EPD OPTIMIZATION REPORT

LEED Credit: LEED v4.1 MRc2 — Environmental Product Declarations, Option 2 (Optimization Assessment)

Product:	Manufacturer:
GGBFS	Union Cement Company
Issue Date:	**Expiry Date:**
26-Mar-2026	25-Mar-2031

EPD Reference and Optimization Basis

شركة أسمنت الإتحاد (ش.م.خ.)
UNION CEMENT COMPANY (Pr.J.S.C)

Product: Ground Granulated Blast Furnace Slag
Declared Unit: 1 metric ton
System Boundary: Cradle-to-gate with options (A1-A4, C1-D)
Manufacturer: Union Cement Company (Pr.J.S.C), UAE
Program Operator: International Climate Intelligence System (ICIS)
EPD Number: ICIS-202603-129
Issue Date: 26-Mar-2026
Expiry Date: 25-Mar-2031

Basis of Assessment

- Baseline EPD: Ground Granulated Blast Furnace Slag EPD (ICIS-202603-129).
- Same product optimization; no third-party manufacturer EPDs used.
- System boundary: cradle-to-gate (A1–A3); declared unit: 1 metric ton.
- Modeled optimization scenario corresponding to an indicative 8-10% reduction in A1–A3 GWP.
- Improvements limited to logistics optimization in A2 and manufacturer-controlled process parameters in A3, with unchanged production technology.

Purpose

The purpose of this report is to assess potential cradle-to-gate (A1–A3) environmental impact reduction opportunities for Union Cement Company's Ground Granulated Blast Furnace Slag through a modeled optimization scenario, in accordance with the requirements of LEED v4.1 MRc2 – Environmental Product Declarations (Option 2).

Methodology

The optimization assessment was conducted using a life cycle assessment-based approach consistent with EN 15804+A2 and ISO 14025 principles, aligned with the requirements of LEED v4.1 MRc2 Option 2.

The current Ground Granulated Blast Furnace Slag (GGBFS) EPD (ICIS-202603-129) was used as the baseline. A modeled optimization scenario was developed for the same product by adjusting selected parameters within the cradle-to-gate (A1–A3) system boundary, while keeping the declared unit, production route, and system boundaries unchanged.

The methodology focuses on identifying realistic improvement levers within the A2 (raw material transportation) and A3 (manufacturing) stages, including logistics optimization and energy efficiency improvements in drying and grinding operations. No changes were made to product classification, functional performance, or downstream life cycle stages.

Environmental impacts were evaluated using the same impact assessment method applied in the baseline EPD to ensure consistency and comparability between the baseline and modeled optimization scenario.

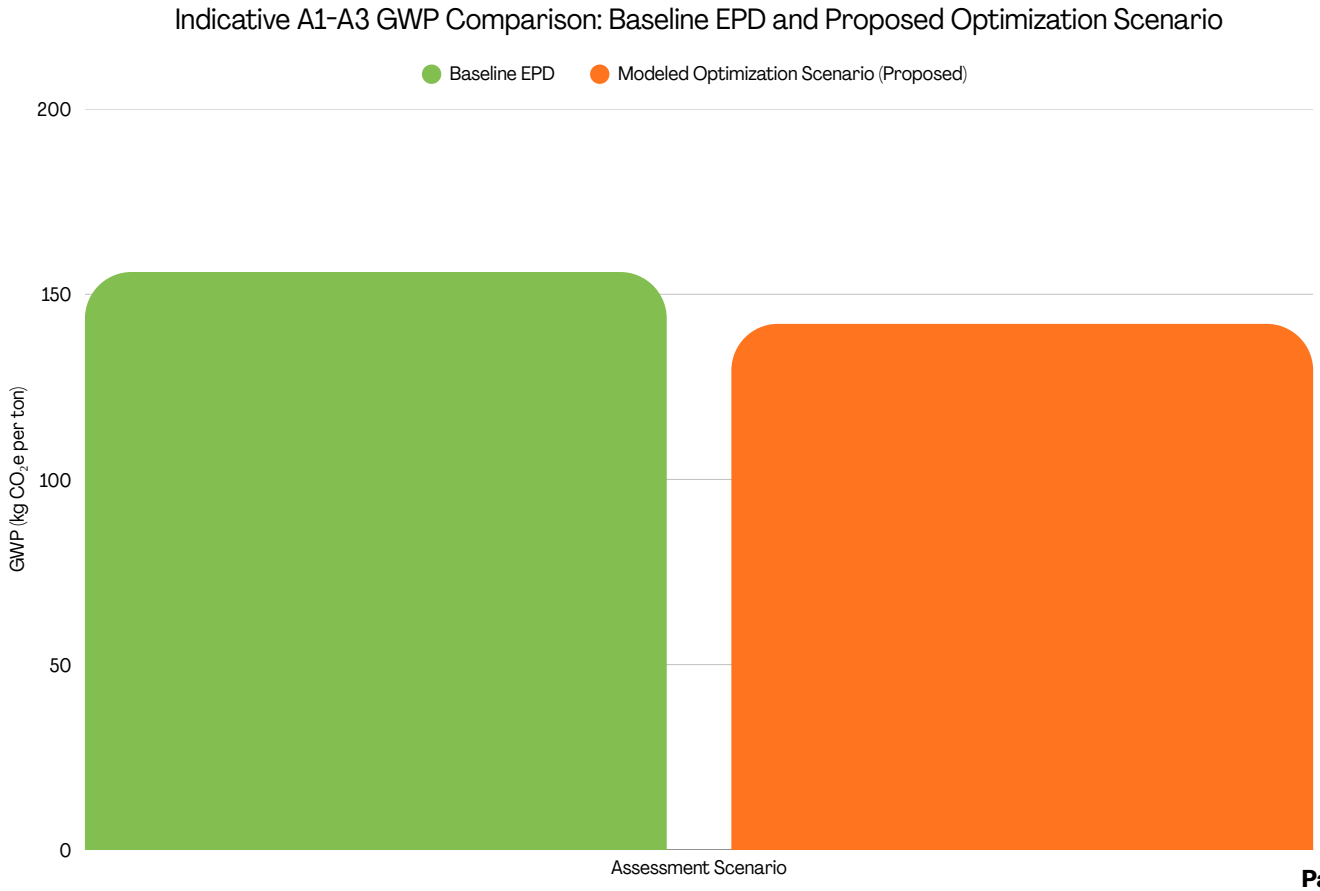
As the optimization scenario is modeled for the same product and manufacturer using identical declared unit, system boundaries, and impact assessment method, the baseline and optimization results are directly comparable.

