PROJECT FACTS

UNIVERSITY OF KENTUCKY
CENTER FOR APPLIED ENERGY RESEARCH

Premium Fuel Production from Mining and Timber Waste Using Advanced Separation and Pelletizing Technologies

PARTICIPANTS

UK Center for Applied Energy Research
UK Dept. of Mining Engr.
James River Coal
H & S Lumber
Pine Mountain Lumber
Complete 10/10/05

SPONSORS

US Department of Energy
State Industries of the Future Program

PROJECT VALUE

DOE Cost: $505,537
Industry: $42,800
UK: $125,983

CONTACT

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Due to high recovery costs and problems associated with transport and handling, vast quantities of fine, high-quality carbon material have accumulated in Kentucky's slurry impoundments. Estimates indicate that over 500 million tons of fine-coal refuse have been stored with approximately 3 million tons added each year. The fine coal being discarded represents not only a loss of a valuable energy resource, but potentially poses serious health and safety concerns as there have been incidents in which impoundments constructed to contain these wastes have failed, sometimes catastrophically.

Similarly, due to the lack of economical alternatives, sawdust is often disposed as a waste by-product by the timber industry. In 1997, the amount of sawdust generated in Kentucky was 35 million cubic feet or about 12% of the total harvest. Nearly 47% of the sawdust was used as an industrial fuel while the remainder was discarded despite the public's growing demand for green energy production.

The goal of the Premium Fuels Project was to economically convert the waste materials created by the coal and timber industries into easily-transported, low-moisture, high-energy-value briquettes. The project is complete with a number of significant accomplishments including:

- Moisture reductions to ~20% were achieved for the fine coal using advanced filtration techniques.
- Based on relative performance, the most cost-effective binders were identified from a list of over 50 tested formulations.
- Two of the most cost-effective binder formulations tested were developed during the project.
- Durable briquettes, exhibiting greater than 14,000 btu/lb, were produced from blends of 10% sawdust and 90% coal fines at a binder addition rate of $8/ton.
- The optimum blending ratio for obtaining the maximum briquette packing efficiency from mixtures of spiral and fine-coal-product streams was determined.
- The impact of a number of briquetting parameters on the physical properties of the briquettes was reported.
- Three larger-scale combustion tests of briquettes prepared from blends of fine coal and sawdust were completed. No difficulties were encountered during these tests. The test results indicated that the combustion properties of the three briquetted samples were similar with the exception that one of the formulations burned much more rapidly and with a significantly higher level of bed burnout relative to a control sample of binderless briquettes.