Coal Combustion Products: A Materials Flow Model

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ABSTRACT

Materials are essential in meeting our most fundamental needs – food and shelter—and to maintain and improve our standard of living. Materials processing requires significant amounts of energy. One of the most versatile and, therefore, desirable forms of energy is electricity. Electricity accounts for more than one third of the total energy consumption in the United States, and more than half of the nations' electricity is produced by burning coal. During 1998 approximately one billion tons of coal was burned by electric utilities. As a result, more than 100 million tons of coal combustion products (CCPs) were generated. As such, CCPs rank behind only sand and gravel and crushed stone, as a produced 'mineral commodity' and rank ahead of portland cement and iron ore. Understanding the system of materials flow, from source to ultimate disposition, can help management and use of our natural resources and protect the environment. This study traces the flow of CCPs from the point of coal mining through their many applications as viable mineral commodities. Analysis tools such as life cycle assessment (LCA) are now used to provide quantitative scientific analysis of industrial systems. A study using LCA compared a coal fly ash highway embankment to a soil embankment showed fly ash to be superior with respect to raw materials consumed and landfill space conserved. Other material flows through coal burning electric utilities will also be analyzed.