

UKRI Policy Fellowships 2023: Fellowship Opportunity Description

Fellowship Title: BEIS Nature based Anaerobic Digester Solutions Fellowship

Host Organisation: [Department for Business, Energy and Industrial Strategy](#)

Host Team: The Energy Research Team (ERT) within the Science and Innovation for Climate and Energy (SICE) Directorate.

Summary: Opportunity to utilise biological science skills to research whole systems impacts of nature-based solutions to methane leakage in anaerobic digester medium storage and clarify policy on fugitive emissions abatement.

Fellowship Theme: Building a Green Future. *Please see the full call text 'What We Are Looking For' for a detailed summary of the research themes targeted in this call.*

Policy Topic: Net Zero.

Research Council: BBSRC

Academic Discipline/s: Microbiology, bioprocessing and bioenergy (with particular relevance to anaerobic digestion)

Research Career Stage: The opportunity is open to both early and mid-career researchers.

Fellowship Structure

Inception Phase:

Estimated Start Date: October 2023. *Exact date to be confirmed by the host depending on onboarding and security clearance requirements*

Duration: 3 months

FTE: 0.4 FTE

Main Placement Phase:

Duration: 12 months

FTE: 0.6-1 FTE

Knowledge Exchange Phase:

Duration: 3 months

FTE: 0.4 FTE

Work Arrangements

Location Requirements: Based in London, Edinburgh, Salford, Cardiff, Birmingham, or Aberdeen. If outside London, occasional trips to London will be required. Eligible travel & subsistence costs are supported in the main UKRI grant. Please see full call text and guidance for more details.

Hybrid Working: We require this role to attend the office for a minimum of 40% of their time.

Security Clearance: [Basic Personnel Security Standard checks \(BPSS\)](#), usually takes around 6 weeks. We would expect the successful applicant to start the security clearance application process, with support from the host team, as soon as their Fellowship has been confirmed. The security clearance process should be completed before the inception phase begins. See [National security vetting: clearance levels - GOV.UK \(www.gov.uk\)](#).

Fellowship Opportunity Description

Anaerobic digestors (AD) are an increasingly popular method for converting biomass into biogas. Utilising biogas/biomethane from AD can replace natural gas usage and avoid associated emissions. If correctly leveraged this

technology can contribute to the UK Net Zero 2050 target. Additionally, as a domestic source of gas, AD could play a key role in UK energy security.

Anaerobic digestion creates both CO₂ and CH₄ at multiple stages of the process and locations within the plant. Methane leakage from AD plants is particularly concerning due to its high Global Warming Potential (GWP). A small amount of methane leakage (relative to plant biogas production) is all that is necessary for the net negative global warming impact of AD plants to be reversed. Concentrated small leaks are easier to detect and quantify using handheld methods such as IR cameras and bagging techniques. However, large relatively diffuse sources have recently been identified as hard to detect and contributing significantly to overall fugitive leakage emissions.

Examples of diffuse methane sources are feedstock storage and digestate/slurry storage. These sources consist of large bodies of biomass spread over a significant area. Current best practice is covered storage of feedstock and end products. However, due to their large volumes this is a difficult task and is often not completed.

The aim of this research is to investigate the possibility of nature based biological solutions to feedstock and digestate/slurry storage that can reduce the methane emissions from their storage.

The question that we wish to address together with the fellow is whether nature based biological solutions can be an additional tool to treat digestate/slurry with the aim of reducing methane emissions when in storage?

The initial phase of the work will consist of designing the research task alongside the Energy Research Team at BEIS. The Energy Research Team regularly meet with the Biomethane and Clean Heat policy teams. These meeting will embed the policy fellow in the interface between policy and research, allowing them direct access to policy makers and to hear their concerns. Additional interest in this project is likely to come from the Climate Science team which sit within the same directorate as the Energy Research Team. Accounting for and abating methane emissions are a key part of their work.

The ERT will support the researcher in engaging with AD industry bodies such as ADBA, other relevant government departments (DEFRA) and arm's length bodies relevant to the project (Environment Agency and National Farmers). This is an excellent opportunity for the policy fellow to develop their network in both government and industry. Suggested initial activities are desk-based research reviewing the biological processes present in stored feedstock/end products and the literature on nature based/biological options for abatement of methane emissions from this source. Reviewing possible emissions abatement and the policy landscape of the area could be a useful first step for the project.

The following phase of the project is open for co-design with the Energy Research Team based on the literature review and stakeholder engagement feedback. Field trials to measure emissions abatement from treating feedstock/digestate would involve collaborating with organisations with known capabilities in methane measurement (National Physical Laboratory) and AD sites for trials of the technology.

AD reactors rely on biological processes to process biomass feedstock into biogas and other co-products. Plant operators often inoculate feedstock to ensure high biogas yields. This work on feedstock emissions abatement solutions must consider the impact that such treatments would have on digestate biome and digester operation. Laboratory testing of the feedstock before and after anaerobic digestion is suggested as a worthwhile activity. Research into biological abatement treatments on AD yields is an area in which few publications are found to exist.

AD digestate and slurry are increasingly being used to replace fertilisers in farming practices. As any biological additive or modification of these end products (and the feedstock) may alter its biome it is crucial that this research considers the impact of discussed nature-based solutions on the soil biology and microbiome for this use case. Measuring soil biome in locations where treated digestate is utilised as fertiliser is another area where field measurements could constitute original research and provide valuable information to multiple policy areas.

The exact balance of the three areas (emissions abatement, effect on biogas yield and effect on soil biome) is to be determined through co-design of the project between the policy fellow, the Energy Research Team and policy colleagues. Interacting with policy colleagues, understanding their needs and translating them to clear research activities and outputs is a key part of this project.

The desired output of this fellowship to support ERT and policy objectives is desired to be a report on the technological feasibility of nature-based solutions for methane emission abatement and their potential for scaling to be applied to the domestic AD sector.

Person Specification

Applications will be assessed against the following opportunity-specific requirements in addition to the generic eligibility and call criteria.

Essential Criteria:

The chosen candidate must have:

- A proven academic track record in a relevant bioscience field (e.g. microbiology, bioprocessing or similar)
- Strong analytical skills and collaborative spirit
- Proven project management skills and evidence of industry engagement
- The ability to condense qualitative literature data into clear policy recommendations
- Excellent written communication

Desirable Criteria:

Please list the desirable criteria you would like the applicants to meet, in order to be successful for this fellowship.

- Experience with the AD sector
- Insight into UK energy security and biomethane policy context