

# PROJECT facts

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

Environmental & Water  
Resources

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## PILOT DEMONSTRATION OF TECHNOLOGY FOR THE PRODUCTION OF HIGH VALUE MATERIALS FROM THE ULTRA FINE (PM 2.5) FRACTION OF COAL COMBUSTION ASH

### CONTACTS

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### PARTNERS

**Center for Applied Energy  
Research**  
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**Louisville Gas & Electric**  
Louisville, KY



### Description

#### Objective

The objective of the project is to develop and demonstrate technology to make new products from coal combustion ash. In this pilot demonstration, the finest size ash fractions are recovered for use as polymer filler or as a specialized high value cement additive.

#### Background

Pulverized coal combustion produces 62 million tons of fly ash annually, of which about 32% is utilized beneficially. Even if all of the current conventional applications were completely saturated, there still would be more than 1/3 left to landfill. To substantially improve beneficial use and meet the U.S. DOE stated long term goals, new applications and markets must be found. One application with great potential is as filler for use in plastics. For this however, the fly ash must be cleaned of residual carbon, magnetite and soluble salts, and the finest fraction of the ash separated and recovered.

### Summary

A mobile pilot plant will be built to demonstrate technology (MicroAsh) to produce new high value products from coal ash. The approach used is to remove all of the contaminants from the ash hydraulically, including the carbon, magnetite, and soluble salts. The ash is then conditioned with a patented organic deflocculating reagent and the finest fraction is recovered. The technology achieves high recovery in the 1 $\mu$ m to 2 $\mu$ m size range, with a mean product size ( $D_{50}$ ) of approximately 3-4 $\mu$ m. The project includes an assessment of ash from Louisville Gas & Electric six largest power plants relative to suitability for processing. The focus of the pilot/demonstration plant operation will be to provide process data, options for dewatering and drying, and, most importantly, materials for testing in polymer and cement systems.

## **COST**

**Total Project Value**  
\$1,593,564

**DOE/Non-DOE Share**  
\$791,441 / \$802,123

## **PERIOD OF PERFORMANCE**

July 2003 to  
October 2006

## **ADDRESS**

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## **Accomplishments**

Tests procedures and protocols were developed to evaluate the amount of organic dispersant that was required for each of the ash types. Six different fly ashes were fully evaluated and characterized chemically and physically. A numerical model was developed for the hydraulic classification and a new unique hydraulic classifier was developed for this application. A design of the mobile pilot plant has been developed.

## **Planned Activities**

Dispersion testing on fly ash candidate substrates is in progress. A reproducible, batch-scale dispersion test has been developed and is in use to determine adsorption and dispersion properties of ultra-fine ash particles, while a pilot-scale continuous classifier has been designed, constructed, and is being tested. Evaluations of process modeling software also are in progress. Construction of the mobile processing plant will be initiated.

## **Issues**

Another utility has shown interest in joining the study. As the ashes from two of the power plants that were initially examined were of such poor quality, it may be advisable to add additional plants to the test series. This would also increase the number of participants in the study.