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Abstract:

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Waste Asphalt Shingles as a Supplementary Alternative Fuel for Cement

The fuel and energy requirement for the production of clinker in rotary cement kilns is such that the cement industry relies heavily on coal which does not only increase the cost of production by virtue of its price, but also negatively affects the sustainability rating of the cement production process because coal is a non-renewable resource. The use of cheap and readily accessible alternative solid fuels in rotary cement kilns without adversely affecting kiln performance is of essential interest to the industry and forms the motivation for this study. Some waste solids destined for landfills possess large amounts of untapped energy that could be used to fuel high temperature furnaces like the rotary cement kiln through direct combustion. Redirecting such waste to a local cement kiln presents a double edged solution to both cost and environmental concerns.

The Lafarge cement plant in Brookfield, Nova Scotia has considered practical means of using alternative fuels including waste asphalt roofing shingles to supplement coal in the production of clinker. The main focus of this research is to study the effects of these waste derived supplementary fuels on the performance of rotary cement kilns. Previous works have looked at the use and effect of tyres, municipal solid waste and waste derived from plants and animals in kilns. The work to be presented is a research on the use of waste asphalt roofing shingles to supplement coal in rotary cement kilns based. It covers aspects of supplementary fuel handling; the combustion mechanism of asphalt shingles and their blends with coal; and the analysis of emissions resulting from burning the fuel blends. Extensive field trials at Lafarge cement plant showed that increasing the quantity of asphalt shingles used in the kiln from the current 5-10% to about 25% is possible. Several variations in the preparation and handling of asphalt shingles are proposed and studied to ascertain which approaches provide most room for an increase in shingle use. The lessons learnt from the mechanisms of combustion and the challenges encountered while engineering an increased use of asphalt shingles as a supplementary fuel will add to current knowledge in alternative energy and the sustainable use of energy.