

Energy for the Future

Advanced microwave technologies developed by LJMU researchers provide UK and international markets with alternative high-efficiency and sustainable energy sources that have real environmental benefits.

The demand for biofuels and alternative energies is increasing globally as a sustainable source of energy is sought for the future. Researchers from the Built Environment and Sustainable Technologies Research Institute have developed novel microwave systems that convert waste into energy at a significantly higher output than conventional thermal heating methods and in the process of doing this, also divert waste away from landfill.

The microwave plasma gasification technology has attracted considerable attention from a range of industries both nationally and on an international level. Examples include the production of biodiesel from waste oil, bioethanol production from low-grade biomass, and the development of a mobile gasification system.

Research supported by the Technology Strategy Board (TSB) not only demonstrated how microwaves could be used for biodiesel production, significantly improving the efficiency of the process (reducing the time, energy and solvents used) but that the system can process a broader range of highly degraded bio-oil feedstock than conventional systems.

Low-grade biomass material such as grass was typically broken-down to bioethanol by a steam explosion method. BEST research, in collaboration with international partners including Biofuel Wales Ltd. and funded by the European Commission Framework 7 programme, demonstrated instead, that an advanced microwave reactor provided an effective, low energy alternative that was less reliant on additional chemicals.

BEST researchers have also considered an alternative to using biofuels as an energy source. The development of a mobile gasification system fulfils a dual purpose: energy production and waste processing. An industrial pre-market demonstrator supported by funding from the TSB is under development for the treatment of sludge waste.

The project has created and safe-guarded ten manufacturing jobs and follows successful testing and evaluation with industry partner Stopford Projects Ltd.

“... results on the use of microwave plasma have proven the way forward in delivery of a niche and efficient way of developing a new compact and mobile gasifier; such capability currently cannot be achieved via traditional means.”

Research and Innovations Manager