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ENGINEERS CREATE SUSTAINABLE PORTLAND CEMENT

 PROPERTY & CONSTRUCTION

Engineers have developed a way to use a byproduct from coal power to replace Portland cement.

We have recently seen a number of innovations aimed at creating sustainable construction processes. For example, using [graphene](#) to strengthen concrete and [dissolvable packaging](#) for construction materials. Now, engineers have devised a more sustainable concrete.

Portland cement is a vital component in concrete. Furthermore, it is used to bind the other components of concrete together. Yet, its production is a huge contributing factor to carbon dioxide in the atmosphere. Now, engineers at [Rice University's Multiscale Materials Lab](#) have developed a concrete binder made of fly ash, that can replace Portland cement as a binder in concrete.

Fly ash is a byproduct produced by the burning of coal. It contains small amounts of silicon and aluminium, and has long been used as an additive in cement. However, the use of fly ash as a binder in cement also requires the addition of expensive and environmentally-damaging chemical activators. In their research, the Rice engineers used sophisticated statistical analysis techniques. This allowed researchers to find the optimum balance of fly ash and other components. Additionally, as a result it also allowed them to create a concrete that uses the least amount of activators. The researchers found that it was possible to use a cheaper type of fly ash in concrete, with fewer activation chemicals. This would lessen the environmental impact as well as the cost of concrete production.

According to Rice materials scientist, Rouzbeh Shahsavari, the work “provides a viable path for efficient and cost-effective activation of this type of high-calcium fly ash, paving the path for the environmentally responsible manufacture of concrete.” He also suggested that the same techniques could be used to turn other industrial waste, such as blast furnace slag and rice hulls, into environmentally-friendly forms of cement. The team’s future work will focus on improving the shrinkage and durability of the fly ash cement. What other products might be improved through statistical analysis?

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