



Coal Ash & Concrete

Using coal ash in concrete is nothing new. The Romans used volcanic ash in their spectacular construction projects long before the introduction of portland cement, having discovered its value as a hardening agent when mixed with lime. The ancient Romans used volcanic ash as an admix to erect buildings such as the Pantheon and Coliseum, roads, and aqueducts.

Fly ash concrete was first used in the U.S. in the 1920s for dam construction, when engineers found that it reduced the total cement requirement. **Today, as more projects seek LEED certification, ash is resurfacing as a popular environmentally-friendly alternative to portland cement. No longer are we using volcanic ash, of course, but coal fly ash is gaining ground as the green alternative of choice for LEED projects.**

What is fly ash?

To understand the green benefit of coal ash, you must first understand fly ash. It's a by-product of coal power plants, which account for more than half of the electricity we consume in the United States. "Fly ash is composed of the non-combustible mineral portion of coal. When coal is consumed in a power plant, it's first ground to the fineness of powder. Blown into the power plant's boiler, the carbon is consumed— leaving molten particles rich in silica, alumina and calcium. These particles solidify as microscopic, glassy spheres that are collected from the power plant's exhaust before they can "fly" away — hence the product's name.

fly ash," **is considered the modern-day "Pozzolan,"** a word that comes from the Italian city, Pozzuoli, which most consider the birthplace of ash concrete technology. Pozzolan is a siliceous material that by itself possesses no cementitious value. However, with the presence of moisture, it reacts with calcium hydroxide to form a compound with cementitious properties. **Concrete made with fly ash is strong, durable and resistant to chemical attack, as evidenced by the many early Roman buildings still standing.**

Why fly ash is popular

Traditionally-produced portland cement, while extremely versatile and strong, is not environmentally friendly. **According to the GreenResource Center, the manufacture of Portland cement accounts for 6% to 7% of the total carbon dioxide (CO2) humans produce. That equates to the greenhouse-gas equivalent of 330 million cars, each driving 12,500 miles per year.**

Coal fly ash is a coal-fired power plant waste byproduct, which otherwise *would end up in a landfill. Its use in cement reduces the energy demands of manufacturing other concrete ingredients, reducing energy consumption, costs and greenhouse emissions, and slowing the depletion of natural resources.* In fact, according to the American Coal Ash Association research, more than 12 million tons of coal fly ash are used in American concrete products each year. **Because of coal fly ash's green qualities, its use in concrete can generate points toward LEED certification by the U.S. Green Building Council.**

