

NOx Emission Reduction

There are several reasons why boiler operators may face the prospect of lowering NOx emissions from their boilers. These are:

Load Increase: As mills and other facilities attempt to improve the throughput of their processes, increasing the output of the boiler is often needed. However, this output change may result in increased overall emissions which may trigger a Prevention of Significant Deterioration (PSD) review to determine what the public health consequences of any modifications or load increase may be. To avoid a PSD review, the boiler may in the future need to operate with lower emissions rates than current values.

Change in Fuel Firing: Boiler operators are often looking for alternate fuels to fire in their existing boiler furnaces. These fuel switches may be driven by economic factors, or environmental factors such as switching from coal firing to biomass or natural gas firing or introducing natural gas co-firing. These changes in fuel may also result in higher NOx emissions than current operations.

Environmental Drivers: The 2021 update to the Cross-State Air Pollution Rule also implemented stricter limits on NOx in twelve states. An evaluation of emissions and the application of Best Available Control Technology (BACT) practices and equipment may be necessary for emissions to meet the new standards.

Scope of work

- Evaluation of the current boiler operation to:
 - Determine the NOx creation mechanism.
 - Analyze the physical arrangement of the combustion system; size of furnace, location of existing burners and air supply.
 - Establish fuel properties.
 - Determine operating strategy/control, fuel splits, load variability.
 - Identify possible unintended consequences.
- Computational Fluid Dynamics (CFD) modeling to determine effective solutions.
- Evaluation of NOx reduction solutions to meet emission targets, such as:
 - Staged combustion/overfire air
 - Automatic combustion controls
 - Urea/ammonia injection (SNCR)
 - Fuel rich secondary combustion (reburning)
 - Flue gas recirculation (FGR)
 - Reduced excess air
 - Low NOx burners
- Provide equipment and operating recommendations to meet the emission goal and determine capital cost and operating costs.