QUB - Mechanical and Aerospace Engineering PhD Project 2019-2020

Title: Future retail electricity market structure and operations with increasing customer engagement

Project description:
SSE supply electricity and gas to around 9 million household and business accounts. SSE is one of the UK's largest generators of electricity with around 10,557MW of generation capacity (UK & Ireland, 31 March 2016) and more than 20,000 employees in the UK. SSE faces complex challenges in running its retail energy sales business over the coming decades due to an influx of new independent energy sellers, uncertainty in fossil fuel prices and the pressure to reduce retail energy prices, while reducing greenhouse gas emissions. Additional market dynamics include the deployment of new technologies (smart meters, electric vehicles, embedded generation) and regulatory and market changes (including those arising from Brexit). SSE must develop a new retail energy business model in response to these complex technical, regulatory and business challenges.

Aims and Objectives:
The overall aim of this project is to design and build a retail energy trading framework for the electricity and gas businesses. The project objectives are; 1) to establish current best practice by examining all retail energy activities and trends in the EU, USA, Korea and Japan; 2) to determine the market engagement behaviours for retail energy customers (3) to identify technical, regulatory and market challenges to new servicers; 4) to develop mathematical method suitable for the framework; 5) to specify big data software systems and tools; 6) design and build the algorithmic framework with associated distributed level ancillary services and 7) validate the framework in real time.

This 3.5 year EPSRC CASE supported SSE studentship will provide a prestigious and privileged framework to acquire technical, commercial, societal and specialised industrial knowledge to enhance academic study The PhD student will spend two, 3 month periods with SSE, at their Belfast location or other (i.e. Glasgow, London or Dublin). Moreover, the student will receive individual and team-based training from engineering, business and commercial specialists in SSE to develop an understanding of the energy trading, operational and shipping activities, which deliver solutions for global energy companies. SSE will support the PhD studentship through a mentoring arrangement in partnership with academic supervision by the lead PI, Dr Aoife Foley with support from Dr Tim Littler and Professor D John Morrow in EPIC cluster in School of Electronics, Electrical Engineering and Computer Science (EEECS). The student will be expected to manage the project and resources and engage with relevant experts in energy markets. The studentship will provide the necessary supportive context to complete a programme of academic PhD study and deliver outcomes from which SSE can benefit.

Key skills required for the post:
A minimum degree of 2:1 (or equivalent) in one of the following areas is required: Engineering, Science, Economics, Computer Science, Mathematics or a closely related subject area. Candidates with other primary degree areas may be considered if they can demonstrate a level of mathematics and/or data analyses in their primary degree area. It would be desirable to have some understanding and knowledge of the energy sector. Solid computer skills are essential as the project will involve significant computer modelling, simulations and analyses.

Key transferable skills that will be developed during the PhD:
The key transferable skills that will be developed during this PhD project will be in the areas of significant mathematical modelling and simulation, industrial engagement and technology transfer, academic and industrial publication/presentation skills and possibly Experimental Testing and Analysis.

Lead supervisor:	Dr Aoife Foley, School of Mechanical & Aerospace Engineering a.foley@qub.ac.uk For Dr Foley's profile, work and details: https://pure.qub.ac.uk/portal/en/persons/aoife-foley(56045b50-ec38-4e1d-b0af-05a21ee3fa81).html

Other supervisor(s):	Prof D John Morrow & Dr Timothy Little, in School of Electronics, Electrical Engineering and Computer Science
Funding details including fees, stipend and top-up:	Normally, to be eligible for a full award of fees, stipend and top-up a student must have no restrictions on how long they can stay in the UK and have been ordinarily resident in the UK for at least 3 years prior to the start of the studentship (with some further constraint regarding residence for education). This will include a basic stipend and a top-up of up to £5,000. The basic stipend for 2019/20 is estimated to be approx. £14,925. The successful candidate will be expected to be in post by October 2019.
Conditional top-up available:	The value of the top-up will depend on the candidate. The student will also be required to travel to at least 1 conference in North America & 1 in Europe.
Demonstrator hours:	PhD students may also have the opportunity to apply to be demonstrators on undergraduate modules. Compensation for this can amount to £1,200 per year.
Enquiries:	For informal inquiries, email a.foley@qub.ac.uk

Queens University Belfast is a diverse and international institution which is strongly committed to equality and diversity, and to selection on merit. Currently women are under-represented in research positions in the School and accordingly applications from women are particularly welcome.