

# Optimization and Economic Evaluation of Coal Fly Ash Reuse in New Synthetic Lightweight Aggregates

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## ABSTRACT

The field of industrial ecology involves the evaluation and optimization of industrial systems so as to minimize their raw material use and waste generation which can be accomplished by the reuse/recycling of waste materials. Recent work highlights the development of a synthetic lightweight aggregate from two such waste materials: coal fly ash and recycled high density polyethylene (HDPE).

This paper presents the current status of on-going research evaluating factors which effect the reuse/recycling of coal combustion by-products and waste plastics. The broad research aim is to analyze both the direct and indirect economic impacts, and specifically investigate how the optimization of production activities changes when post-process wastes are re-categorized as a raw material for the production of another product (synthetic aggregates). The research plan is divided into two tasks. Task one is examining the existing economic and optimization structure of industries with a focus on the production and uses of coal and plastic as well as the production and use of lightweight aggregates. This task will also examine the synthetic aggregate in terms of the costs associated with the procurement of waste fly ash and plastics and aggregate production equipment, operation and maintenance, labor, and product marketing. Task two involves the development of a general input-output (I/O) model, utilizing computable general equilibrium (CGE's) modeling techniques to evaluate the economic impact of technological innovations arising from the utilization of coal fly ash and waste HDPE.