

PROJECT facts

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



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PARTICIPANT

University of Kentucky Research
Foundation – Center for Applied
Energy Research
Lexington, KY



Clean Coal Power
Initiative (CCPI)

12/2006

ADVANCED MULTI-PRODUCT COAL UTILIZATION BY-PRODUCT PROCESSING PLANT

Project Description

The University of Kentucky Research Foundation (UKRF) of Lexington, Kentucky, in partnership with CEMEX USA and Kentucky Utilities (KU), a subsidiary of Louisville Gas and Electric Corporation (LG&E) of Louisville, Kentucky, will design, construct, and demonstrate an advanced coal-ash beneficiation plant to be sited at KU's 2,200 MW Ghent Power Station in Ghent, Kentucky.

By addressing the entire coal utilization by-product (CUB) stream to generate a variety of useful products, this plant will demonstrate the next generation in CUB beneficiation.

The process, based on hydraulic classification and froth flotation technology developed at the University of Kentucky Center for Applied Energy Research, will use coal by-products to make the following:

- A commercial product called pozzolan that can replace up to 30 percent of the Portland cement used to make concrete, achieving better strength and performance than unprocessed ash.
- A beneficiated coarse ash that can be used to produce a lightweight aggregate suitable for use in concrete masonry units, such as blocks, or which can be used as graded fill-sand for construction applications.
- A supplemental fuel product that can be made from concentrated, unburned carbon.
- A polymer filler or specialized pozzolan that can be made from very fine-sized material (~3 to 4 μm median particle size)



Ghent Power Station

ADDITIONAL TEAM MEMBERS

LG&E Energy Corp.
Kentucky Utilities (collaborator)
CEMEX USA (collaborator)

LOCATION

Kentucky Utilities
Ghent Power Station
Ghent, Carroll County, KY

ESTIMATED PROJECT DURATION

56 months

COST

Total Estimated Cost
\$8,979,544

DOE/Non-DOE Share
\$4,480,793 / \$4,498,751

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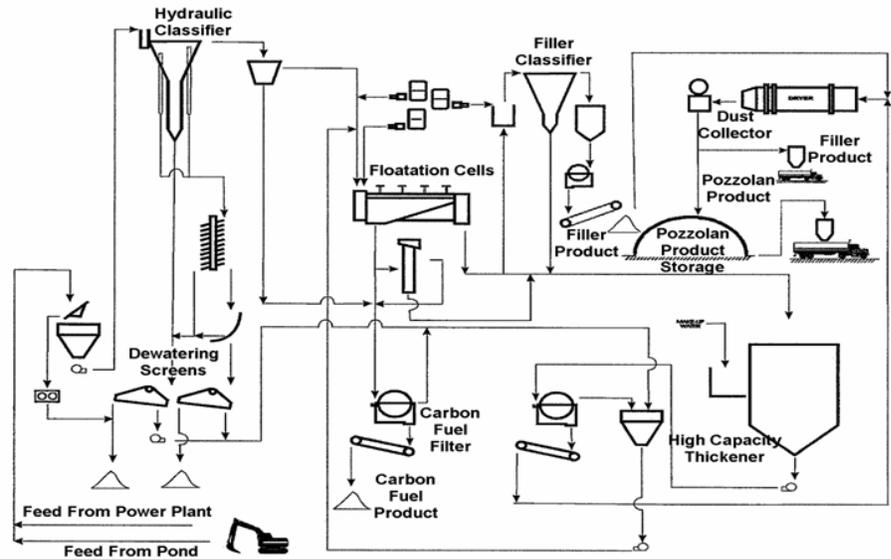
CUSTOMER SERVICE

1-800-553-7681

WEBSITE

www.netl.doe.gov

Overall, the project targets total CUB utilization by using it to generate high-value products with consistent quality. The project concept is depicted in the following figure:



CUB Processing Plant

Benefits

Throughout the United States, many coal-fired power plants utilize ash-settling ponds and in many cases are required to pay for offsite landfill disposal. This project makes use of all of the CUBs from a plant to produce saleable and valued products. Finding a beneficial use for these materials will reduce and potentially eliminate the need for creating new ash settling ponds at coal-fired power plants and will extend the life of existing ponds.

Another important benefit associated with this project is that the 156,000 tons per year of high-quality pozzolan to be produced from coal by-products will displace an equivalent amount of Portland cement. Manufacturing each ton of Portland cement results in release of approximately 1 ton of CO₂, or about 47 million tons per year of CO₂ in the United States, making it one of the highest generators of CO₂ of any industrial process. Therefore, utilization of existing coal ash to replace cement offers a new pathway for reducing CO₂, a greenhouse gas.