

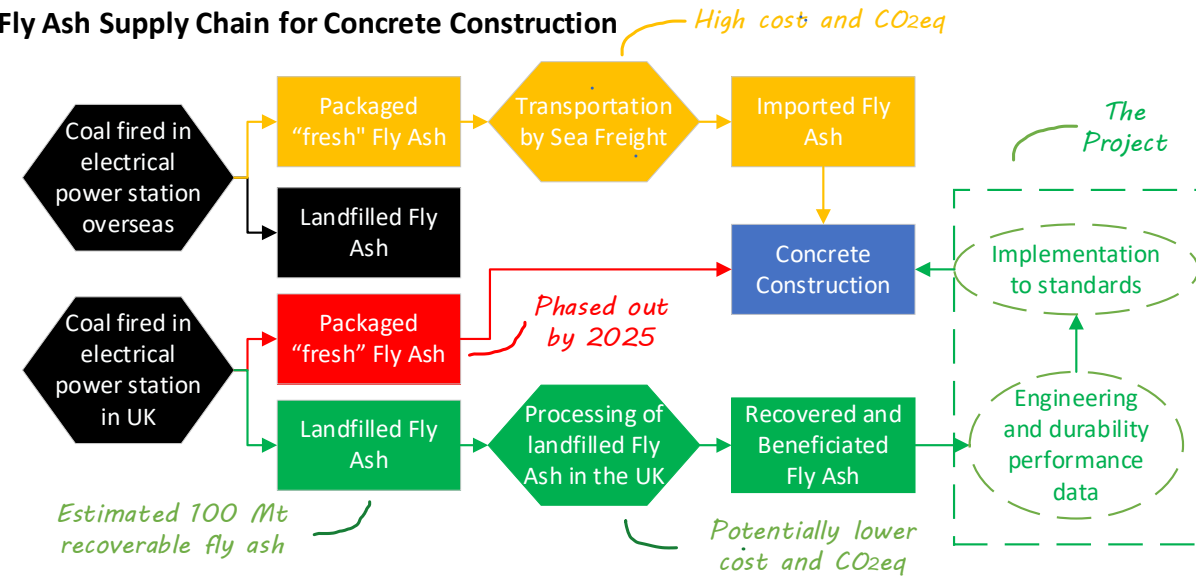
SRPe-Industry Doctorate Programme

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Industry Sponsor(s): UK Quality Ash Association (UKQAA)

Abstract

Fly ash is used in concrete as a Portland Cement (PC) replacement for engineering, economic and environmental benefits. However, since 2014, the UK has faced shortages of freshly produced fly ash, this has increased interest in recovering and processing the estimated 100 Mt of long-term wet stored fly ash from landfill sites around the UK. Previous studies have shown wet storage causes physical and chemical changes to fly ash. Therefore, this project will investigate the engineering and durability performance of concrete containing fly ash which has been recovered and beneficiated through large-scale processing to determine the suitability for use in concrete.

Fly Ash Supply Chain for Concrete Construction



Project Description / Activities

The project will consider fundamental engineering properties of fresh and hardened concrete, with the primary focus of the study being durability performance. Durability factors that will be tested include carbonation, chloride-induced corrosion, freeze-thaw attack, sulfate attack, and alkali-silica reaction.

Four recovered and beneficiated fly ashes will be used, providing a range of characteristics. Cements that will be tested will include binary cements (fly ash and PC) and ternary cements (fly ash, ground-granulated blast furnace slag, and PC) to cover the range of common cements found in the British Standard for cement, BS EN 197-1.

The outcomes of the work will allow guidance to be developed on how recovered and beneficiated fly ash may be introduced into standards such as BS EN 450-1 (British Standard for fly ash in concrete) and BS 8500 (British Standard for specifying and producing concrete).

Key Results / Impacts to Date, Future Work

- ✓ Industrial processing of stockpile fly ash (based on previous UKQAA research)
- ✓ Physical and chemical characterisation of the materials to be used
- ✓ Submission of research proposal to the British Standards Committee (B/517/1)
 - Trial mixing and casting of concrete specimens for testing
 - Test the engineering and durability properties of concrete
 - Assess the practical implications of the study and provide suggestions for the use of the materials and introduction in standards

References/Links: <http://www.ukqaa.org.uk/wp-content/uploads/Dundee-Final-UKQAA-Report-Jan-2019.pdf>

[Comparative life cycle assessment between imported and recovered fly ash for blended cement concrete in the UK – ScienceDirect](#)