

PROJECT FACTS

UNIVERSITY OF KENTUCKY CENTER FOR APPLIED ENERGY RESEARCH

PARTICIPANTS

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2540 Research Park Dr.
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SPONSORS

Kentucky Energy Cabinet

PROJECT VALUE

\$100,000

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POWER GENERATION & UTILITY FUELS

Resolution of the Technical Obstacles Impeding Commercial Production of Briquetted Fuels from Coal And Biomass Wastes

Despite advantages of sustainability, low emissions of SO_x, NO_x, and mercury, and neutrality with respect to CO₂ emissions, biopower accounts for less than 1% of the electricity generated in the U.S. This low rate of utilization is due to a low energy density, making transport expensive, as well as to the significant capital investment needed to utilize biomass directly for power generation. Co-firing biomass with cleaned waste coal is a practical and economical way to generate electric power from biomass at a significant scale. Similar to biomass, utilization of fine waste coal is hindered by obstacles associated with handling, storage, and transportation that stem mostly from a high and expensive-to-remove moisture content. Manufacturing a high-quality briquetted fuel from coal and biomass can improve the marketability of both materials by providing a reduced-moisture product that can be transported as dense, free-flowing solids and then stored, crushed, and conveyed in existing equipment.

Prior work at the UK CAER demonstrated that high-quality briquettes can be produced from a combination of sawdust and fine waste coal at an estimated cost of \$17/ton. While the investigation demonstrated that coal and timber wastes can be economically converted into a premium fuel, the study failed to resolve a major technical obstacle. Namely, that due to poor flow properties, the fine coal/sawdust blends could not be uniformly fed to a continuous briquetter, resulting in frequent run stoppages and variable quality briquettes. Accordingly, this project focused on resolving this major impediment to commercial production of fine coal/biomass briquettes. Two methods were identified that resolved the non-uniform feed issues; 1) processing of larger-particle-size coal fines and 2) pelletization of the wet fines in a pan pelletizer prior to briquetting. This latter approach not only provided improved flow properties but offered a means of drying the fine coal prior to briquetting in a conveyed bed drier as opposed to a fluidized bed drier, thereby offering a more convenient and less problematic means to dry the coal fines. The study also revealed that biomass types other than sawdust, including wheat straw, fescue, switchgrass, and corn stover, yielded coal-biomass briquettes that were superior in quality to those made with fine coal and sawdust.