



Installation of the Ecotube system at Karlskoga WTE-Plant, Sweden



Karlskoga WTE-Plant, Sweden

The Ecotube system was installed in 1998/99 at Karlskoga Waste to Energy Plant, Sweden. The plant was built in 1985 and supplies Karlskoga community with district heat as well as process steam to the nearby industry Nobelverken. The basic battery of fuels comprises various fractions of waste, peat, coal, bio-fuels, LPG-gas and oil. The Ecotube system was installed in the waste incinerator burning 35 000 tons of waste per year. The main purpose of the installation was to reduce NO_x emissions at low CO-levels.

In 2011/12 the Ecotube System was upgraded to a Ecotube SNCR System to further reduce emissions of NO_x. The Ecotubes supply a 24,8 % NH₃ water solution via internal nozzles inside the Ecotubes. The NH₃ is stored in a 30m³ double skinned stainless steel tank.

Plant:	Karlskoga Värmekraftverk, Sweden
Purpose of installation:	NO _x -reduction
Year of installation:	1999 / 2012
Operating time:	7000 hours/year
Heat output of the boiler:	17 MW _{th}
Fuel:	Unsorted municipal waste
Pre Ecotube Emissions	
NO _x	200
CO	< 40
Post Ecotube Air Staging	
NO _x	130
CO	< 40
Post Ecotube Air Staging + Ecotube SNCR	
NO _x	65
CO	< 25
All values correspond in mg / Nm³@ 11% O₂	
Other advantages:	Higher thermal efficiency due to reduced O ₂ (from 6 to 4 vol-%) Increased heat output by 0.8 MW _{th}

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 NO_x 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.

