Research Proposals 2024

This document contains the Research Proposals submitted to the Research Hub in 2024. The perspectives expressed in these proposals do not necessarily reflect the views of the Research Hub.

Proposal 1: *Alternative control growing media for REAL CCS plant response tests*

Description of the proposed work (max. 250 words)
The current REAL CCS plant response test (PRT) compares the growth of tomato plants in a 'control' peat medium against a mixed medium of peat and 'test' compost sample. The optional CCS field bean test, used to detect certain herbicide residues in compost, similarly compares plant growth in peat against a peat and test compost mix. With changes in planning requirements for peat extraction in the Republic of Ireland, and a proposed ban on peat sales for amateur garden use in England in 2024, there is increasing concern from various stakeholders about the long-term availability of peat for these tests. Additionally, the continued use of peat in these tests contributes to the damage of an important natural habitat and carbon sink. Therefore, the purpose of this project is to evaluate and test alternative control growing media for use in the CCS PRTs.
Brief statement of objectives, methodology and intended outcomes:
Objective(s) (max. 60 words)
• Evaluate different growing media (including those made from mixed materials) as potential alternatives to Sphagnum moss peat for use in CCS PRTs • Identify preferred alternative control growing media for the CCS PRTs • Advise changes to the CCS PRT methods and quality control criteria
Methodology (max. 60 words)
• Evaluate potential alternative control growing media (via desk and laboratory/glasshouse research) • Compare growth of Shirley tomato variety and field bean in alternative control media against Sphagnum moss peat • Compare growth of Shirley tomato variety and field bean in alternative control media against test compost samples mixed with the alternative control media.
Aim(s)/outcome(s) (max. 60 words)
• Alternative control growing media identified and suitability demonstrated by laboratory/glasshouse test data • Amended methods and quality control criteria for tests
Relevant Scheme(s): CCS
Benefit(s) to relevant Scheme(s):
Ensure continued usability of the CCS PRT methods. Improve environmental credentials of the scheme through use of peat alternative. Potentially counter increasing test costs.

Proposal 2: *Annual Survey of the Organics Recycling Industry*

Description of the proposed work (max. 250 words)

This project would involve conducting an annual survey of the Composting and AD industries to understand the current state of the industries as well as the changing landscape of the organics recycling sector over time (longitudinal analysis).

The survey would be conducted on an annual basis. Each year, a report presenting a summary of anonymised survey findings would be compiled and published. Over time, this report could include notable trends including areas of consistency or significant changes.

Scope of survey may include details on the following:

- ***Site characteristics:*** Location, contact info; Type of site (e.g., farm vs commercial); CCS/BCS participant
- ***Inputs:*** Quantity, source, cost, and type of inputs (e.g., are compostable materials accepted?); Frequency of rejected loads and reason(s) for rejection
- ***Manufacturing:*** Pre-treatment steps (e.g., shredding, litter picking); Process type/parameters; throughput quantity; post-treatment steps (e.g., bagging, blending); For AD - estimated biogas produced, injected or used onsite
- ***Distribution:*** Distribution distances for finished material; Unit of sale, quantity sold annually, market value of product
- ***Use:*** When, where, how applied; End-market(s)
- ***End-of-life:*** For sites bagging material, any extended producer responsibility for packaging; Disposal route(s) for materials not applied to land
- ***Other:*** Any GHG emissions accounting and/or LCA reporting; common issues experienced (e.g., operational challenges); Expectations about further industry development/expansion and perceived barriers; Views on current/upcoming regulatory/policy developments

This information could be synthesised to draw larger conclusions about the operational capacity of the industry, common practices, direction of development, and overall value of the industry.

Brief statement of objectives, methodology and intended outcomes:

Objective(s) (max. 60 words)

1. To establish a mechanism for collecting key industry information and perspectives on an annual basis.
2. To collect, analyse, and summarise the self-reported characteristics and views of composters and AD operators to produce a comprehensive snapshot of the organics recycling industry.
3. To proactively gather industry information to support future decision-making and R&D work.

