

Oxygen enrichment to enhance biomass cofiring in fluidized bed combustors

While being favorably recognized for low NO_x and SO_x emissions, the operability and performance of fluidized bed (FB) boilers can be adversely affected by changes in fuel feedstock, exposing a limitation in the ability to blend renewable feedstocks, such as biomass, with coal into the FB fuel mix. Both bubbling and circulating fluidized beds rely on precise control of air flow rate to ensure proper bed mixing and combustion efficiency, and at the same time, precise temperature control to avoid ash slagging and subsequent flow channeling, increased bed pressure drop, and bed plugging. However, changes in fuel composition and energy content alter both the air-to-fuel ratio required for complete combustion and the bed temperature distribution, thereby threatening process stability.

Generally, the addition of relatively low-energy-content biomass to coal tends to lower bed temperature, which slows combustion kinetics and reduces overall thermal efficiency. Depending on the specific biomass composition, the air flow requirement per Btu fired can also increase, which can either lead to an undesirable air-starved condition if insufficient fan capacity is available, or reach the upper limits in bed gas velocity. Either way, reductions in fuel throughput and boiler output may be required to compensate for the fuel and air upsets.

An effective, practical and affordable approach to stabilizing combustion parameters and restoring baseline fluidized bed operation is through oxygen enrichment. By strategic injection of oxygen using Air Products' proprietary technology and tapping into our combustion expertise and decades-long experience building, owning and operating fluidized bed combustors, combustion air flow requirements can be reduced and deficits in bed temperature eliminated. Plus, the utilization of oxygen can be easily and conveniently adjusted to compensate for variations in biomass properties, providing a very convenient and powerful tool for maintaining boiler stability amid uncertainties in fuel supply quality. For most biomass fuels of commercial interest, oxygen enrichment equivalent to only a couple of percent increase in the equivalent oxygen concentration of combustion air is needed, ensuring safety and minimal disturbance to normal plant operations.

[We invite you to give us a call to learn more.](#)



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