Cofiring Biomass with Coal

When we are talking about global warming and greenhouse gas (GHG) emission carbon monoxide (CO_2) is the gas which has the most attention, perhaps because potentially CO_2 all by itself is estimated to contribute about 60% of the enhanced greenhouse gas effect.

The Monitoring of the total excess air is an emerging concept and important process, but it has largely been ignored or properly analyzed. Most fossil fuel combustion facilities, especially outside the U.S., pay little attention to excess air or Oxygen – the predominant ideology is to push as much air as possible through the system to ensure everything is burned. Excess air in the combustion process is any additional air flow above the stoichiometric air-to-fuel ratio for theoretical complete combustion. Coal-fired boilers should operate with about 10-20% excess combustion air to prevent the formation of CO_2 or other dangerous and unburned hydrocarbons in the flue gas.

To control gas emissions and decrease the CO_2 and Nitrous Oxides (NOx), many sites attempt to control emissions by first installing expensive SCR before upgrading to less expensive methods like installing low NOx burners, stage gas recirculation, or attempting to monitor excess air. This is based on the misconception that the flue gas composition coming out of the boiler should match the gas composition coming out of the stack. However, the correct amount of excess air in fossil fuel combustion facilities can be determined by continuously monitoring and analyzing of the Oxygen (O_2), Carbon Monoxide (CO) and Carbon Dioxide (CO_2) concentrations in the exhaust flue gas. When we are talking of combustion control CO_2 and NOx are in a way related to one another because too much air pushed into the boiler will increase NOx and lower CO_2, while too little air will increase CO_2 readings lowering NOx emissions. Total and accurate monitoring of the excess air throughout the entire combustion cycle is necessary in order to achieve, maintain, and control the delicate balance between CO and O_2 emission, increasing in the process the combustion efficiency of the boiler.

With the proper instrumentations and know how It is finally possible to achieve continuous and accurate monitoring of O_2, CO, CO_2, and other gases across a coal-fired plant facility to obtain a system-wide snapshot of the total Excess air gas changes across the plant – Coal Biomass burning were Carbon measurements can be tricky to extrapolate. Installing multiple excess air monitoring devices throughout all combustion stages will provide a key detection function in keeping a balance for a continuous optimal percentage of Oxygen flowing throughout the process. The output data can be used to control combustion air dampers in order to maintain uniform Oxygen percentages, and indicate potential drafts or leaks that can affect emissions. Just the fuel saving of few months improved efficiency can alone suffice and justify the additional instrumentations' cost.

Dario DiMaggio