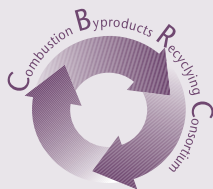


Project Facts



Promoting and supporting the commercially viable and environmentally sound recycling of coal combustion byproducts for productive uses through scientific research, development, and field testing.



Department of Energy
National Energy Technology
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Illinois State
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University of Illinois-
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Colonial Brick Company
Cinergy PSI's Cayuga Power
Generation Station (CPSIC)
Indiana Geological Survey

CBRC Project No:
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Manufacturing Fired Bricks with Class F Fly Ash from Illinois Basin Coals

Project Objectives

- Assess the technical, economic, and environmental suitability of fly ash for commercial production of fired bricks
- Conduct a public outreach campaign to promote the use of similar fly ash from other adequate sources by brick producers

Background

Researchers at the Illinois State Geological Survey/University of Illinois are working with brick manufacturers to develop high quality and marketable brick products that use high volumes of Class F fly ash generated from burning Illinois coals. In this fired brick-making process, fly ash is used as a raw material to substitute for a part of the clay and shale, which are the two main raw materials of a conventional brick. Test bricks produced so far have met or exceeded ASTM commercial specification.

Description

More than six million tons of Class F fly ash are generated from burning about 100 million tons of Illinois basin coal each year. Most of this fly ash is ponded or landfilled and is readily available for making fired brick. Nevertheless, until the brick industry gains more confidence in using fly ash as a raw material for brick production, evaluation and testing will be needed on a case-by-case basis. Researchers will determine if the Class F fly ash produced by Cinergy PSI's Cayuga Power Generation Station is a viable raw material for brick production at Colonial Brick Company, a brick plant in Indiana near the Illinois border.

Project tasks include: sample acquisition; characterization of raw materials, intermediates, and final products; production of commercial-size green bricks; evaluation of preliminary in-plant firing; commercial-scale production; economic assessment; and an environmental feasibility study.

Preliminary Results and Status

Researchers at the Illinois State Geological Survey (ISGS) bench-scale facility made 24 commercial-size green paving bricks containing fly ash at 10, 20, and 30 wt% balanced with clay and shale material. Next, they fired a set of these mold-pressed green bricks using the ISGS kiln. Researchers also fired another set of these mold-pressed green paving bricks at the brick plant as part of a commercial firing. This preliminary in-plant firing also produced high-quality, attractive, and strong paving bricks.

The brick plant conducted two commercial-scale production test runs (2,000 bricks per run—including extrusion and firing). Run I produced paving bricks with raw material containing 20 vol% (about 14 wt%) fly ash balanced with 80 vol% of the shale material. Run II was similarly composed of a mix of fly

ash, shale, and clay (20 vol% fly ash, 60 vol% shale, and 20 vol% clay). These runs also produced high-quality paving bricks. The engineering properties of these bricks either met or exceeded ASTM standards for commercial application. For example, their compressive strength was three times greater than the minimum allowable strength.

Researchers will produce additional paving bricks at the bench-scale facility with a greater input of fly ash (40 and 50 wt%). In addition, they will initiate tests for the production of building bricks containing fly ash.



Mold-pressed paving bricks produced at the Illinois State Geological Survey bench-scale facility before (A) and after firing (B).



Two thousand paving bricks with fly ash from commercial scale-up production (Run II).