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Biomass Gasification and Anaerobic Digestion Hybrid System

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1 Rationale

Utilise all available resource of both woody and non-woody biowaste at a local scale .
Provide sustainable community energy.
Stimulate rural enterprise.

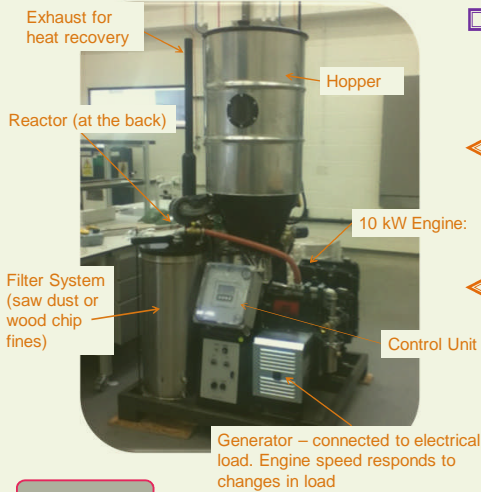
Explore beneficial synergies between the two technologies and communities.
Showcase technologies and provide proof of concept

Estimated annual resource quantities:

- 4.1 million tonnes of wood waste in the UK goes to landfill¹. Much more is left to decompose where felled.
- 80 million tonnes of food, manure and liquid waste available in the UK².
- 4.5 million households in “fuel poverty” in the UK - A 125% increase since 2002³.



Downdraft Gasification



Research

- Gasifier experimentation with different biomass feedstocks.
- Biomass reaction kinetics.
- System performance for ease of use.
- Char analysis including plant growth experiments.
- Novel waste textile and torrefied pellet gasification.
- Socio-economic appraisal.
- Waste as effective tar filter media

2 Hybrid system

Waste heat leaves gasifier engine exhaust and supplies process heat to anaerobic digesters

Digestate made into gasifier feedstock briquettes

Hybrid system able to accept all rural biomass waste



Research

- Heat transfer engineering
- Briquette manufacture
- Heat store/control system.
- Producer gas for greenhouse air enrichment

Anaerobic Digestion

Research

- Assessment of digestate for combustion and gasification potential
 - Ash fusion
 - Reaction kinetics
 - Elemental analysis
- Digestate soil fertiliser experimentation
- Gas boiler for heating



Demonstration sites

- Sutton Bonington, UK
- Tezpur and Bangalore, India.



3 Potential Community Benefits

- Reduces transportation energy and costs
- Sustainable mechanical power
- Sustainable electricity
- Minimise waste
- Community empowerment
- Sustainable heat
- By products for soil fertilisation
- Stimulate local bio-economies
- Synergistic technology benefits

1. Department for Environment Food and Rural Affairs, 2012, Wood waste landfill restrictions in England call for evidence, 2012, DEFRA: London
2. H.M. Government, Annual Report on Fuel Poverty Statistics 2013, Department of Energy and Climate Change: London
3. Waste or resource? Stimulating a bioeconomy, 2014. House of Lords Science and Technology Committee, 3rd Report of Session 2013-2014. London: H.M. Stationary Office.

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