QUB - Mechanical and Aerospace Engineering
PhD Project Description

Title: Evaluating the non-market co-benefits of biogas to enable expansion of biogas fuel supply into new markets

Theme: Clean Energies

Project description:

Biogas, through both its production and use, creates non-market co-benefits, such as improved air quality, reduced land and water pollution, and scope for economic development, particularly in rural areas. However, although biogas is linked with clear societal benefits, the issues have not been quantified and are not reflected in the current value of biogas, which is focused on electricity. The challenge faced by the biogas industry is the difficulty in expanding into markets outside the electricity sector, particularly in the absence of subsidies.

It is hypothesised that the non-market co-benefits of biogas can be modelled using a new approach that combines life cycle analysis techniques from energy engineering with health impact assessment methodologies from the public health discipline and economic value estimations from the field of environmental economics. The novelty of the project is based around two areas: the development of interdisciplinary methodologies and the creation of a new database of non-market co-benefits in the biogas sector.

The ultimate goal of the research is to open up of new markets for biogas. The subsequent expansion of the biogas industry could lead to both social and environmental benefits, including rural development, improved water quality in rural areas (through reduced pollution load from land-spread raw slurries), reduced greenhouse gas emissions (through displacement of fossil fuels and effective management of wastes), and reduced air pollution, specifically particulate matter, in urban areas (through replacement of diesel/petrol with biomethane) with associated positive impacts on health.

Aims and Objectives:

The aims of this project are to fully identify and quantify the societal benefits of biogas, so as to inform policy makers of the potential of the biogas economy and open up new markets for biogas

Key skills required for the post:

- A minimum of a 2:1 or first degree in a relevant discipline/subject area (e.g. Agriculture, Chemistry, Biological/Environmental Science, or Civil/Environmental/Mechanical/Chemical Engineering) or
- A masters degree in a relevant subject area (e.g. Agriculture, Chemistry, Biological/Environmental Science, or Civil/Environmental/Mechanical/Chemical Engineering). The masters must have been attained with overall marks at merit level (60%). In addition, the dissertation or equivalent element in the masters must also have been attained with a mark at merit level (60%). Students with a postgraduate masters degree should preferably also hold a minimum of a 2:1 in their first degree.
- Experience or knowledge of energy and environmental issues is preferable.
- Analytical skills along with high self-motivation and preparation for laboratory/field work are required.
- Students should demonstrate the potential to engage in innovative research and to complete the PhD within a prescribed period of study.
- English language proficiency is essential (please refer to http://www.qub.ac.uk/International/International-students/Applying/English-language-requirements/).

Key transferable skills that will be developed during the PhD:

At the end of the doctorate the candidate is expected to have developed generic and transferable skills in time management, problem solving, report writing and oral presentations. The student is also expected to

develop a considerable skillset in environmental life cycle assessment, as well as knowledge of the biogas sector. The project will also benefit from the collaboration with the anaerobic digestion industry, which should enhance both professional standing and competency.

The successful candidate will have access to supplementary professional training, allowing him/her to develop skills in analytical and interdisciplinary thinking; improved oral and written communication skills through dissemination of research findings; contacts for future projects, employment and funding opportunities; and project management skills in preparation for future challenges in both industrial and academic settings.

Lead supervisor:	Dr Beatrice Smyth, School of Mechanical and Aerospace Engineering, beatrice.smyth@qub.ac.uk
Other supervisor(s):	Dr Declan Bradley, Centre for Public Health, School of Medicine, Dentistry and Biomedical Sciences, declan.bradley@qub.ac.uk
Funding mechanism:	Yet to be secured
Application closing date:	Until suitable candidate appointed
Guaranteed stipend:	Stipend for 20-21 is not yet confirmed. Base stipend for 19/20 is £15,009.
Conditional top-up available:	N/a
PhD students in the School may have the opportunity to apply to be demonstrators on undergraduate modules. Compensation for this can amount to in excess of £2,400 per year.	

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.