

RMRC



Recycled
Materials
Resource
Center



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Research Project 43

Recycled Material Highway Construction Assessment

Project Objectives

- To provide appropriate context for future decision making in roadway construction
- To evaluate site-specific human toxicity potential
- To characterize comparative environmental impacts of virgin aggregate and recycled materials in roadway construction

Project Summary

The U.S. Generates approximately 88 million Mg of coal ash (bottom and fly), of which 41% are recycled or reused in a wide variety of applications from concrete, structural fill and pavement to waste stabilization. The remaining 53 million Mg of coal ash are landfilled. Aside from the cement and concrete applications, CCP products can be used for structural fills or embankments, soil stabilization, stabilization of waste materials, flowable fill and grouting mixes, and mineral filler in asphalt paving. A recent survey revealed that a primary reason that recycled material use in the U.S. is limited is concern over environmental impacts. This research explores the environmental impacts from the use of coal ash, and puts these impacts in the context of other 2 systemic impacts that result from the choice to use or not use a recycled material to replace a virgin material

The scenario used in this research is based on portions of a field scale project, constructed along a highway in Lodi, WI that used multiple industrial by-products for roadway stabilization. The project constructed several sections of roadway using different recycled materials in the road subbase as well as a control section using crushed rock. The recycled materials used in the project were coal fly ash, coal bottom ash, foundry slag and foundry sand. This research analyzes only the effect of using bottom ash (Obtained from Alliant Energy's Columbia Power Station, Columbus, WI), since the leached metals concentrations were higher for this material than the other recycled materials.

In comparing results for virgin material with bottom ash at equivalent source distances, bottom ash has significantly less impact than crushed rock, saving 1,385,130 megajoules of energy, 98 megagrams of CO₂ and 107 kilograms of water.

Project Partners

Alliant Energy Corporation, University of Wisconsin Madison Department of Civil Engineering

End Results

The combination of the LCA and the site-specific analysis can provide an appropriate context for decision making. Tradeoffs are inherent in making decisions about recycled versus virgin material use and regulatory frameworks should recognize and explicitly acknowledge these tradeoffs in decision processes.

Further Information

The Recycled Materials Resource Center (RMRC) is a national center that promotes the appropriate use of recycled materials in the highway environment. It focuses on the long-term performance and environmental implications of using recycled materials