

PROJECT facts

U.S. DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY
NATIONAL ENERGY TECHNOLOGY LABORATORY

Environmental & Water
Resources

07/2005



ENVIRONMENTALLY SAFE, LARGE VOLUME UTILIZATION APPLICATIONS FOR COAL GASIFICATION BYPRODUCTS

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PARTNERS

**Center for Applied
Energy Research**
Lexington, KY
Eastman Chemical
Kingsport, TN
Tampa Electric-Polk Station
Mulberry, FL



Description

Objective

The objective of the project is to evaluate large volume utilization options for gasifier slag produced by the Eastman Chemical gasifier, in Kingsport, Tennessee and TECO's Polk Station in Mulberry, Florida. Each material will be characterized and beneficiated into 3 distinct products: frit, coarse carbon and fines. The beneficiated products will then be evaluated for large volume and higher-value utilization options to enable total utilization and potentially eliminate the need for by-product storage. Products will be tested for leaching potential to ensure the environmental safety of the uses.

Background

The use of coal gasification to produce power or chemicals and fuels will increase in the U.S. in the next few years, due to its inherent energy and environmental efficiencies. The rate of increase is not known, but even under slow growth models, the amount of solid by-products from these technologies will rise from hundreds of thousands to millions of tons per year within the next decade. If the objective of "zero emissions" from coal gasification is to be realized, the utilization and environmental safety of the solid by-products from gasification technologies in large volume applications must be addressed and developed early. This is the focus of the project.

The creditable demonstration of large volume utilization of gasification by-products requires a reasonable scale of research by a qualified research team. The project entails experiments that employ many practical demonstrations.

Summary

There are four components of the project that are necessary for the successful development of large volume gasification by-product utilization applications. These are: thorough characterization, the separation and concentration of the individual components of the slag (i.e. carbon and vitreous frit); the demonstration of the important uses for these materials; and finally, successfully overcoming environmental barriers to specific uses.

COST

Total Project Value

\$341,680

DOE/Non-DOE Share

\$199,493 / \$142,187

PERIOD OF PERFORMANCE

October 2004 to
September 2006

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Accomplishments

Representative samples of gasifier byproducts have been collected from both TECO and Eastman. Characterization of both samples has been completed, which identified the specific sizes where partitioning of the potential product streams occurs. For samples from both gasifiers, a vitreous slag component is concentrated in the size fraction coarser than 850 microns (20 mesh) while the material finer than 20 mesh but coarser than 150 microns (100 mesh) is enriched in carbon. Material finer than 150 microns is comprised of both ash and carbon.

A bulk sample from the TECO gasifier has been prepared in order to conduct testing to assess the feasibility of utilization options. The bulk sample has been thoroughly characterized and laboratory-scale testing is in progress, focusing on the use of the slag as a pozzolan.

Planned Activities

A bulk sample from the Eastman Chemical gasifier will be prepared and testing will be initiated to evaluate utilization options on this substrate. Carbon-enriched material will be prepared and submitted to Eastman for evaluation as recycle fuel while the vitreous slag will be evaluated for potential uses.