Methodology (max. 60 words)

- Identification of all active composting and AD sites in the UK (England, Scotland, Wales, and Northern Ireland)
- Compilation of survey and circulation to all sites (with brief statement of purpose/intent)
- Follow-up with nonresponsive sites (e.g., via phone or direct email) to encourage as much participation as possible.
- Data collation and analysis
- Production of written report

Aim(s)/outcome(s) (max. 60 words)
To enable a nuanced and representative view of industry experiences and perspectives to inform policy, regulatory, and scheme-related developments as well as areas for further Research and Development.
Relevant Scheme(s): **CCS and BCS**
Benefit(s) to relevant Scheme(s):
• Ensure that Scheme Participants' views are consistently and accurately represented in policy, regulatory, and Scheme-related discussions and developments • Improved knowledge sharing – would give scheme participants a view of industry trends, practices, and perspectives (e.g., areas for development, common operational challenges, etc.) • Potential to inform potential areas for future Research Hub projects for the benefit of scheme participants (e.g., the annual report could note common issues/questions and suggest areas for further research for the Research Panel to consider alongside proposals)

Proposal 3: *Do biodegradable plastics fully degrade in commercial compost and anaerobic digestion systems?*

Description of the proposed work (max. 250 words)
Increasingly the contracts to accept green waste and food waste into commercial composting systems and anaerobic digesters specify that these inputs will include biodegradable plastics. Many commercial operators of these systems, in the UK and more widely across western Europe, are finding evidence of large pieces of undegraded biodegradable plastic in their final outputs. The determination of whether a plastic is biodegradable involves a degradation test undertaken in the laboratory under very specific conditions both in terms of ambient temperature (at 58° considerably higher than temperatures experienced in most compost systems and mesophilic anaerobic digesters) and over time periods (12 weeks) considerably longer than the duration of commercial composting or the throughput time of anaerobic digesters (EN 13432 "Requirements for packaging recoverable through composting and biodegradation"). This proposal seeks to investigate in real world conditions (commercial compost and anaerobic digestion sites) the degree to which biodegradable plastics are reduced to <2mm fractions.
Brief statement of objectives, methodology and intended outcomes:
Objective(s) (max. 60 words)
To more fully investigate the nature of the breakdown of a range of biodegradable plastics in commercial composting sites and anaerobic digesters to establish which of these materials are present solely in the <2mm fraction at the end of the process.
Methodology (max. 60 words)
The project will add clearly tagged sheets of a range of biodegradable plastics to normal feedstocks in a number of composting sites and anaerobic digesters and examine the outputs for the presence of these plastics in the final product.
Aim(s)/outcome(s) (max. 60 words)
Provide evidence to regulators of the efficiency of biodegradation of biodegradable plastics and if necessary, require a re-evaluation of the definition of what is meant by biodegradable.
Relevant Scheme(s): CCS and BCS
Benefit(s) to relevant Scheme(s):
As both composting and anaerobic digestion sites are increasingly expected to take on waste in biodegradable plastic bags there is increased chance of these sites failing certification due to the presence of biodegradable plastics in sizes >2mm. It would therefore benefit both schemes to re-evaluate this use of biodegradable plastics.

Proposal 4: *Suitability of AD outputs for use as growing media for production of insect feed/food materials. Suitability of insect farming products and by-products/waste as AD feedstocks.*

Description of the proposed work (max. 250 words)
We are aware of a number of initiatives to develop insect protein feedstocks for use as a feed material and have been approached as potential suppliers of digestate as a growing media for growth of insects as a crop. We are also interested in whether insect crops, and the wastes/by-products from this type of farming might be suitable AD feedstocks in a PAS110 certified plant.
Brief statement of objectives, methodology and intended outcomes:
Objective(s) (max. 60 words)
To carry out an appraisal of the potential for AD operations to contribute towards this developing industry, both with respect to providing a growing media, and as a recipient of product/waste/by product materials as a feedstock. To understand where further areas of research may be needed to generate evidence needed to enable further use of this material.
Methodology (max. 60 words)
Literature review, overview of the regulatory issues relating to production and use of this material. Assessment of the various outputs from a production process of this nature and the suitability of these materials for use in AD. Assessment to include the characteristics of the various potential feedstock stream material to assess suitability as a feedstock and to determine minimal processing or suitability requirements. Trials to see if digestates might be used as a growing media for insect crops.
Aim(s)/outcome(s) (max. 60 words)
Outline of the potential for involvement of AD operations in this area and further evidence that might be needed to extend use of digestate as a growing media in this area (if suitable) and demonstrate suitability of potential feedstocks for input materials to a PAS110 certified AD process. The benefits to operators are that there might be a potential other end use for digestate and that there may be another feedstock material stream that can be accepted.
Relevant Scheme(s): BCS
Benefit(s) to relevant Scheme(s):

Proposal 5: *Appraisal of the necessity for pasteurisation in different AD processes for production of quality digestate.*

