

Laying the foundations for a green industry

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Australian university researchers have developed a strong, lightweight building material that they believe could generate a thriving new "green" industry for countries such as China and India.

Coal-burning power plants spend millions of dollars disposing of waste fly ash, a fine powder loaded with toxic chemicals. An estimated 200 million tonnes of the byproduct is generated in China each year, much of it sent to waste disposal sites on increasingly scarce land and it is also responsible for serious air and water pollution.

In India about 100 million tonnes of fly ash is generated each year. The Indian Government passed a law in October 2005 stating that a minimum of 25 percent of fly ash must be used in the manufacture of clay bricks for use in construction activities within a 50 km radius of coal burning thermal power plants. There are also restrictions on the excavation of top soil for the manufacture of bricks.

In the Middle East there are very few coal fired power stations and there is an acute shortage of durable building materials because of the lack of suitable clay, aggregate and sand. Quality building materials are imported at considerable cost. Thus, there is a definite market for high-quality light-weight building materials in the Middle East.

Dr Obada Kayali and Mr Karl Shaw of the University of New South Wales' Australian Defence Force Academy (UNSW@ADFA) have developed bricks and building aggregate that can be manufactured entirely from waste fly ash.

They say their unique manufacturing method traps any harmful chemicals, creating an eco-friendly construction material that saves on construction costs and reduces generation of greenhouse gases.

Flash Bricks are 28 percent lighter and 24 percent stronger than comparable clay bricks while the aggregate, Flashag, can be used to make concrete that is 22 percent lighter and 20 percent stronger than standard products. This results in lighter structures, shallower foundations, cheaper transportation, and less usage of cement and steel reinforcement. This also results in more slender building components and hence, larger rentable space.

They also generate fewer emissions during manufacture as they take less time in the kiln to manufacture than clay bricks.

"Fly ash comes straight out of the power station and can be fed straight into the brick manufacturing process," says Dr Kayali. "In China it is difficult to find a clay quarry or aggregate quarry close to a city. Many brick plants are idle due to lack of clay yet most power stations have some form of brick plant close by."

"There is growing interest in the country in reducing greenhouse gases, reducing chemical pollutants and dust emissions and stopping the alienation of the land. Flash Bricks and Flashag overcome many of these problems."

Neil Simpson of NewSouth Innovations (NSi), the university's commercialisation arm, says the products had won widespread praise from structural engineers.

"Because Flashag results in lightweight yet sturdy concrete, it can be used effectively in high-rises where smaller structural columns are needed to maximise floor space and in concrete bridges requiring longer

spans."

The Fly Ash technology has two patents and licenses have been issued for the UK and US markets. NSi is seeking interest from companies wanting to develop the technology for China, Japan, Southeast Asia, Europe and India.

Source: University of New South Wales

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