



Installation of the Ecotube[®] system

All Sites in the USA



The first Ecotube System was installed in the USA in 2004, a total of 5 systems have been installed as of 2006. All boilers so far have been spreader-stoker biomass boilers located in the North East. Primary goals with the installations have been NOx reduction and combustion optimisation.

4 of the 5 installations use 4 Ecotubes, one installation uses 2 Ecotubes as the boilers range from 65-150 MW thermal load which corresponds to approximately 20-50 MW electrical power. NOx reductions have typically been 25-40% on these boilers without using a reagent such as urea or ammonia.

3 of the 5 plants also have SNCR systems using urea injection, injection is performed from both the Ecotube System and via wall injection. This enables a further reduction of approx 40-60% of NOx emissions.

INDUSTRY	COMPANY	UNIT TYPE	SIZE *	ECOTUBES	FUEL	Year	NOx-red.**	NOx-red.***	CO-red.
Utility	Boralex Energy	Spreader-stoker	150 MWth	4	Biomass	2004	25%	≈ 40-60%	90
Utility	#	Spreader-stoker	65 MWth	2	Biomass	2005	25%	N/A	10
Utility	#	Spreader-stoker	120 MWth	4	Biomass	2005	30%	≈ 40-60%	0
Utility	#	Spreader-stoker	120 MWth	4	Biomass	2005	25%	≈ 40-60%	0
Utility	#	Spreader-stoker	110 MWth	4	Biomass	2005	30%	N/A	0

* All unit sizes are in MW thermal load

** All NOx reduction levels are WITHOUT SNCR, only air staging and combustion optimization

*** Further reduction when combined with SNCR

The Ecotube system optimises the combustion process in boilers. Ecotubes are retractable lances which penetrate the boiler furnace wall and are equipped with injection nozzles. The Ecotube system supplies a small proportion of the combustion air under high pressure through the high velocity nozzles. Injection of high velocity air streams create radically improved **mixing** of the partially burned combustion products, so enabling efficient completion of combustion and significantly reduced emissions of pollutants like NOx and unburned components – CO, VOC (Volatile Organic Compounds), particles etc. Improved mixing enables the boiler to run at a lower air/fuel ratio, thus resulting in a higher thermal efficiency. Another important feature is the opportunity to increase thermal output of the boiler.