Results

The cradle-to-gate (A1–A3) Global Warming Potential (GWP) results for the baseline EPD and the modeled optimization scenario are summarized below.

Scenario	**A1-A3 GWP (kg CO_2e / ton)**
Baseline EPD	156
Modeled Optimization Scenario (proposed)	~140-144

The modeled optimization scenario represents a proposed potential reduction of approximately 8-10% in A1–A3 GWP relative to the baseline EPD, subject to implementation of the identified optimization measures.



Key Optimization Opportunities (A1 & A3)

A2 – Raw Material Transportation (GBFS Supply Chain)

- Optimize sourcing by prioritizing closer GBFS suppliers to reduce transport distances and emissions.
- Improve logistics through route optimization and higher load utilization across sea and road transport.
- Increase use of bulk transport to improve payload efficiency and reduce emissions per ton transported.
- Optimize port selection and supply chain consolidation to reduce intermediate handling and transport stages.
- Improve marine transport efficiency through better vessel utilization and lower fuel intensity.

A3 – Manufacturing (Drying & Grinding Operations)

- Improve drying efficiency by optimizing thermal energy use for moisture removal from incoming slag.
- Reduce natural gas consumption through improved heat utilization and process control in drying systems.
- Enhance grinding efficiency by reducing specific electricity consumption (kWh/ton) through process optimization.
- Optimize material handling and internal transport to reduce auxiliary energy use.
- Improve operational stability and reduce material losses across drying, grinding, and storage stages.

Key Findings

- The optimization assessment indicates that measurable reductions in A1–A3 GWP are achievable for Ground Granulated Blast Furnace Slag through targeted improvements in transport logistics and manufacturing energy efficiency within defined system boundaries.
- A2 remains the dominant contributor to total GWP, with reductions primarily driven by transport optimization, improved load utilization, and reduced emissions intensity per ton-km.
- A3 contributes to reductions through improved drying efficiency, lower thermal energy use, and reduced electricity consumption in grinding operations.
- A1 contribution is minimal, and therefore reduction potential is primarily governed by transport and process efficiency rather than raw material changes.
- The identified measures focus on logistics and operational efficiency without altering product composition, functional performance, or underlying production technology.
- The reduction potential reflects realistic improvements aligned with current Ground Granulated Blast Furnace Slag supply chain and grinding-based manufacturing practices.
- Overall, the results potentially demonstrate a credible and technically achievable pathway for 8–10% reduction in cradle-to-gate GWP through targeted logistics and process optimization measures.

Limitations & Assumptions

This optimization assessment is based on a modeled scenario and represents indicative reduction potential rather than verified or achieved performance. The assessment is limited to cradle-to-gate (A1–A3) life cycle stages and Global Warming Potential (GWP) only; other impact categories and downstream life cycle stages are not evaluated. The modeled optimization assumes implementation of the identified improvement measures, primarily related to transport logistics and manufacturing energy efficiency, without changes to product composition, functional performance, or declared unit. Results are intended solely for LEED v4.1 MRc2 Option 2 documentation purposes.

Alan Beski Christopher
Sustainability Manager
GCAS Quality Certifications

Office no. 110, National Insurance Building
Sheikh Zayed Road
P.O. Box 65561
Dubai, UAE
www.gcasquality.com | info.dubai@gcasquality.com

GCAS Quality Certifications - ECO Platform member
