

As a result of the achievements stemming from Ecocem’s innovation programme, Ground Granulated Blastfurnace Slag (GGBS) cement can be used effectively in structural and non-structural precast elements. Values of 50% GGBS and above can be achieved while maintaining typical turnaround times of 16 – 24 hours.

Since it began trading in 2002, Ecocem has grown to be Europe’s largest independent producer of high performance, high quality, low carbon GGBS and has manufacturing facilities in France, Holland and Ireland, along with import terminals in the UK and Sweden. Ecocem has the capacity to produce 2.4 million tonnes of GGBS per annum.

Ecocem GGBS is an industrial by-product sourced from the iron manufacturing process. The slag material resulting from the iron manufacturing process is diverted from landfill and upcycled into a commodity product known as Granulated Blastfurnace Slag (GBS). The GBS is then ground to produce GGBS cement.

BENEFITS OF GGBS IN PRECAST

- **Achieved turnaround times**
- **Increased strength**
- **Enhanced durability**
- **Increased sustainability - Low CO₂**
- **Lighter colour & smoother finish**
- **Easier to pigment**
- **Reduced water demand**
- **Reduction in limestone filler**
- **Meets specification requirements:**
 - **Exposure classes**
 - **Client demand**
 - **Increased recycled content**
 - **Benefits for LEED & BREEAM**



INNOVATION & TURN AROUND TIMES

Ecocem invests significantly in the development of technologies which advance the capabilities and use of GGBS in precast concrete products. As a result of this effort Ecocem can offer the precast sector the opportunity to enhance the percentages of GGBS beyond those currently used and do this across all areas of precast, both structural and non-structural.

These developments present significant opportunities for the precast sector as the technical, architectural and environmental benefits of GGBS can be attained within the turnaround time demands of the precast production environment. Ecocem offers its customers different options to achieve higher replacement percentages of GGBS. These options include thermal activation, chemical activation and finely ground GGBS additive (Superfine).



DURABILITY

By substituting CEM I with GGBS, producers can increase the durability of concrete and extend its service life. GGBS is highly resistant to chemical attack. This results from the characteristics of GGBS which include decreasing chloride diffusion and chloride ion permeability. Ecocem have worked with concrete producers to successfully achieve DC-4 classification (sulphate resistant) concrete which is XA3 equivalent. GGBS also enhances ultimate compressive strength and reduces heat of hydration. The characteristics of GGBS in precast make it possible for producers to cost effectively extend the benefits and opportunities for concrete used in high exposure class conditions.



ENVIRONMENT

CEM I embodies approximately 900Kg CO₂/tonne produced. In contrast the embodied figure for Ecocem GGBS is only 42Kg/tonne (Fig. 1). By substituting CEM I with Ecocem's GGBS cement it is possible to reduce the carbon emissions of cement production by up to 95%.

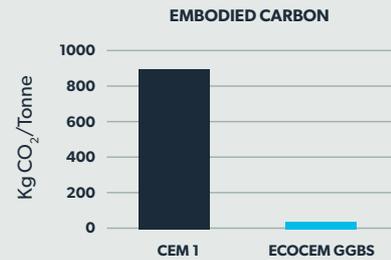


Figure 1

AESTHETICS

Ecocem GGBS cement is a white powder with finer particle sizes than CEM I. This results in Ecocem's GGBS imparting a lighter, brighter colour to the finished concrete which is also smoother and has less defects when compared to grey concrete made with CEM I. The addition of GGBS to the concrete mix can also significantly reduce the effects of efflorescence / white staining.

The white colour of Ecocem GGBS cement permits a cost effective means of achieving exposed fair-faced concrete finishes and is most effective at replacement levels of 50% or higher.



