Novel Design for a Magnesium-Enhanced Lime Ex-Situ Gypsum Crystallizer

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Abstract

One method of gypsum production in FGD systems is magnesium-enhanced lime (MEL) ex-situ oxidation. A typical 1400MW commercial system consists of two 9.1 m (360") diameter reactors with 13.0 m (516") liquid level. An air sparge grid is the sole means of agitation and solids suspension. This existing design is proven to be effective but is not optimized for agitation. For example, more air may be added to achieve agitation than is required for oxidation. This paper presents the novel design of a mechanically agitated ex-situ gypsum oxidizer/crystallizer. Presented data was collected on 0.6 m (24") diameter pilot installation of countercurrent oxidizer/crystallizer consisting of four separate mixing stages. Calcium sulfite from a commercial MEL scrubber was oxidized to form gypsum crystals. Pilot scale results demonstrate a significantly reduced stoichiometric oxygen requirement. Calculations for a commercial scale system show a 50% reduction of compressor power. Combined with the power requirement for agitation the net energy savings may be in the range of 20-30% over the existing installation.