Reburn Technology Application Guidelines

David Moyeda
david.moyeda@ps.ge.com

Don Hartsock
don.hartsock@ps.ge.com

Roy Payne
roy.payne@ps.ge.com

GE Energy
18 Mason, Irvine, CA 92618
Phone: 949-859-8851; Fax: 949-859-3194

Summary

Reburn technology consists of the staged introduction of fuel and air to a furnace to reduce NO_X emissions. In reburn technology, fuel is injected above the main burners or primary zone to form a fuel-rich reburn zone and overfire air is injected following the reburn fuel to bring the boiler up to its normal operating excess air level. Reburn is a very flexible technology and can be applied to cost effectively reduce NO_X emissions from a broad range of utility and industrial boiler designs. In each application, a number of site specific factors need to be considered in the design and optimization of a reburn system.

The critical factors that influence the performance of reburn in a particular application are zone stoichiometries, residence time, initial NO_X emissions level, and reburn fuel type. The reburn zone stoichiometric ratio is an important parameter and results in the lowest NO_X emissions when operated near a range of 0.9. Reburn zone residence time and initial NO_X level can also impact performance with higher values generally leading to deeper NO_X reductions. Any hydrocarbon fuel can be used as a reburn fuel in the process, including coal, fuel oil, natural gas, and biomass. Fuels with lower fuel nitrogen content generally produce lower NO_X emissions levels.

GE Energy has developed a reliable design methodology for ensuring optimal reburn performance while minimizing impacts on boiler performance. Modeling techniques such as physical flow modeling and computational fluid dynamics are used to ensure proper distribution and mixing of the reburn fuel and overfire air. Good mixing ensures maximum reburn performance with minimum impacts on unburned carbon or CO emissions. Boiler performance simulation tools are also used to ensure that the changes in furnace heat release profiles can be readily accommodated within the boiler design with no impacts on steam generation or temperature.

GE Energy has applied Reburn technology to all major types of utility boilers, including wall fired, tangential fired, and cyclone fired boilers. NO_X emissions reductions between 50 to 70% have typically been achieved with no impacts on boiler operability or steam generating capability.