

Developing Engineered Fuel (Briquettes) Using Flyash and Biomass

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Objective:

The objective of this research is to explore the feasibility of producing engineered fuels from a combination of renewable and non renewable energy sources. The components are flyash (containing coal fines) and locally available biomass waste. The constraints were such that no other binder additives were to be added.

Accomplishments

1. Determination of the carbon content of the flyash sample from the Aquila plant. It was found to be around 43%.
2. Experiments were carried out using a model which simulates the press process of a wood pellet machine, i.e. a bench press machine with a close chamber, to find out the ideal ratio of wood and fly ash to be mixed to get the desired briquette. The ideal ratio was found to have 60% wood and 40% flyash.
3. The moisture content required to produce the briquettes was found to be anything below 5.8%.
4. The most suitable pressure required to extract the lignin from the wood and cause the binding of the mixture was determined to be 3000psi. At this pressure, the briquettes withstood an average of 150psi on its lateral side.
5. An energy content analysis was performed and the BTU content was determined to be approximately 8912 BTU/lb.
6. The environmental analysis was carried out and no abnormalities were noted.
7. Industrial visits were made to pellet manufacturing plants to investigate the most suitable manufacturing process for the briquettes.

8. A simulation model of extrusion process was developed to explore the possibility of using a cattle feed plant operating on extrusion process to produce briquettes.

Future work:

- evaluate the technical viability of producing large quantities of briquettes consistently from fly ash and sawdust.

-Soon, the research team will conduct a trial production run at a Feed Mill in La Junta, CO to produce two (2) tons of briquettes using an extrusion process.

-Immediately after producing the briquettes, these briquettes will be sent through Aquila's current system to test the ability of the briquettes to flow through the system without requiring any equipment or process changes.

-An economic analysis of a production facility manufacturing such briquettes would be conducted to determine the economic viability of the project

- A precise energy impact (energy consumed to produce the briquettes versus the energy content of the briquettes produced) shall be calculated.

Papers Published:

None so far. One student is in process of writing his thesis on this work.