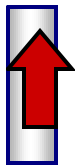


ClearStack



Ashworth Gasifier – Combustor™ Reduces NO_x, SO₂, Hg & Other Air Toxic Emissions

The Ashworth Gasifier-Combustion System™ is a multi-pollutant reduction clean coal technology that was demonstrated at the Lincoln Developmental Center in Lincoln, Illinois by ClearStack Combustion Corporation. Private funding (ClearStack, Allegheny Energy Supply, Dynegy, Detroit Edison, EPRI) and State (Illinois Department of Commerce and Community Affairs - Office of Coal Development and Marketing, Illinois Clean Coal Review Board, and the Illinois Development Finance Authority) was secured to demonstrate the technology for a total project cost of \$3.5 million. The technology is a three-stage coal oxidation technique based on the use of a gasifier stage (limestone added), followed by a slightly reducing gasifier stage followed by a final overfire excess air stage. This technique reduces the major air pollutants, NO_x, SO₂, Hg and other metal air toxic emissions, associated with coal combustion. The technology is patented and capable of biomass co-firing. Testing was completed in March 2003; see test results below. ClearStack is currently working toward the development of a large scale commercial project. The technology can be retrofitted to coal-fired boilers or kilns to reduce pollutant emissions. It is much less expensive to install and operate than a wet scrubber plus selective catalytic reduction.



Ashworth Gasifier - Combustor

Test Results

- NO_x emissions as low as 0.095 lb/10⁶ Btu
- SO₂ reduction of 72% at a Ca/S ratio of 0.85, achieving 85% calcium utilization
- 99 wt% Carbon conversion
- CO emissions of 15 to 30 ppmvd @ 3% O₂
- Hg capture in slag/fly ash of 93 to 100 wt%
Leach tests of slag and fly ash yielded 0 mg Hg/L of leachate
- Near 100% capture of Sb, As, Ba, Be, Cd, Cr, Co, Cu, Hg, Pb, Mo, Ni, Se, Ag, Tl, V, Zn & 80% Mn with slag and fly ash.

Fly ash and slag leachate tests (TCLP) showed that Ag, As, Ba, Cd, Hg, Pb, and Se were all below the EPA regulatory limit.



Quenched Slag

Fly Ash



Baghouse

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