THE POLIMITER – A NEW CONCEPT INSTRUMENT FOR REAL TIME MONITORING OF FLY ASH, LOSS OF IGNITION, AMMONIA CONCENTRATION AND GRANULOMETRY – A HELP TO REDUCE ENVIRONMENTAL IMPACT AND ASH WASTE DISPOSAL

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Off-the-shelf instruments like the Italian MITER (ENEL-G&B) measure the unburnt carbon content in fly ash as produced in the combustion process of coal-fired electric power facilities. Many facilities are also installing ammonia-based deNO_X technologies, such as Selective Catalytic Reduction (SCR) and Selective Non-Catalytic Reduction to restrict the emissions of nitrogen oxides (NO_X) from fossil fuel combustion and reduce the adverse effects on human health and the environment. Ammonia can be fixed onto the fly ash by absorption or deposition onto ash surfaces in the form of ammonium salts. Relevant percentages of unburnt carbon and/or ammoniated salts in the ash and also large particles can have a negative impact on ash utilization and disposal. According to recent investigations there is also a close relationship between ammonia and unburnt carbon presence in the ash.

With these issues in mind, a new instrument, the POLIMITER is in an advanced stage of development at our company, GAMBA & BOTTEGHI SNC (G&B). Like MITER, the new instrument collects fly ash from the electric power ducts following the deNO_X phase of the process and lets ash flow through a resonant chamber where a microwave device measures the unburnt carbon content. Inside the POLIMITER instrument, an additional constant volume sample of the collected ash is then diluted with demineralised water. The ammonia concentration in the sample is measured by an ion-selective electrode using the direct and/or dynamic standard addition method.

In an extended version of the instrument, with the help of a high resolution camera and dedicated illumination and magnification optics, the ash is also examined during its drop towards the resonant cell in order to determine the particle size distribution in the 1-100 micron range.

Most importantly, the POLIMITER can perform all these measurements in real time and send summary information to power facility operators in their control room. Two to ten sample measurements are carried out per hour to determine unburnt carbon content, ammonia concentration and granulometry quality. A powerful on-board computer with associated display drives the sequence of operations, measurements, and data transfer and storage.

Thus the POLIMITER provides a means to optimize the combustion process as regards LOI (Loss Of Ignition), UBC% (UnBurntCarbon) and SCR/SNCR (degree of utilization), at the same time increasing ash marketability rather than ash waste.

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