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RSCR® SYSTEM TO REDUCE NO_x EMISSIONS FROM BOILERS

Richard F. Abrams

Vice President, Business Development
Babcock Power Inc.
5 Neponset Street
Worcester, Massachusetts 01606
508-853-1140 (Telephone)
508-853-2572 (Fax)
Email: rabrams@babcockpower.com

Robert Faia

Sr. District Sales Manager
Babcock Power Sales Inc.
5 Neponset Street
Worcester, MA 01606
508-248-6996 (Telephone)
508-248-6831 (Fax)
Email: rfaia@babcockpower.com

ABSTRACT

Babcock Power Environmental (BPE), a Babcock Power Inc. company, has developed a new, innovative, high-efficiency NO_x reduction technology designed to greatly reduce the NO_x emissions from waste to energy (WTE) boilers at relatively low cost. This "tail-end" system uses Selective Catalytic Reduction (SCR) to achieve the high reduction performance. Conventional SCR catalyst cannot be used in the traditional "high-dust" location, downstream of the economizer because constituents in the ash would poison the catalyst quickly, rendering it useless. Thus, the Regenerative Selective Catalytic Reduction (RSCR®) system is designed to operate at the end of the plant before the flue gas is discharged to the stack. The process utilizes a reactant (usually aqueous ammonia) to be added to the flue gas stream upstream of the RSCR to reduce NO_x to harmless reaction products, N₂ and H₂O.

The RSCR combines the efficient heat recovery, temperature control, reactant mixing, and catalyst into a single unit and provides the maximum NO_x reduction and heat recovery practical. The paper will describe the overall predicted performance of a typical WTE boiler plant using this new technology. The paper will also provide actual operating data on the RSCR, which has been retrofitted to four biomass-fired units.

INTRODUCTION

There is a need for today's power plants to meet the growing demand for electricity while, at the same time, achieving efficient combustion, low emissions, and no net CO₂ releases into the environment. Waste to energy (WTE) boilers achieve relatively low NO_x emissions with new combustion techniques to below that achieved by conventional selective non-catalytic reduction (SNCR) systems. However, to achieve even lower emissions, a new, proven emissions control device has been developed to significantly reduce NO_x and CO, thus enabling the industry to meet the challenge of higher energy demands and lower emissions.

A new system for the reduction of NO_x emissions to levels hereby unheard of for US WTE boilers has been developed

and commercialized. Emissions are controlled using a system called the "RSCR", which is a regenerative selective catalytic device achieving NO_x reductions of >80%, applied to the relatively cold gas (after the boiler and scrubber/particulate removal equipment) prior to its discharge to the stack. This paper will provide actual operating data on the RSCR, which has been retrofitted to four existing biomass-fired units. The technology is covered by US patent # 7,294,321.

RSCR® TECHNOLOGY FOR EFFICIENT NO_x REDUCTION

The conventional technology for attaining NO_x reductions of >80% from a combustion process is Selective Catalytic Reduction (SCR). Hundreds of coal and gas fired plants worldwide have had "conventional" SCRs installed between the