

Coal Combustion Product Type

Fly Ash

Project Name

HS2 London Euston Station

Project Location

London, England

Project Participants

Capital Concrete, Wagners, John F Hunt, Mace Dragados JV, Arup, WSP, Grimshaw Architects, Haptic, LDA Design

Project Completion Date

Ongoing

Project Summary

Euston Station is a railway terminus under construction in central London that will connect Britain's capital city with Birmingham, Manchester, and Scotland as part of the High Speed 2 ("HS2") rail network. The station's ground-level concourse will be a 1,000-foot-long hall spanning over three acres that will become the largest station concourse in the UK upon its completion. It is a key part of the largest infrastructure project in Europe, which will include the construction of four new stations and 260 miles of new high-speed line, including 32 miles of tunnel, 9 miles of viaduct, and 140 bridges.

Project Description

A stated goal of HS2 Ltd, the company responsible for developing the UK's new high-speed rail network, is to achieve a 50 percent reduction in carbon emissions compared to traditional construction methods. As such, the decision to employ low-carbon concrete in the construction of Euston Station was an easy one.

In September 2022, John F Hunt, working for HS2's station Construction Partner, Mace Dragados (MD) joint venture, placed 8,200 cubic feet of Earth Friendly Concrete (EFC)—the largest single placement of this product in the UK to date. The EFC, supplied by Capital Concrete, was used for a temporary foundation slab that will support polymer silos used for future piling works at the north end of the Euston Station site.

First developed by Australian construction materials company Wagners, EFC is a cement-free concrete incorporating fly ash and ground granulated blast furnace slag that lowers the embodied carbon by 75 to 87 percent compared to standard concrete mixes. The concrete placement for the foundation used a mix of 25 percent fly ash and incorporated approximately 22 metric tons of fly ash (to date, an additional 18 metric tons have been used in other applications in the station's construction).

Capital Concrete supplied the materials for the foundation, importing the fly ash by ship from Spain. The company estimates that use of the EFC in the foundation reduced the embodied carbon by over 76 metric tons. In addition to the environmental considerations, the cement-free concrete was specified for its performance characteristics, which include its low heat generation for deep sections, low shrinkage,

resistance to cracking, high durability, and increased tensile strength—the latter of which enabled thinner slab designs and thus a reduction in the volume of both concrete and reinforcement used.

Elsewhere on the Euston site, HS2 and MD have adopted a number of measures designed to reduce the environmental impact of construction, including the use of liquefied petroleum gas generators as a direct replacement for diesel generators and employing a new piling method that will provide heating for buildings above.



Photo courtesy of HS2