NEW FGD DEVELOPMENTS IN EUROPE

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INTRODUCTION

In Europe over the past 40 years there has been considerable social, regulatory, and economic pressures to manage solid waste in a manner that is beneficial to mankind. There have been many successful programs to minimize waste, recycle and reuse waste through energy conversion. As part of the energy conversion process strict air emissions emission standards have been adopted for waste-to-energy plants.

However, the latest trend in waste management has been to ban landfilling of municipal waste. In the smaller countries such as Austria this has resulted in an increase demand for waste-to-energy. The waste management practices in Germany and Holland are considerably different than those of the less densely populated countries such as Austria and Hungary. In Austria the waste-to-energy plants are smaller than most plants in Germany. As a result, the economics of air pollution control systems are considerably different.

Some waste-to-energy plants in Germany and Holland have used up to five independent stages of air cleaning to meet their contractual, recycling and land disposal requirements. This approach to air pollution control is not economically viable in most other countries. Austrian Energy, now part of the Babcock Borsig Power Group, began development of several dry and semi-dry FGD technologies that will meet the economic as well as the regulatory environmental criteria. One advancement has been in the development in air pollution control systems is the application of fluidized bed technology.

DRY AND SEMI-DRY TECHNOLOGIES

We would like to distinguish the difference between "dry" scrubbing and dry additive injection into furnace process. New methods have emerged in the last decade including isolated moistening of absorbent (being a mixture of reaction products and fresh reactant), in such a way that it keeps the properties of dry powder (having not more than 12 mass % of water). This method mitigates sticking of solids to apparatus walls and corrosion is minimized and the broad use of carbon steel in apparatus manufacturing made possible. Process regulation is much easier due to high recirculation ratios, the required costs involved with securing of high availability (obviously higher that energetic block itself) are also much lower than in the other technologies.

Such process is often incorrectly named "dry desulfurization", dry scrubbing or acid gas control i.e. just the same as in the literature is named process in which a sorbent – mostly limestone, undergoes temperature decomposition in the range of 1385 to 1655°F (750 – 900°C), and just formed CaO takes part in fixing of SO_2, SO_3, HCl, and HF. Such dry, high temperature desulfurization process, in its modification with additional moistening of particulate laded flue gases beyond boiler

In semi dry technologies that are mainly the subject of this presentation, binding of acid gases goes mostly in water solution according to the reactions:

$$Ca(OH)_2 + SO_2 \Rightarrow CaSO_3 * \tfrac{1}{2} H_2O + \tfrac{1}{2} H_2O$$

$$Ca(OH)_2 + SO_3 \Rightarrow CaSO_4 * \tfrac{1}{2} H_2O + \tfrac{1}{2} H_2O$$

$$Ca(OH)_2 + SO_2 + H_2O + \tfrac{1}{2} O_2 \Rightarrow CaSO_4 * 2 H_2O$$

$$CaSO_3 * \tfrac{1}{2} H_2O + \tfrac{1}{2} O_2 \Rightarrow CaSO_4 * \tfrac{1}{2} H_2O$$