

Carbon Burn-Out - The State-of-the-Art in Commercial Fly Ash Beneficiation

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Progress Materials Inc. is the inventor of the ash beneficiation technology known as Carbon Burn-Out (CBO) with over 16 years of development and operating experience. CBO is a process that combusts the residual carbon in fly ash, producing a very consistent, low carbon, high-quality pozzolan. The process is continuous and is fueled solely by the residual carbon in the ash. Heat is recovered and sent back to the host power plant.

Commercial CBO installations that have operated at very high capacity and availability levels since coming on line include:

- SCE&G Wateree Station CBO placed into service January of 1999 designed to process approximately 185,000 tons of fly ash per year.
- Santee Cooper Winyah Station CBO placed in service September, 2002 designed to process approximately 225,000 tons of fly ash per year
- Dominion Energy Brayton Point Station CBO placed in service August, 2006 designed to process approximately 310,000 tons of fly ash per year.
- Dominion Virginia Power Chesapeake Energy Center CBO placed in service November, 2006 designed to process approximately 180,000 tons of fly ash per year.

In contrast to other beneficiation technologies, all of the ash fed to a CBO facility (minus the carbon fraction that fuels the process) is beneficiated and sold into the pozzolan market; none of it goes to waste or requires disposal. Therefore, when other technologies state they “process” a certain amount of ash, the key to truly compare CBO technology to others, is to compare tons sold into the pozzolan market. Also in comparison to other non-thermal beneficiation technologies, no additional processes are required to remove ammonia from the ash, thus eliminating additional operating and maintenance costs. Ammonia contamination of ash typically results from the installation of SCRs, SNCRs or the use of ammonia for SO₃ control. In addition, a significant advantage of the CBO process over others is in the recovery of heat that measurably improves the efficiency of the host power plant. Also of note is the fact that full scale commercial testing indicates that any mercury in the feed ash is retained on the product ash, which is ultimately bound up in the concrete matrix when the beneficiated ash is utilized.

While increased carbon in fly ash, as a result of low NOx burner installations, was the original driver for the development of CBO, new environmental requirements continue to play to the strengths of the CBO technology. EPA's actions to further reduce NOx, SOx and mercury emissions from coal-fired boilers and the use of additional additives to control SO₃ are accelerating interest in the application of this technology. Data will be presented at the WOCA conference showing that CBO has successfully processed fly ash containing activated carbon (used for mercury capture) and reversed the damaging effects of activated carbon in fly ash on air entrainment additives. No separation technology can make this claim. As an added bonus, since the product ash is used as a partial substitute for Portland cement, CO₂ emissions by Portland cement producers are displaced leading to a significant net reduction in greenhouse gas emissions.

CBO performance has significantly exceeded the expectations of marketers, as well as the licensees, operators and other beneficiaries in terms of both ash beneficiation and heat recovery. The resulting product ash has proven highly attractive to the end users. High carbon ash, including ash resulting from coal/petroleum coke co-firing and activated carbon injection is readily converted to a very consistent high performance pozzolan.

With over fourteen unit years of commercial operation, CBO is a successful, proven, fully commercialized, process. CBO facilities are currently producing approximately one million tons per year of a superior pozzolan, and saving host utilities fuel and both the cost and potential liability of ash disposal. Additional CBO facilities are currently under negotiation and are targeted to be operational in 2008 and 2009.

Based on proven performance, CBO is truly the "State-of-the-Art" in fly ash beneficiation. For additional information contact Lisa Cooper at 1-866-9-FLYASH (1-866-935-9274).