

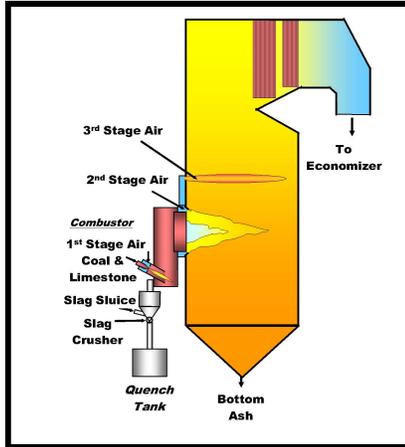


ClearStack Power LLC

Ashworth Combustor™

Low Cost Clean Coal Technology

Reduces NO_x, SO₂, Hg, Other Air Toxics and Particulate Emissions



The Ashworth Combustor™ is a staged-*combustion* low cost multi-pollutant control technology that was demonstrated on a coal-fired boiler at the Lincoln Developmental Center in Lincoln, Illinois. It is a three-stage coal oxidation technique based on using a sub-stoichiometric stage with limestone added to coal being fired to capture sulfur and air metal toxics in the slag and fly ash, followed by a slightly reducing stage at the gasifier outlet then by a final over-fire excess air stage. Additionally, the gasifier is biomass co-firing capable.



Technology

Characteristics:

- Reduces NO_x emissions to 0.070 to 0.095 lb/10⁶ Btu
- Reduces SO₂ emissions by 90% to 95%+ depending on limestone particle size
- Low Carbon in fly ash, < 5 wt% (99 wt% Carbon conversion)
- CO emissions of 7 to 8 ppmvd @ 3% O₂
- Hg capture in slag + fly ash of >90 wt%
- TCLP leachate tests of slag and fly ash yielded 0 mg Hg/liter of leachate
- Near 100% capture of Sb, As, Ba, Be, Cd, Cr, Co, Cu, Hg, Pb, Mo, Ni, Se, Ag, Tl, V, Zn and 80% Mn with slag and fly ash
- Reduces HCl and HF acid gas emissions
- Reduces fly ash by 90% to 95%; less particulate emissions from ESP to atmosphere
- Reduced excess air requirement (1% O₂); less heat loss from stack
- Fly ash and slag leachate tests (TCLP) showed that Ag, As, Ba, Cd, Hg, Pb, and Se were all below the EPA regulatory limit (*Salable slag and fly ash*)
- Fraction of capital and operating cost for SCR + Wet Scrubber + ACI
- Can use low cost high ash - high sulfur coals and waste coals