

## Recycling of Coal Combustion Residues and Waste Glass into Construction Materials

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Coal combustion residues (CCR) that consist of bottom ash and off-spec fly ash may be beneficially converted to value-added construction materials for use in long-lived infrastructure assets to reduce disposal costs and landfill waste. We evaluate the cost and life cycle energy and greenhouse gas emissions of converting CCR into lightweight aggregates using a sintering process that uses NaOH as fluxing agent based on the properties of CCR collected from two power plants located in the U.S. Experiments together with thermodynamic and viscosity models described in Billen et al. (2018) identified optimal additions of fluxing agent to attain desired characteristics in the final lightweight aggregate, which were used as benchmarks against which to test waste glass as an alternative fluxing agent. Torelli (2018) used thermodynamic models to further predict optimal operating conditions and waste glass additions for producing high quality lightweight aggregates. Thermodynamic calculations were integrated with a life cycle assessment (LCA) model to estimate that energy and GHG emissions are minimized at operating temperatures of 1000°C for glass:ash and 1150°C for NaOH:ash in ratios of 1.25:1 and 0.1:1, respectively. We discuss opportunities and tradeoffs for using construction infrastructure as a “sink” for CCR.

### References

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