a diverse multi-cultural population of some 17,000 students and around 1700 staff. For over 100 years the university has provided top quality teaching and learning, underpinned by relevant research and delivered in an environment that is focussed on the needs of its students and the great capital city of London. Our students and staff come from every part of the community and from all over the world, making our campus truly multicultural. The courses offered here are flexible and closely linked to the needs of industry and the professions, with particular specialities in health (nursing and allied health professions); computing, internet and multimedia, engineering, applied science and sports science; architecture, construction and estate management; business studies, management, tourism, hospitality and law; social sciences, arts, media studies, digital media and video production; English and a new exciting programme of Combined Honours degrees.

#### **London Underground Ltd (LUL)**

The London Underground (often shortened to The Underground or The Tube) is a rapid transit system in the United Kingdom, serving a large part of Greater London and some parts of Buckinghamshire, Hertfordshire and Essex. It incorporates the oldest section of underground railway in the world, which opened in 1863 and now forms part of the Circle, Hammersmith & City, and Metropolitan lines. The Underground serves 270 stations and has 402 kilometres of track, 45 per cent of which is underground. It is the second largest metro system in the world in terms of route miles, after the Shanghai Metro and part of the largest system in terms of route miles when taken together with the Docklands Light Railway. It also has one of the largest numbers of stations. In 2011/12 passenger numbers were just under 1.2 billion making it the third busiest metro system in Europe, after Moscow and Paris. London Underground Ltd (LUL) has an extensive engineering capability used to maintain and develop the infrastructure. One of the teams is focusing on the opportunity of waste heat recovery from The Tube and this team will be involved with this project.

## **The Project**

In response to climate change challenges and health issues associated with burning of fossil fuels for heating in cities London Mayor Sadiq Khan made the utilisation of waste heat a major part of his 2015 manifesto to ensure a greener and cleaner London. He stated his intention to provide 25% of the heating needs of London from waste heat sources by 2025. One large potential waste heat source is the London Underground network which remains relatively warm in most locations throughout the year. Significant amounts of heat are available from the more than 100 London Underground ventilation shafts. Work carried out at LSBU under an Innovate UK project calculated that this energy can be very efficiently captured and used to provide heating for district schemes, blocks of flats, hospitals, etc. In parallel, LUL has installed a heating scheme at Bunhill/ City Road connected to an energy centre. The heat will be used by more than 400 homes in an adjacent housing estate owned by Islington Council. This scheme aims to provide low cost and low carbon heating to social housing homes, and avoids the need for fossil fuel derived heating which has a big impact on particulates in London. However, as a by-product it will deliver cooling to London Underground when required.

The Bunhill/ City Road scheme is currently being constructed and will become operational in 2018. Whilst significant capital was provided for the scheme, there is no support provided to investigate and optimise the performance of the system. As a result, the new systems that will be installed may not demonstrate the full benefits of the scheme in this large scale trial. The proposed PhD will be undertaken in conjunction with LUL and investigate system performance, providing better understanding of the benefits of the scheme, and how best it can be applied. It will also make generic recommendations which drive future system concepts and configurations. In addition, the PhD will also analyse the market to understand and evaluate the size and potential for growth of demand for waste heat from the London Underground vent shafts.

This project involves all of these themes, which importantly will be undertaken in collaboration with a leading team of engineers at LUL who are enthusiastically supporting this scheme. It is therefore an outstanding career opportunity for a recent graduate both to study for a PhD and also to gain valuable industrial and technical experience in a vibrant and developing international field of advanced engineering.

## **The Candidate**

You should have a first or upper second class honours degree in an appropriate area such as engineering, product design, science or mathematics and environmental technology. Evidence of interest in sustainable energy systems, energy market analysis (energy policy issues affecting heat), heat pumps and heat recovery systems would be an advantage, as would experience/knowledge of any of the following:

Computer modelling (e.g. COMSOL, Matlab, EES), thermodynamics/heat transfer, experimental research

### **Key skills and selection criteria:**

- Good relevant first or upper second class honours degree in engineering, science or product design.
- Evidence of interest and experience in sustainable energy systems and energy market analysis, with knowledge of some of the following; thermodynamics, energy engineering and energy balance, heat transfer, and modelling.
- Experience of software packages e.g. Microsoft Office.
- Ability to research subjects using libraries, the internet and other information resources.
- Ability to analyse critically technologies and case studies and to use computer modelling to develop improved systems and performance predictions.
- Ability to analyse energy markets (energy policy issues affecting heat) to understand and evaluate the size and potential for growth of demand for waste heat sources in London.
- Ability to communicate in writing and verbally, the outcomes of the work to commercial industrial and scientific audiences.
- Ability to work within a team of both industrial and academic supervisors, to communicate flexibly to scheme players and leaders, at all stages within a structured timetabled project.
- Able to demonstrate an understanding of equality and diversity and their practical applications.

### **The Award Detail**

The 3.5 year studentship is funded by the LUL and LSBU and leads to the degree of PhD in Urban Waste Heat Recovery and Re-use. The Studentship provides a tax-free maintenance allowance of up to £15,000.00 pa and includes tuition fees payable to the University. The studentship will also come with the opportunity of disseminating research outcomes on National and International conferences. The successful candidate will join an active research team, under the academic supervision of Professor Graeme Maidment, Dr Gareth Davies and Dr Akos Revesz. The chance to teach LSBU students will also be given to the successful candidate.

### **Application Procedure**

Informal enquiries can be made to Professor Graeme Maidment, Dr Gareth Davies or Dr Akos Revesz

Email: [maidmegg@lsbu.ac.uk](mailto:maidmegg@lsbu.ac.uk), [gareth.davies@lsbu.ac.uk](mailto:gareth.davies@lsbu.ac.uk), [revesza2@lsbu.ac.uk](mailto:revesza2@lsbu.ac.uk)

Interested applicants should apply via email with a CV application and covering letter highlighting how they meet the selection criteria above by 5 p.m. 7<sup>th</sup> March 2018 **quoting**

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A short list of candidates will be invited for interview and the successful candidate will be selected for an award in accordance with the University's postgraduate admission requirements and meet the eligibility of Education (Fees and Awards) Regulations 1997.