

Pulsed Atmospheric Fluidized Bed Combustion

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Abstract

The scale-down of conventional fluidized bed combustion (FBC) technology for application to the commercial, institutional, and light industrial market sectors has been hampered by unfavorable cost, performance, start-up, and load following characteristics in comparison to oil- and gas-fired boilers. ThermoChem and Manufacturing and Technology Conversion International, Inc. (MTCI), have developed an advanced FBC concept known as Pulsed Atmospheric Fluidized Bed Combustion (PAFBC) that addresses this market sector.

The PAFBC integrates a pulse combustor with a bubbling atmospheric fluidized bed combustor. Fine coal is burned in the pulse combustor upstream of the fluidized bed of sorbent, reducing NO_x and sulfur emissions relative to conventional FBC technology. Furthermore, the acoustic effect of the pulse combustor enhances combustion efficiency and heat transfer in the bed; resulting in modestly sized units with high throughput rates and lower costs compared with conventional FBC units.

A commercial-scale boiler (50,000 lb./hr. steam generation) has been installed at Clemson University as part of the Department of Energy funded development program. This facility and the results of its initial operation are described.