Developing novel soil conditioners and plant fertilisers from waste streams derived from anaerobic digestion and thermal conversion technologies.
The team

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- **Stopford Energy and Environment**
  - Dr Ben Herbert
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- **Aqua Enviro**
  - Dr Paul Lavender

- **James Hutton Institute**
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Overall rationale

- Increase in anaerobic digestion (AD) and thermal conversion bio-energy generation
- Waste streams from these technologies (digestate and ash) typically have limited monetary value
- Potential for increased amounts to be applied to land
- Digestate and ash are rich in complementary nutrients, but currently of limited use
- Finite primary reserves of mineral fertilisers (phosphorus)
- Drivers:-
  - rising pressures on environmental resources
  - landfill taxes
  - waste-minimisation legislation
- Alternative options for waste reuse are increasingly being sought.
Preliminary Studies

Glasshouse trials
Preliminary Studies

Plant Physiology Measurements
Aims of project

This project aims to radically change the way in which biomass energy producers can support a circular economy. This will be achieved through utilising bio-energy waste streams to develop soil conditioners and plant fertilisers, facilitating new ways to mesh commercial ideas with positive environmental benefits.

1) Assess the environmental impacts of applying a waste derived product to land

2) Optimize a novel soil conditioning material derived from mixtures of bio-energy waste (ash and digestate)

3) Close the nutrient cycle and ensure food security
Catalyst phase - outcomes

• Database of those working in sector
• Two workshops to the sector on the background and development of the project
  - identification of key issues/areas requiring research
  - a consortium to take project forward
• Submission of a position paper to Environment International
• Writing and submission of full grant proposal to NERC
Plans for next 3 years

- **Work Package 1 (4 months)**
  - To characterise the digestates, ashes and blended putative soil amendments collected and transported to Lancaster for use in glasshouse trials.

- **Work Package 2 (8 months)**
  a) To assess the impact of amendments on physicochemical properties, leachate quality and greenhouse gas emissions
  b) To characterise the non-nutritional impact of amendments on plant growth
  c) To quantify the impact of amendments on plant growth, nutrient uptake and interactions with soil nutrient cycling
  d) To characterise the impact of amendments on the subsurface function of soils
Plans for next 3 years

• Work Package 3 (24 months)
  ➢ To assess the performance of selected soil amendments under field conditions

• Work Package 4 (3 months)
  ➢ To consider the legislative requirements surrounding the application of putative soil amendments in agriculture
The vision

• Widespread adoption of this technology
• A sustainable substitute for conventional chemical fertilisers
• Reduction in the carbon footprint of the agrochemical industry
• Underpin the long-term commercial viability of the biomass to energy sector by monetising sector derived waste streams
• Utilisation of growing waste streams of biomass by-products to promote the growth of crops
• Close the production loop for biomass to energy generation enabling a cradle to grave approach
Outcomes

• A sustainable substitute for conventional chemical fertilizers

• Significant reductions in the carbon footprint of the agrochemical industry.

• Closing of the production loop for biomass to energy generation enabling a cradle to cradle approach.