Description of the proposed work (max. 250 words)
The PAS110 standard requires all operators to carry out a pasteurisation step. This is applied even in instances where a plant does not operate under an APHA approval and as such there is no statutory requirement for pasteurisation under the ABP regulations. There is existing research that demonstrates that a range of pathogens are eliminated in the mesophyllic AD process alone regardless of any additional pasteurisation step. We would suggest further evaluation of this area to see if there are instance where quality digestate can be produced without the need for a pasteurisation step to be applied.
Brief statement of objectives, methodology and intended outcomes:
Objective(s) (max. 60 words)
Evaluate the evidence that is available to demonstrate that relevant pathogens are eliminated during mesophyllic AD. To determine whether there are instance where the objectives of a process of production for quality digestate can be maintained and quality digestate produced without use of a pasteurisation step. To determine any key controls or aspects that would need to be applied for an AD process to produce quality digestate without a pasteurisation step (e.g. minimum retention time, specified feedstock types only, specified end use controls etc). This is with a view to supporting any standard for operators of farm based plants without pasteurisers to achieve PAS110 certification.
Methodology (max. 60 words)
Literature review. Review of digestates produced in plants that don't need an APHA approval that are certified to see if there are significant differences in the quality of digestate after AD treatment only vs after AD treatment and pasteurisation. Specific issues will be viable plant and animal diseases, whether there might be different levels of risk relating to different feedstocks and different AD process parameters.
Aim(s)/outcome(s) (max. 60 words)
A view on whether there might be circumstances where a pasteurisation step is not deemed necessary to produce quality digestate, and what controls or constraints might need to be applied to operations that might be exempt from use of the pasteurisation step to allow certification. Whether there are any benefits to digestate quality that might arise from not applying the pasteurisation process. The benefits of this may be to operators of farm-based plants that do not have pasteurisation units, and may need to achieve PAS110 certification in the future to achieve end of waste status.
Relevant Scheme(s): BCS
Benefit(s) to relevant Scheme(s):

Proposal 6: *Appraisal of the impact on digestate quality for digestates with a final screening step, from introduction of a smaller screen size.*

Description of the proposed work (max. 250 words)
The PAS110 standard requires operators to produce digestate that is below stated benchmark thresholds for physical contaminants. These thresholds are likely to be reduced in the near future and operators will need to find ways to continue to achieve compliance with the standard. If this is achieved by installation of replacement more efficient screening techniques, what other impacts are there likely to be on digestate quality of final products on other quality parameters such as N, P, K and dry matter?
Brief statement of objectives, methodology and intended outcomes:
Objective(s) (max. 60 words)
Compare digestate quality of digestates produced by different screening methods to determine the impact of screening to different sizes on digestate quality. Does screening to a smaller size to meet new plastic thresholds also impact on other quality parameters such as dry matter and nutrient content and how significant are any impacts identified?
Methodology (max. 60 words)
Comparison of digestate quality factors of digestates produced by different screening methods. Prepare screened digestate using a range of different screen sizes and types and compare the digestate quality parameters of final digestate. Is there an optimum screen size and methodology of screening that will reduce plastics and retain nutrients?
Aim(s)/outcome(s) (max. 60 words)
To inform the aspects that might change when different screens are used to meet new plastic thresholds. To allow operators to select best technology that will achieve reduction in plastics but also retain nutrient content of final digestate products, and to determine if small changes in screen size are significant or not to other quality parameters other than physical contamiants. To determine if transitions between different screen sizes impact significantly on other digestate quality factors other than physical contaminant with a view to determining if there may be a case to be made that if an operator changes a screen to reduce size, that only the parameter of physical contaminants needs to be re-validated.
Relevant Scheme(s): **BCS**
Benefit(s) to relevant Scheme(s):

