

A Sustainable Shift in Road Construction: The Potential of Alkali-Activated Binders and Waste Glass Reuse

In some areas with soft or loose soils, soil stabilisation may be required for all road construction projects. Conventional soil stabilisation methods typically use additives such as cement and lime mixed with soil. In an era of growing environmental concerns, considerations regarding sustainability are necessary in every field, and the construction industry is no exception. Cement and concrete are essential parts of modern civilisation, with an annual production of over 10 billion tonnes worldwide. Concrete is the second most used material after water and is counted as the most used man-made material. Cement, as the vital component of concrete, has a massive carbon footprint, contributing to about 8% of global CO₂ emissions.

Alkali-activated binders (AABs), considered an eco-friendly cement alternative, have promising applications for road construction due to their ability to stabilise soil sustainably. This presentation begins by reviewing the history and progress of alkali-activated binders (AABs) in soil stabilisation. Subsequently, it explores the practical implementations of alkali-activated technology, highlighting its capacity to fortify infrastructure sustainability. A key focus is the innovative use of waste glass in alkali-activation procedures. Explaining this approach not only reduces waste going to landfills but also mitigates the need to extract new raw materials for building. This presentation highlights the need for further research in this field, focusing on the long-term performance and standardisation of relevant testing methods for AABs. Ultimately, this research advocates a shift towards more sustainable and eco-friendly practices in road construction, leveraging the benefits of AABs with waste glass reuse.