Concrete with Ecocem GGBS

- Stronger and more durable** (Icon: interlocking circles)
- Low embodied energy** (Icon: lightning bolt with downward arrows)
- BRIGHTER IN COLOUR** (Icon: sun)
- Highly resistant to chemical attack** (Icon: flask)
- Cost neutral** (Icon: handshake)
- Requires less water** (Icon: water drop)
- More SUSTAINABLE** (Icon: leaf)

Using **10,000 tonnes** of GGBS can **save 8,000* tonnes of carbon** (Icon: globe with leaf)

Equivalent to (Icon: arrows) Providing electricity to **1,600* houses** for a year (Icon: lightbulb and houses)

(Icon: downward arrows) Taking **3,200*** cars off the road for a year (Icon: cars and calendar)

(Icon: downward arrow) Reduces carbon footprint **by up to 60%** (Icon: globe with leaf)

100% Recycled Product (Icon: recycling symbol)

Cement Type	Carbon Emissions (Kg/T)
PORTLAND CEMENT	850
ECOCEM GGBS	42

* Approx.

CHEMICAL ACTIVATION - AcceIR8

AcceIR8 is the first admixture of its kind which activates the GGBS and cement components of concrete. It contains less than 10% chloride (non-calcium chloride), 10% alkali and has a PH value of 7-8. It is applicable for non-structural precast products enabling the use of higher levels of Ecocem GGBS.

The increased early age strength makes AcceIR8 the ideal admixture for applications such as blocks, paving, fencing and other light precast which is not pre-stressed.



Figure 2 illustrates the strength gains over time by contrasting GGBS with no accelerate and GGBS with 1% AcceIR8 added to the mix.

Figure 2



CHEMICAL ACTIVATION - AcceIR8 Plus

AcceIR8 Plus is a chloride free admixture used in structural precast elements. It contains 7% alkali and has a PH of 4.51. With a 1% dosage AcceIR8 Plus can increase the concrete strength by 50 - 90%.

AcceIR8 Plus can be used for all structural precast product types including bridge beams, culverts, wall panels, flooring, tunnel segments, stairs, retaining walls and costal defences.

Figure 3 shows the progressive strength gain of a cube from 17 – 20 hours inclusive. The gain is 18.5 – 23 MPa.



Figure 3

THERMAL ACTIVATION

Thermal activation is a process of utilising heated water in the production of concrete precast elements. The water temperature is heated up to 70°C with a target temperature for the fresh concrete of between 19 - 25°C. This fresh concrete temperature can be attained all year around by adjusting the water temperature to suit seasonal changes. Sufficient early age strength is achieved for 50% GGBS use or greater.



ECOCEM - SUPERFINE

Ecocem's Superfine GGBS is used in ultra-high performance concrete (UHPC) precast elements. Due to its high blaine (specific surface area) characteristic, Superfine can activate the GGBS component of material formulations leading to higher strength gains. Superfine improves the microstructure of material formulations making the concrete more durable and better performing. Superfine is a white powder making it easier to handle over other materials such as micro silica. It contains no chemical additions or chromium and has a low pH making it a safe and efficient additive which can improve the final finish and reduce pigment requirements.



ECOCEM TECHNICAL TEAM

Ecocem pride ourselves in the technical service we offer. Contact the technical services team to learn more.

JOHN REDDY

Technical Development Manager

John leads the innovation team in Ireland and the UK, providing concrete customers with product information, mix designs and on-site assistance. For more information or to organize an admixture trial contact John on +353 (1) 678 1800.

AIDAN FOGARTY

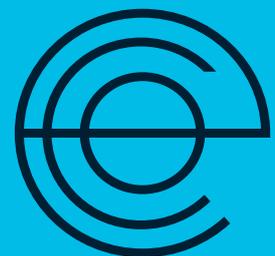
Quality & Technical Services Engineer

Aidan provides technical support to customers in Ireland and the UK. He is also responsible for product quality and standard compliance. To book an admixture trial with Aidan contact him on +353 85 877 0741.



CERTIFICATION

Ecocem has been rigorously tested in accordance with the EN 197-2 Cement - Part 2: Conformity evaluation and the EN 15167-2: Ground Granulated Blast furnace Slag and has been issued with an EC certificate of conformity by an EU Notified Body and carries the CE mark.



**Innovation
Powering
Sustainability**

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