



BPS Upgrade with E²Stak Yields Energy Savings, Decreased NOx Emissions, and improved Operations

Background

A major food processor installed an 150,000 lb/hr boiler in 1999 to help meet increased seasonal demand. To meet low NOx limits at the time, a high flue gas recirculation (FGR) burner and a large forced draft (FD) fan were installed for 9 ppm NOx operation.

Problem

To meet sub-10 ppm NOx requirements, the ULN burner resulted in high FGR rates that often compromised the operational limits of the boiler equipment. These included limited turndown capabilities, flame pulsations, unstable operation, and the unit could not properly follow the normal plant loads. The burner was also operating with high excess air (4.5% O₂) resulting in poor efficiency. A solution was needed to improve boiler efficiency, provide a better operating boiler and meet the newest air standards of 5 ppm NOx.

Summary

- Utilize "Best Performance Standards" for improved boiler performance.
- E²Stak solution with a CataStak™ SCR system and EconoStak economizer.
- Rapid project ROI from local utility rebate due to energy savings.

Solution

The existing boiler was upgraded with Nationwide's "Best Performance Standards" (BPS) boiler technology. The high FGR burner was replaced with a new low NOx burner that required no FGR and resulted in 10:1 turndown and low excess air operation (3%). New E²Stak efficiency upgrades were also installed including an extended surface EconoStak economizer designed for maximum heat recovery. To meet NOx emissions a CataStak™ selective catalytic reduction system was installed to easily achieve 5 ppm NOx or less.

Results

The BPS solution provided immediate efficiency savings, emission reductions and a quick return on investment. The burner upgrade decreased FD fan

horsepower requirements by almost 200 HP and coupled with the EconoStak economizer, existing stack temperature was reduced by an additional 40°F, resulting in a 1% increase to the current boiler's fuel to steam efficiency. The immediate energy cost savings resulted in a utility rebate check of almost \$150,000 to the end-user, offsetting the costs of the project.

The customer was more than satisfied with the overall performance of the system and commented that, "This was the first year we could operate the boiler in automatic!". The yearly savings in both fuel and electricity further demonstrates how a BPS boiler upgrade assures that the latest efficiency gains and low NOx emission performance can be achieved.

Equipment Used

- A low temperature CataStak™ Selective Catalytic Reduction System
- Stack-mounted EconoStak economizer on an existing 150,000 lb/hr boiler
- Low NOx burner with no FGR

