

Geological Sequestration of CO₂ by Hydrogen Carbonate Formation with Reclaimed Slag

Benefits

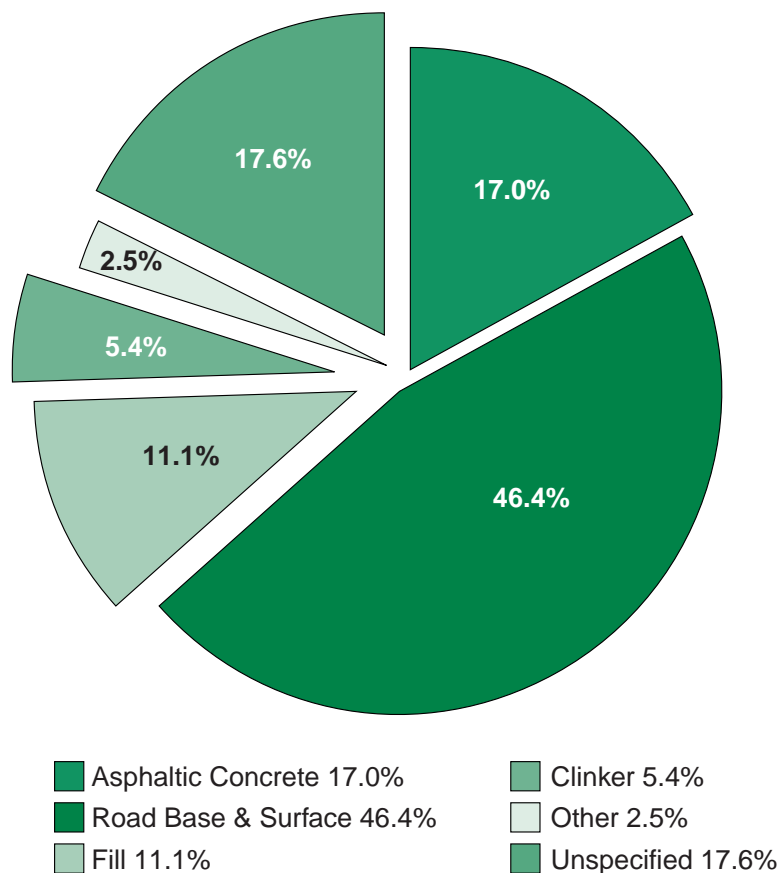
- ❖ This process has the potential to reduce the CO₂ emissions from a plant site at which it is applied by 85%.
- ❖ The proposed technology converts slag and exhaust gas to potentially saleable products.
- ❖ The opportunity to capture and concentrate environmentally undesirable trace elements that may appear in slag.

Applications

This process can be used to remove the CO₂ from the furnace exhaust gases using slag as a means to sequester the CO₂. There should be a net energy savings, since the process can produce about 920 BTU per pound of slag processed. Further, it can be integrated properly into the exhaust stream of the plant, the sensible heat in the exhaust gas and slag can be recuperated to enhance process kinetics.

This project aims to develop a process that improves the kinetics of the hydrous carbonate formation reaction enabling steelmakers to directly remove CO₂ from their furnace exhaust gas. It is proposed to bring the furnace exhaust stream containing CO₂ in contact with reclaimed steelmaking slag in a reactor that has an environment near unit activity of water resulting in the production of carbonates. These products are suitable for polymer fillers, agricultural and construction applications. In addition to the removal of CO₂, some sensible heat may be recuperated for process or plant services application. The CO₂ emissions from the plant would be reduced by the amount sequestered in the formation of carbonates. The main raw materials for the process are furnace exhaust gases and specially prepared slag.

Current Slag Re-use



Project Goal: To develop and demonstrate a process for sequestering CO₂ from steelmaking in either a BOF or EAF by forming carbonates with the alkaline earth component of used slag for beneficial reuse in other applications.

The kinetics and applicability of forming hydrous carbonates from used slag and exhaust gas will be studied on a bench and pre-pilot scale. In principle the product will be used to replace mined carbonate products for construction, agriculture and polymer product fillers.

Progress and Milestones

- ❖ Project start date: March 2005
- ❖ Industrial site application survey: May 2005
- ❖ Literature survey: June 2005
- ❖ Bench evaluation of kinetic factors and trace elements: May 2006
- ❖ Potential products system comparison: July 2006
- ❖ Construct bench-scale prototype: October 2006
- ❖ Evaluation of bench-scale system: February 2007
- ❖ Project completion date: March 2007

Total Project Cost \$465,184

Duration 2 years

Research Organization

University of Missouri-Rolla
Rolla, MO

Industry Participants

Dofasco Inc.
Hamilton, ON, Canada

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Ghent, KY

Hylsa
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