Accepted Manuscript

Hybrid life cycle assessment of greenhouse gas emissions from cement, concrete and geopolymer concrete in Australia

Soo Huey Teh, Thomas Wiedmann, Arnaud Castel, James de Burgh

PII: S0959-6526(17)30566-8

DOI: 10.1016/j.jclepro.2017.03.122

Reference: JCLP 9249

To appear in: Journal of Cleaner Production

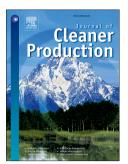
Received Date: 6 December 2016

Revised Date: 22 February 2017

Accepted Date: 18 March 2017

Please cite this article as: Teh SH, Wiedmann T, Castel A, de Burgh J, Hybrid life cycle assessment of greenhouse gas emissions from cement, concrete and geopolymer concrete in Australia, *Journal of Cleaner Production* (2017), doi: 10.1016/j.jclepro.2017.03.122.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



ACCEPTED MANUSCRIPT

1	Submission to:	[Journal of Cleaner Production]
	buomnosion to.	journal of creater i foudetion

- 2 Category: [Original article]
- 3 Word count: 12628 (total), 8467 (main text only)
- 4

5

6 Hybrid Life Cycle Assessment of Greenhouse Gas Emissions from

7 Cement, Concrete and Geopolymer Concrete in Australia

8

9 Soo Huey Teh^{a, *}, Thomas Wiedmann^{a, b}, Arnaud Castel^a and James de Burgh^{a,c}

- 10 ^{a.} School of Civil and Environmental Engineering, UNSW Sydney, NSW 2052, Australia
- 11 ^{b.} ISA, School of Physics A28, The University of Sydney, NSW 2006, Australia
- 12 ^{c.} BG&E Consulting Engineers, Perth, WA 6000, Australia
- 13 * Corresponding author. Email: soohuey.teh@unsw.edu.au
- 14

15 Abstract

Concrete is the second most used material after water and the production of cement is 16 responsible for 5-8% of global carbon dioxide emissions. The development of low-carbon 17 concretes is pursued worldwide to help the construction industry make its contribution to 18 19 decarbonising the built environment and achieving carbon reduction targets agreed under the 20 Paris Climate Agreement. However, there is uncertainty around the actual amount of 21 greenhouse gas emissions that can be avoided by employing alternative types of concrete. 22 This study quantifies the carbon footprint intensities of Australian cement and concrete 23 production, including ordinary Portland cement, standard ordinary Portland cement concrete, 24 blended cement-based concrete and geopolymer concrete production. For the first time, an 25 input-output based hybrid life-cycle assessment method is used for these products. The main 26 goal of this paper is therefore to make a methodological comparison between process-based 27 and hybrid life cycle assessment using the Australian cement and concrete production as a 28 case study. A comparison with published results from process-based life-cycle inventories as 29 well as a decomposition of results into product categories is provided. The hybrid life cycle 30 assessment resulted in higher greenhouse gas emissions for ordinary Portland cement and all 31 types of concrete due to the methodology incorporating an economy-wide system boundary, 32 which includes the emissions from upstream processes. For geopolymer concrete in particular, 33 the results are also dependent on the method applied for allocating greenhouse gas emissions from fly ash and slag. The findings from this study are likely to inform the development of 34 strategies and policies aimed at greenhouse gas reduction in the cement and concrete 35 industries. 36

Download English Version:

https://daneshyari.com/en/article/5481302

Download Persian Version:

https://daneshyari.com/article/5481302

Daneshyari.com