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Boiler Performance When Switching from Coal to Gas Firing

Converting coal fired boilers to natural gas firing improves boiler efficiency and reduces stack emissions.

Consider the following comparison table:

	<u>Coal</u>	<u>Gas</u>
1. Heat Losses from:		
1.1 Bottom Ash Carbon	-3.00%	0
1.2 Fly Ash Carbon	-2.00%	0
2. Stack Gas Enthalpy at 340F for:		
2.1 10% excess oxygen	-14.25%	
2.2 3% excess oxygen		-10.75%
3. Radiation from Boiler Skin	-1.00%	-1.00%
4. Total Boiler Heat Losses	-20.25%	-11.75%
5. Boiler Efficiency	79.75%	88.25%
6. Fuel Efficiency Gain: $(88.25-79.75)/79.75 = 0.10658$		<u>+10.658%</u>
7. NOx emissions, lb/mmBtu	0.500	0.100
8. SOX emissions, lb/mmBtu	2.000(1%S)	0
9. Particulate, lb/mmBtu	0.5	0
10. Opacity (Smoke), %	20+	0

This analysis shows that the large gains in boiler efficiency (5%) are from the elimination of the carbon losses in the bottom and fly ashes from coal combustion. Reduction in the stack gas enthalpy losses due to the reduction in the excess air of the gas firing is also substantial (3.5%). These reductions are available without any modifications to the boiler other than conversion to natural gas firing with the Calpenn Associates, Inc. Stoker Gas Matrix Burner(SGMB)or Low Pressure Jet Burner (LPJB). Stack Gas temperatures may also be reduced when firing gas since all of the heat transfer surfaces are cleaner.

NOx emissions are reduced by 80% on gas.

SOx emissions are reduced to 0 ppmv on gas.

Opacity as well as Particulate emissions are eliminated.

Contact **Calpenn Associates, Inc.** for more information.