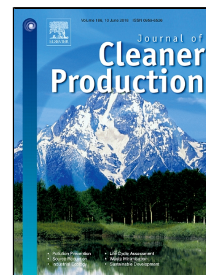


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Use of Recycled Aggregates for Low Carbon and Cost Effective Concrete Construction

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1 **USE OF RECYCLED AGGREGATES FOR LOW CARBON AND COST EFFECTIVE CONCRETE**
2 **CONSTRUCTION**

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12 **ABSTRACT**

13 Reducing the carbon footprint of activities and a more prudent use of natural resources require for
14 concrete production is a significant concern on the grounds of environmental and economical
15 sustainability. It is widely reported that the concrete industry contributes around 8% to total global
16 carbon dioxide (CO₂) emissions whereas cement utilization contributes approximately 90% of these
17 emissions. Moreover, natural resources are becoming scarce and the world has become
18 environmentally conscious. Against this background, reported work carried out to assess BS EN 197-
19 1 cement concretes made with natural and partially substituted recycled aggregates and thus their
20 suitability for use in low carbon cost effective concrete construction. In that respect, supplementary
21 cementitious materials (SCMs) additive cements were selected to reduce the potential carbon
22 footprint and establish fresh and hardened properties of natural aggregate concrete (NAC) mixes for
23 equivalent 28-day compressive cube strengths of 40 and 50 N/mm². Then, a further investigation was
24 carried out to assess the potential embodied CO₂ (ECO₂) emissions and cost analysis and
25 performance of partially substituted recycled aggregates (coarse recycled aggregate (RA) and
26 recycled glass sand (RGS) with proportions of 25% and 15% respectively by mass replacement).

27 Results showed that SCMs incorporated NAC mixes has a potential to reduce ECO₂ emissions and
28 cost of concrete whilst partially substituted recycled aggregate concrete (RAC) mixes provided
29 comparable ECO₂ emissions but slightly increased cost for equal design strength. The loss of

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