

Chemical Plant Waste Gas Turned to Profit



RESULTS

- 1,000,000 MMBtu Annual Reduction in Natural Gas Use at Site
- 30% Annual Reduction in CO₂ Emissions
- Operating Power Boiler within emissions, fuel mix, and equipment constraints



APPLICATION

Control of waste gas combustion in boiler to produce low cost steam using Emerson DeltaV™ system and SmartProcess® Boiler optimization solution for optimizing waste gas use.

CUSTOMER

Major chemical plant site in the Southeast U.S. producing primarily agricultural chemicals.

CHALLENGE

A chemical plant had processes producing waste gas that was being flared to the atmosphere in order to safely dispose of it. This waste gas stream was recognized as a source of low cost Btu that could be captured and used as fuel in order to cost effectively produce a portion of the steam that was needed by the site.

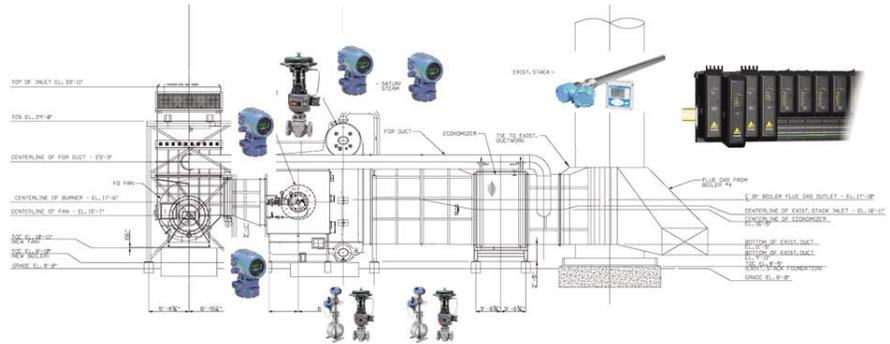
The plant embarked on a project that installed a new Power Boiler with dual fuel combustion capability that required a highly functional control system and a complement of measurement and end devices to operate safely and properly. To complete the solution, there was a need for a specialized control strategy that would optimize the dual fuel combustion in order to be stable, within constraints, highly responsive to steam demand swings, and as economical as possible.



For more information:
www.Emerson.com/QBR
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An Emerson instrumentation and control solution was installed and implemented for the Dual Fuel Boiler to provide safe and reliable control and to optimize the unit. Emerson's DeltaV™ digital automation system, Rosemount measurement devices, and Fisher valves and actuators were installed. For combustion control and optimization of waste gas firing, the Emerson SmartProcess® Boiler package was implemented.



The SmartProcess Boiler optimization solution was chosen to meet the following project goals:

- Provide safe and efficient coordination of fuel and air whether Natural Gas single fuel firing or Natural Gas/Waste Gas dual fuel firing
- Minimize high cost Natural Gas fuel by driving it to minimum fire whenever possible
- Economically optimize the use of low cost Waste Gas fuel within constraints
- Maintain steam header pressure with minimal variability
- Meet minimum Natural Gas percentage setpoint in total fuel
- Achieve Excess Air target

Combustion control on a boiler with waste gas as a fuel component presents some unique challenges. The control strategy must be able to accommodate the normal variations in waste gas supply volume and must be configured to handle additional constraints associated with the variable fuel mix. SmartProcess Boiler delivered the specialized functionality required for this application, including:

- Fuel optimization and constraints
 - Respond to sudden demand changes with both fuels if needed
 - Satisfy overall heat rate demand with low cost fuel first
 - Drive NG toward minimum, but not below % limit
 - Prevent over fire of burner when firing dual fuels
- Mode switch to match operating need, pressure control or base load
- All loop manual/auto changes are bumpless and balanceless
- Cross limits based on heat rate (single or dual fuel)
- Load dependent excess air correction

The waste gas utilization project has been very successful for this chemical site. The site achieved its goals of effectively utilizing their waste gas as a valuable fuel source. By the numbers, the project achieved:

- 1,000,000 MMBtu Annual Reduction in Natural Gas Use
- 30% Annual Reduction in CO2 Emissions
- Operation of the Power Boiler within emissions, fuel mix, and equipment constraints.

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