Providing energy for rural Indian communities: anaerobic digestion at Loughborough University

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Rural Hybrid Energy Enterprise Systems (RHEES) is a research partnership between 6 UK and 7 Indian Universities. The aim of this project is to develop best practice at a smaller community scale which makes use of hybrid and combinations of biofuels. The idea is to improve rural energy availability, equity of cost and to generate an economic stimulus from the desire to provide greater energy security and reduced environmental impact.

Our part of the project is AD and here we describe the typical Assam design. We summarise how a novel gas monitoring device for remotely controlled, autonomous monitoring of AD might avoid shock loadings from heterogeneous feedstocks.

**CASE STUDY**

Why is AD beneficial for Indian communities?
- Remote un-electrified rural areas
- The digestate can be used as a fertilizer
- Biogas burners more efficient than burning wood or dung
- Reduced health risk with less smoke pollution from biogas
- Potential for biomass resources (domestic waste, animal and agro-residues)
- Opportunity for energy crop plantation in unused lands
- Small scale reactors would provide cooking/heating energy and bring immediate improvement of quality of life for rural communities
- Type of Digester: Deenbandhu model Dimension: 3 m³

**SENSING/MONITORING**
- Aiming for autonomous remote monitoring of: CH₄, CO₂, O₂, pressure, temperature, H₂S
- Using autonomous wireless gas sensing platforms- reliable long term performance and reduction in component cost
- The data to be sent to the cloud via GSM transmissions, and will be accessible via an online portal for remote monitoring by the facility management
- CO₂ and CH₄ sensing: high-accuracy infrared absorbance sensors,
- Pressure sensing: piezoelectric sensors (critical for understanding gas flows)
- Autonomous operation is achieved by custom-programmed microcontroller circuitry, which also manages data logging and remote transmission (GSM communications)
- Hybrid solar thermal heating of the digesters

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