Proposal 7: *End of waste case information for digestate derived products*

Description of the proposed work (max. 250 words)
Building on the previous research hub project that looked at digestate processing and digestate valorisation, this project will look at the high commercial readiness products and compile information that could be used in an end of waste case submission and to inform the Quality Protocol revision. Information needed includes: • Information on how the material will be used and in what market(s) • That market or demand exists for such a substance or object – could look at other countries where the technology has been deployed. • The substance or object fulfils the technical requirements for the specific purposes and meets the existing legislation and standards applicable to products • The use of the substance or object will not lead to overall adverse environmental or human health impacts – this could be the completion of a rapid risk assessment for these digestate derived products. In addition to the above the project will identify a relevant comparator, or comparators for each different digestate derived product. The digestate derived products will be compared to the non-waste comparators. A final report will be produced that brings together all of the above information and can be used to inform the revision of the AD QP.
Brief statement of objectives, methodology and intended outcomes:
Objective(s) (max. 60 words)
To research and put together information on digestate derived products, how they can be used, the demand for them and how they compare to a non-waste comparator, that could be used to submit for an end of waste decision from the Environment Agency or to inform the revision of the AD Quality Protocol.
Methodology (max. 60 words)
Build on the information in the digestate valorisation report and for the digestate derived products that are high on the commercial / technological readiness rating, research and pull together the information needed for an end of waste decision. This will focus on assessing market demand, risk assessment and defining a comparator and carrying out a comparison with it.
Aim(s)/outcome(s) (max. 60 words)
To produce a report that will enable digestate derived products to be considered for inclusion in the revision of the AD Quality Protocol.
Relevant Scheme(s): **BCS**
Benefit(s) to relevant Scheme(s):
The end of waste positions (Quality Protocols) are essential for industry and the schemes. Industry is keen for the AD QP to include digestate derived products to enable developments in this area. Having an industry wide agreed position (i.e. the QP) will enable further development of the sector and incentive people to go for certification, rather than individual bespoke EOW agreements with the EA.

Proposal 8: *Monitoring the quality of organic waste arriving at Composting and AD sites and fed into the process.*

Description of the proposed work (max. 250 words)
To undertake physical contaminants (PCs) sampling on a representative number of AD and composting sites, both on wastes delivered – food wastes (FW) and co-mingled food and garden waste streams (FW+GW) and after pre-treatment step(s) for removing such contamination, i.e. at a suitable stage before waste undergoes any biological treatment phase(s). The project has several work packages: 1. To test the protocol REA is revising / developing for sampling and quantifying PC types and levels in FW / FW+GW to ensure the protocol works in practice. 2. To measure PCs types and levels within i) FW and ii) FW+GW streams received at composting and AD sites. 3. To measure the efficacy of front-end technologies / treatment steps, in use at the selected sites, for removing PCs. 4. To calculate the financial costs of extracting PCs and their subsequent management (e.g. supply to EfW or landfill). 5. Collate and anonymise the data and publish in a report including information that can inform upstream and technological solutions to reducing physical contaminants.
Brief statement of objectives, methodology and intended outcomes:
Objective(s) (max. 60 words)
1. To ensure PC sampling is valid 2. To understand challenges operators face in managing physically contaminated FW and FW +GW deliveries and the efficacy of current on-site waste pre-treatment technologies/step 3. To calculate the costs of managing PCs so operators and industry have visibility of such costs and improved capacity to negotiate PC reductions with waste suppliers 4. To propose, if needed, recommendations relevant to regulations, legislation and/or guidelines on contract clauses that control or influence FW and FW+GW waste collection methodologies.
Methodology (max. 60 words)
The project will choose operators using different technologies: wet AD, dry AD, IVC and AD+post AD composting across a representative geographical selection (minimum 8 sites, maximum 16 sites) where sampling will be undertaken at least 3 times on each site over a six-month period. The results will be anonymised to protect operator data and collated, and a report published.
Aim(s)/outcome(s) (max. 60 words)
To have a proven, tested methodology for measuring PCs in FW and FW+GW delivered to AD and composting sites and PCs in such wastes after pre-treatment. The project will: 1. detail which PCs (material types and product formats) in the waste streams are most common and problematic; 2. look at how operators can work with collectors to reduce PCs at source; 3. measure the performance of front-end PC extraction technologies / treatment steps;

4. judge the financial costs of the removal and onward management of PC, giving improved negotiating leverage with collectors;
5. report information that aids future improvement of compost and digestate quality through reduced PCs in the targeted wastes streams and better shared knowledge of the efficacy of in-use pre-treatment technology/steps; and
6. be able to use real life data to propose changes to waste collection methodologies to improve quality of the targeted biowaste types.

Relevant Scheme(s): CCS & BCS

Benefit(s) to relevant Scheme(s):

Visibility of the quality of food and co-mingled food and garden waste deliveries will drive improvements which will in turn reduce costs for operators in extraction and onward management of physical contaminants; reduced quantities of physical contaminants therefore less food waste also extracted with physical contaminants (or fewer resources used for washing, cleaning, pressing and drying them), leading to higher compost and digestate yields; improved quality of outputs as a result of better quality wastes to treat; improved leverage with waste collectors to raise the quality of wastes received; and overall improved financial viability of biowaste treatment operators.