thinkstep Ltd – 11 Rawhiti Road – Pukerua Bay – Wellington 5026 - New Zealand

Golden Bay Cement
Fletcher Concrete and Infrastructure Limited
810 Great South Road
Auckland 1061
New Zealand

5th September 2022

RE: Golden Bay Cement Product Carbon Footprint and EPD

This letter provides validation of the carbon footprint reductions from process updates including use of tyre-derived fuel and reduction in the clinker factor of cement products produced at Golden Bay Cement's manufacturing facility in Portland, New Zealand. It presents a comparison of Golden Bay Cement's new carbon footprint against the published EPD results for EverSure™ GP cement and EverFast™ HE cement (EPD Australasia Registration No: S-P-01170, version 1.0 of 12 May 2019). The work was commissioned by Golden Bay Cement and conducted by thinkstep-anz.

Methodology

The work involved identifying relevant process changes and updating the life cycle assessment model used for Golden Bay Cement's EPD in 2019. The work focussed primarily on energy inputs to the kiln (precalciner) and the clinker content of finished cement. The main updates include:

- Update of the model parameters to represent data for FY2022 (1 July 2021 to 30 June 2022) including:
  - Energy inputs to the kiln (precalciner) such as coal, wood waste, and welt (tyre-derived fuel input); and emissions from the kiln (specifically CO_2).
  - Other energy inputs across the site, primarily diesel and electricity.
  - Update of the clinker content of cement to the forecasted factor (from 91% to 86%).
- Minor modelling updates (e.g., update to electricity grid).
- Update of the 2019 EPD model from GaBi service pack 33 and GaBi Databases 2017 to GaBi 2022.1 and GaBi Databases 2022. This change updates the emission factors used for purchased materials, purchased energy and off-site waste processing.

thinkstep ltd
11 Rawhiti Road
Pukerua Bay, Wellington 5026
New Zealand Phone + 64 4 889 2520 Fax: +64 4 974 7223
anz@thinkstep-anz.com **www.thinkstep-anz.com**

CEO: Barbara Nebel
Registration Office: West Perth, WA 6005
ABN 55 121 363 031, ACN 121 363 031
Bank Account: Westpac Bank, BSB: 036308, Account No. 210 703
BIC/SWIFT code: WPACAU2S

Carbon footprint results

Carbon footprint results are reported in Table 1. These results follow European standard EN15804:2012+A1:2013 for consistency with Golden Bay Cement's published EPD.

Table 1: Global warming potential (GWP) [kg CO2-Equiv.] per 1 tonne of cement (EN15804 +A1)

		2019	2022	% Change
GP, EverSure	GWP) [kg CO_2-Equiv.]	732	699	-4.5%

Draft results for other environmental impact indicators are presented in Table 2. These results also follow EN 15804+A1; however, they should be treated as provisional as stack emissions data covering non-greenhouse gas emissions also need to be updated.

We would like to congratulate Golden Bay Cement for making continued progress to reduce the carbon footprint of its cement in a hard-to-abate sector.

Kind regards,

Dr Gayathri Gamage
Senior Sustainability Specialist

Dr Jeff Vickers
Technical Director

EN15804 +A1 environmental impact comparison

Table 2: Comparison of EN15804+A1 environmental impacts per 1 tonne of EPD product (Modules A1-A3)

Environmental Indicator	Abb.	Unit	2019		2022		% Change	
			GP, EverSure	HE, EverFast	GP, EverSure	HE, EverFast	GP, EverSure	HE, EverFast
Global Warming Potential	GWP	kg CO_2-Equiv.	732	734	699	703	-4.51%	-4.22%
Depletion potential of the stratospheric ozone layer*	ODP	kg CFC11-eq.	5.29E-12	5.57E-12	4.29E-11	5.20E-11	711%	834%
Acidification potential of land and water	AP	kg SO_2-eq.	8.23E-01	8.38E-01	7.19E-01	7.30E-01	-12.6%	-12.9%
Eutrophication potential	EP	kg PO_4^{3-}- eq.	2.07E-01	2.08E-01	1.88E-01	1.90E-01	-9.18%	-8.65%
Photochemical ozone creation potential	POCP	kg C_2H_4-eq.	6.83E-02	6.91E-02	5.86E-02	5.93E-02	-14.2%	-14.2%
Abiotic depletion potential – elements	ADPE	kg Sb-eq.	9.99E-06	1.30E-05	3.65E-06	4.50E-06	-63.5%	-65.4%
Abiotic depletion potential – fossil fuels	ADPF	MJ	2.86E+03	2.87E+03	2.24E+03	2.28E+03	-21.7%	-20.6%

* Results for “Depletion potential of the stratospheric ozone layer” are highly sensitive to small changes. The numbers reported (both old and new) are very small due to ozone depleting substances being almost completely banned under the Montreal Protocol. The large percentage change is therefore misleading. Nevertheless, these values will be further investigated before the revised EPD is published.