

THE UNIVERSITY OF MANCHESTER

PARTICULARS OF APPOINTMENT

FACULTY OF SCIENCE & ENGINEERING

SCHOOL OF MECHANICAL, AEROSPACE AND CIVIL ENGINEERING

RESEARCH ASSOCIATE: PROCESS MODELLING OF BIOENERGY SYSTEMS INCLUDING
BIOENERGY WITH CARBON CAPTURE AND STORAGE

VACANCY REF: S&E-10830

Salary: Grade 6 £31,604 to £38,833 per annum according to experience

Hours: Full time

Duration: Fixed term for 18 months from 1 December 2017

Location: Oxford Road, Manchester

Enquiries about the vacancy, shortlisting and interviews:

Name: Dr Paul Gilbert

Email: p.j.gilbert@manchester.ac.uk

Overall purpose of the job:

To conduct research on the following two projects:

1. A multi-university, interdisciplinary NERC project entitled 'Feasibility of Afforestation and Biomass energy with carbon capture and storage for Greenhouse Gas Removal (FAB-GGR)'. The project objectives are to a) assess the nature and requirements of afforestation and bioenergy with carbon capture and storage (BECCS) supply chains that achieve global net greenhouse gas removal levels of 1 GtCO₂/yr and 10 GtCO₂/yr respectively and b) explore the real world feasibility of these 1 GtCO₂/yr and 10 GtCO₂/yr supply chains, by evaluating their associated wider consequential environmental, technical, economic, policy and societal implications and trade-offs. **Duration – 12 Months.**
2. A multi-university, multidisciplinary EPSRC project entitled 'REAL TIME CONTROL OF GASIFIERS (RTCoG)'. The principle objective of this research project is to demonstrate controlled gasification operating at the minimum tar production point for a range of biomass varieties and pre-treatment inputs; achieved via robust and inexpensive control systems, with reduced greenhouse gas and particulate emissions. **Duration – 6 Months.**

This research post will be based within the **Tyndall Centre for Climate Change Research, University of Manchester: Tyndall Manchester**. You will conduct **processing modelling** for a range of BECCS systems in FAB-GGR and **process modelling** and **techno-economic assessment (TEA)** (and potentially life cycle assessment) for the biomass gasification systems identified in RTCoG. Note RTCoG has an existing process model and techno-economic model that you will be required to use.

Duties/Responsibilities of the Post:

FAB-GGR

- Help to support a scoping exercise with wider project team to identify the system boundaries for up to three BECCS systems identified as part of the FAB-GGR project. These are to include large-scale combustion of biomass feedstocks for electricity, with post-capture and biomass gasification for H₂ production, with pre-capture.
- Conduct process modelling simulation of these BECCS systems.
- Determine the mass and energy balance of the systems to better inform the wider LCA work conducted in the project (No LCA required for this part of the post). Eg biomass requirements, appropriate operational scale, flue gas compositions and capture rates.

RTCoG

- Ensure current goal, scope and system boundaries for the gasification systems are fit for purpose.
- Update and conduct process modelling and TEA for the biomass gasification systems selected in RTCoG, with a view to understand the technical and financial performance of real time control technology. Update findings for LCA to understand further the environmental performance of implementing control technology.

Both projects

- To work with consortium partners to gather necessary inventory data to conduct the research.
- Interpret the findings, consider relevant sensitivity analysis and disseminate output accordingly to stakeholders and the wider academic community.
- To provide the team and advisory board with updates of project progress.
- To prepare academic papers suitable for high quality journal publication, as well as policy- and/or industry-relevant reports and give presentations (inc at conferences) on the research work.
- To travel to project meetings in the UK and to Supergen Bioenergy Hub events.

Person specification:

Essential knowledge, skills and experience:

- A PhD in a scientific, mathematical, engineering, or environmental discipline – or relevant experience.
- Experience in conducting process-modelling assessments, in particular for bioenergy systems. Experience in using Matlab and/or gCCS is desirable.
- Experience in conducting techno-economic assessments, in particular for bioenergy systems.
- Understanding of bioenergy feedstocks and technologies, in particular gasification, combustion and bioenergy with carbon capture and storage.
- Experienced team player with a track record in integrating knowledge and expertise across different research themes or research groups.
- Experience in working independently to tight deadlines with appropriate supporting evidence.
- Excellent interpersonal skills, oral and written communication skills. In particular, a strong track record in producing high quality academic papers (or showing potential for).

Desirable Knowledge, Skills and Experience:

- Post-doctoral experience in a relevant topic.
- Experience in conducting life cycle assessments, in particular for bioenergy systems; experience in using SimaPro is desirable.
- Working knowledge of climate change mitigation measures and an understanding of policy frameworks relevant to bioenergy.
- Excellent numeracy skills and expertise in basic computer packages, including Microsoft Excel.
- Experience of working with academic partners in other disciplines and conducting multidisciplinary research.
- Experience of stakeholder engagement on different levels including industry, institutions and policy making for the purpose of gathering inventory data.

Information about the School:

Tyndall Manchester conducts interdisciplinary research in the fields of energy, decarbonisation and climate change mitigation. Based in the School of Mechanical, Aerospace and Civil Engineering, Tyndall Manchester also enjoys excellent links to departments across the University including the School of Chemical Engineering and Analytical Science, the School of Electronic and Electrical Engineering and the Dalton Nuclear Institute.

The post holder will be part of the Tyndall Manchester team, which brings together engineers, scientists, social scientists and economists, working together to develop sustainable responses to climate change through trans-disciplinary research and dialogue at a local and national level. The post will provide the researcher with a direct link to the Tyndall community, the various

Tyndall projects and allow the researcher to be part of a supportive team within the University of Manchester. It will also provide the researcher with a direct link to the Supergen Bioenergy Hub.

Further background information about the project/post:

FAB-GGR is a project funded by NERC, as part of a £8.3 million [Greenhouse Gas Removal Research Programme](#), which will evaluate the potential and wider implications of a variety of options for large-scale removal of greenhouse gases. The interdisciplinary research team is led by the University of East Anglia; the other partner institutions are the University of Exeter and the University of Aberdeen with support from project partners at the Met Office. The project objectives are to a) assess the nature and requirements of afforestation and BECCS supply chains that achieve global net greenhouse gas removal levels of 1 GtCO₂/yr and 10 GtCO₂/yr respectively and b) explore the real world feasibility of these 1 GtCO₂/yr and 10 GtCO₂/yr supply chains, by evaluating their associated wider consequential environmental, technical, economic, policy and societal implications and trade-offs. This post will also have an emphasis on processing modelling, physical science and engineering, but the successful candidate will be expected to have an interdisciplinary outlook, as well as being an excellent communicator, as data is required from project partners and beyond. Further information about FAB-GGR can be found here: <http://www.tyndall.ac.uk/FAB-GGR>

RTCoG is one of the projects funded by the EPSRC under the Supergen Bioenergy Hub 2nd Challenge call. This project joins together with Universities of Glasgow, Aston and Aberystwyth to address challenges associated with biomass gasification deployment. This post will also have an emphasis on processing modelling, physical science and engineering as well as techno-economics, but the successful candidate will be expected to have an interdisciplinary outlook, as well as being an excellent communicator, as data is required from project partners and beyond. Further information about RTCoG can be found here:

<http://www.supergen-bioenergy.net/research-projects/real-time-control-gasifiers/>